APPLICATION FOR SITE CERTIFICATION AGREEMENT
NO. 2013-01
VOLUME 2 - APPENDICES

TESORO SAVAGE
Vancouver Energy Distribution Terminal

Tesoro Savage
Vancouver Energy Distribution Terminal

Submitted to
State of Washington
Energy Facility Siting Evaluation Council
Olympia, Washington

29 August 2013

Volume 2 - Appendices

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Archaeological Investigations Northwest, Inc.

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Phone (503) 761-6605 • Fax (503) 761-6620

Vancouver Phone (360) 696-7473
E-mail: ainw@ainw.com
Web: www.ainw.com

August 20, 2013

Richard Bellon, THPO
Confederated Tribes of the Chehalis Indian Reservation
P.O. Box 536
Oakville WA 98568

Re: Tesoro Savage Vancouver Energy Distribution Terminal Project
Vancouver, Washington
Cultural Resource Information Request

Dear Mr. Bellon:

I am writing to provide you with information and a request to initiate coordination regarding the Tesoro Savage Vancouver Energy Distribution Terminal that is proposed to be located at the Port of Vancouver (Port) in Vancouver, Washington (Figures 1 and 2, attached). The proposed facility will receive crude oil by freight rail, temporarily store it on site, and pipe it to marine vessels for shipment via the Columbia River.

The proposed project is subject to the jurisdiction of the Washington State Energy Facility Site Evaluation Council (EFSEC) since the project is expected to ship over 50,000 barrels of crude oil per day over marine waters. In support of the application to EFSEC, AINW is preparing an analysis of potential impacts to cultural resources in accordance with applicable state statutes and regulations. For purposes of the EFSEC application, the proposed study area will be the area where construction impacts may occur at the Port, as illustrated in the attached figures.

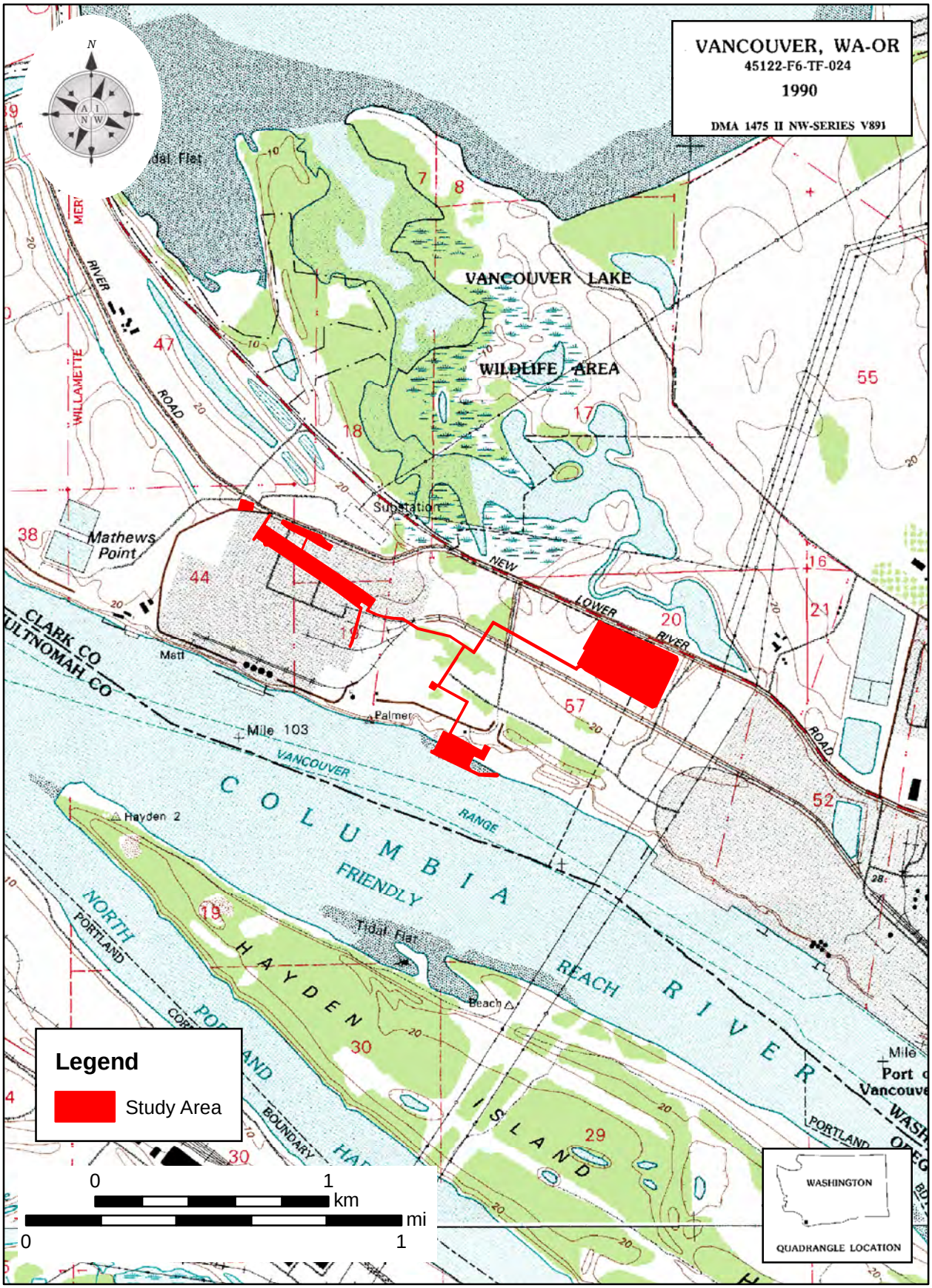
The project may also require approval from the U.S. Army Corps of Engineers (USACE) for potential in-water work on the existing Port Berths 13 and 14 which will be used to support the marine activities related to the project. For purposes of supporting review by the USACE, a separate cultural resources study meeting the requirements of Section 106 of the National Historic Preservation Act of 1966 (as amended) and its implementing regulations, 36 CFR 800, will be prepared. The standards of the Washington State Department of Archaeology and Historic Preservation will be followed, and the cultural resource study will be directed by AINW staff who have met the professional qualifications of the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation. Based on the currently proposed project impacts, my review of previous studies indicate that nearly the entire study area has been previously surveyed for archaeological resources (Figure 3, attached) and none have been identified within the study area; from 1.2 to 6 meters (4 to 20 feet) of dredge fill deposits cover most of the APE and the small portions not previously surveyed are paved and are on the filled area.

The applicant is very interested to learn whether you have information regarding properties, features, or materials within the study area that may be of concern to the Chehalis Tribes so that these concerns can be addressed in the cultural resources review included in the application to EFSEC. If you have information regarding cultural resources, please feel free to contact me at 503-761-6605. For information about the project's proposed facilities, you may contact me or contact the environmental planner for the project, Irina Makarow of BergerABAM, at 206-431-2373. Feel free to reply by letter, email, or telephone. You may email me at jo@ainw.com, or if you prefer, you may email Ms. Makarow at Irina.Makarow@abam.com. Thank you very much for your time and consideration.

Sincerely,

Jo Reese, M.A., R.P.A.
VP/Senior Archaeologist

Encl.



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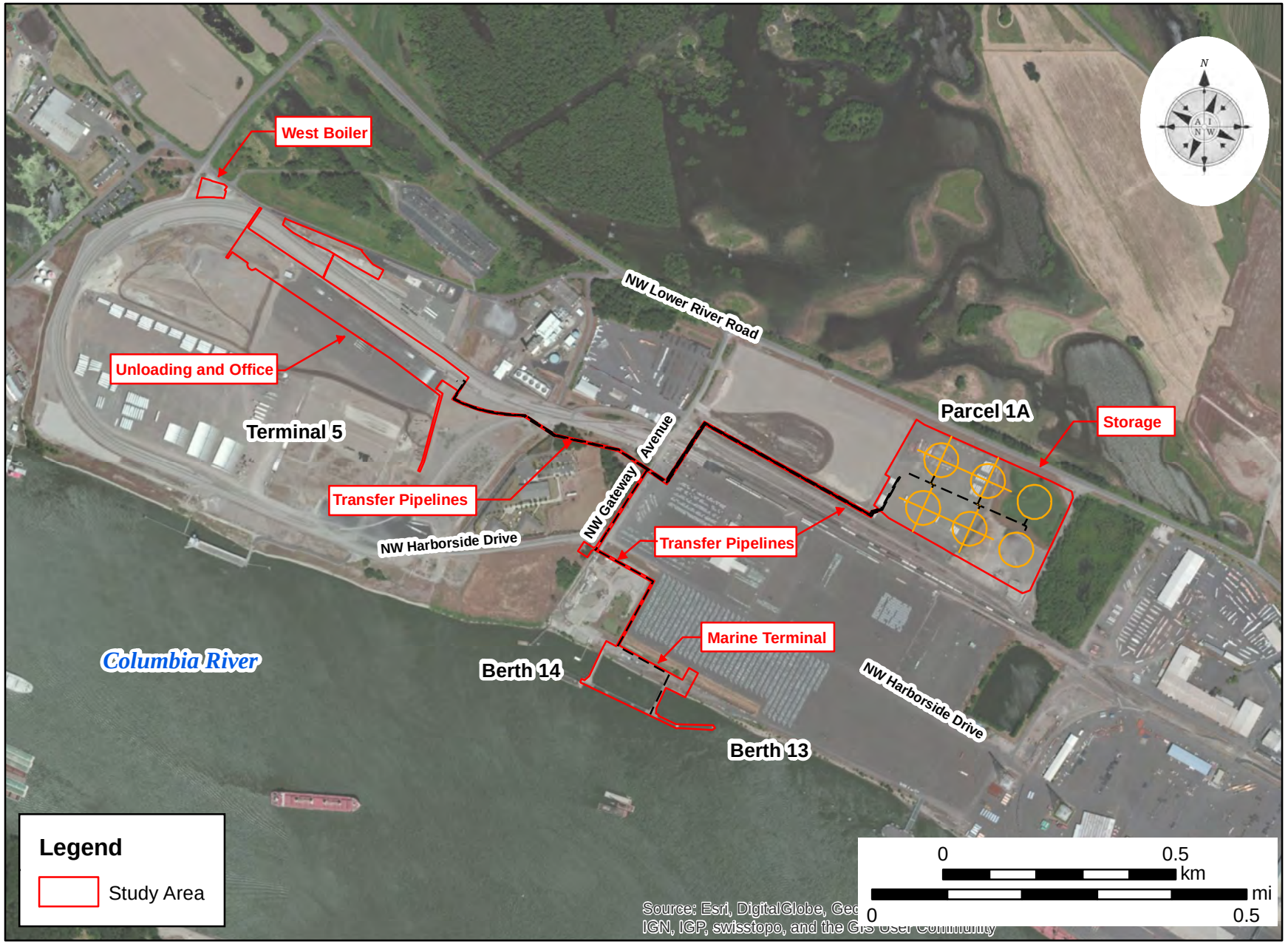

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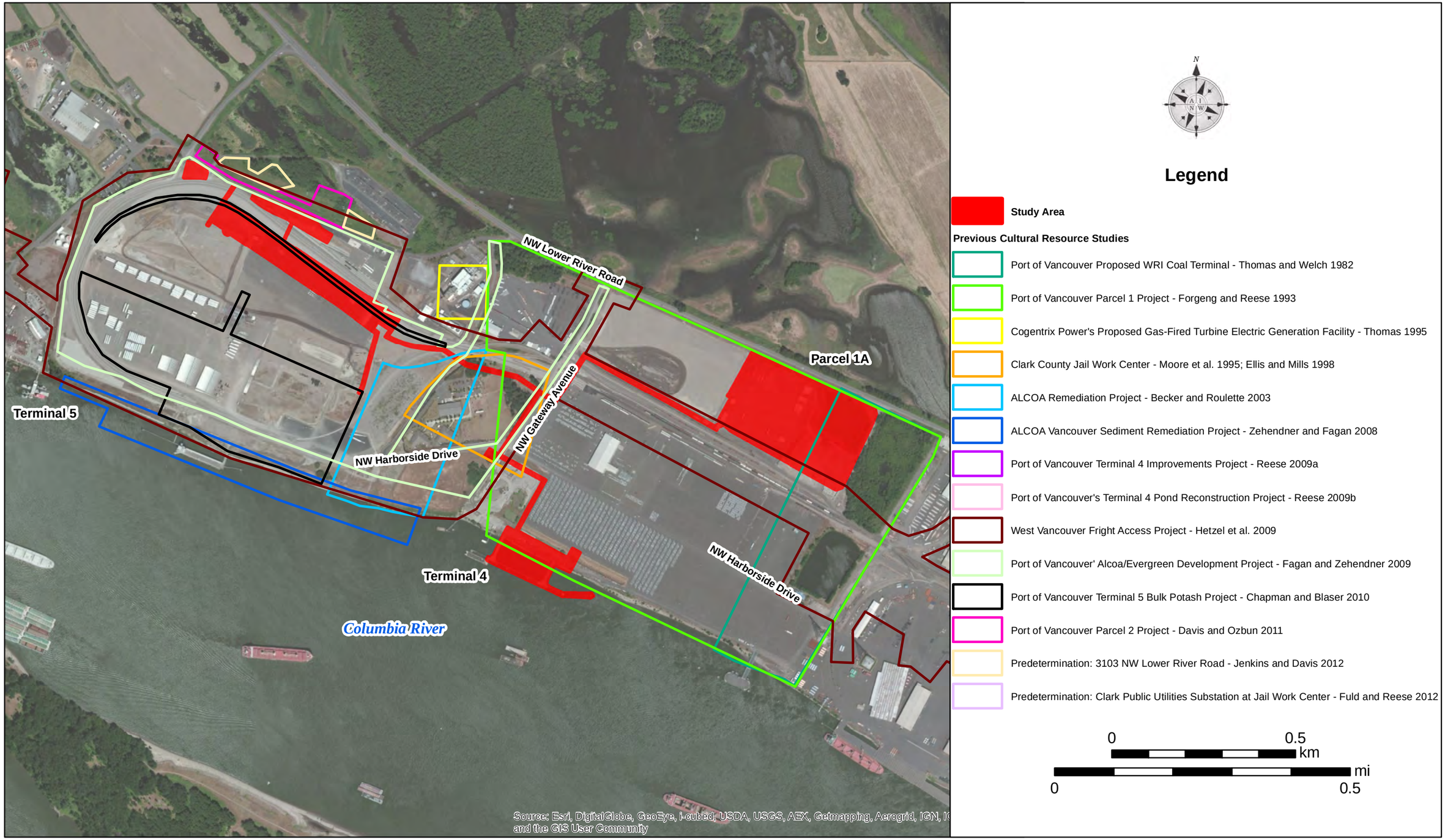

Figure 3. Previous cultural resource studies within and surrounding the study area.

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Web: www.ainw.com

August 20, 2013

Ray Gardner, Chairman
Chinook Tribe
P.O. Box 368
Bay Center WA 98527

Re: Tesoro Savage Vancouver Energy Distribution Terminal Project
Vancouver, Washington
Cultural Resource Information Request

To The Honorable Ray Gardner:

I am writing to provide you with information and a request to initiate coordination regarding the Tesoro Savage Vancouver Energy Distribution Terminal that is proposed to be located at the Port of Vancouver (Port) in Vancouver, Washington (Figures 1 and 2, attached). The proposed facility will receive crude oil by freight rail, temporarily store it on site, and pipe it to marine vessels for shipment via the Columbia River.

The proposed project is subject to the jurisdiction of the Washington State Energy Facility Site Evaluation Council (EFSEC) since the project is expected to ship over 50,000 barrels of crude oil per day over marine waters. In support of the application to EFSEC, AINW is preparing an analysis of potential impacts to cultural resources in accordance with applicable state statutes and regulations. For purposes of the EFSEC application, the proposed study area will be the area where construction impacts may occur at the Port, as illustrated in the attached figures.

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The applicant is very interested to learn whether you have information regarding properties, features, or materials within the study area that may be of concern to the Chinook Tribe so that these concerns can be addressed in the cultural resources review included in the application to EFSEC. If you have information regarding cultural resources, please feel free to contact me at 503-761-6605. For information about the project's proposed facilities, you may contact me or contact the environmental planner for the project, Irina Makarow of BergerABAM, at 206-431-2373. Feel free to reply by letter, email, or telephone. You may email me at jo@ainw.com, or if you prefer, you may email Ms. Makarow at Irina.Makarow@abam.com. Thank you very much for your time and consideration.

Sincerely,

Jo Reese, M.A., R.P.A.
VP/Senior Archaeologist

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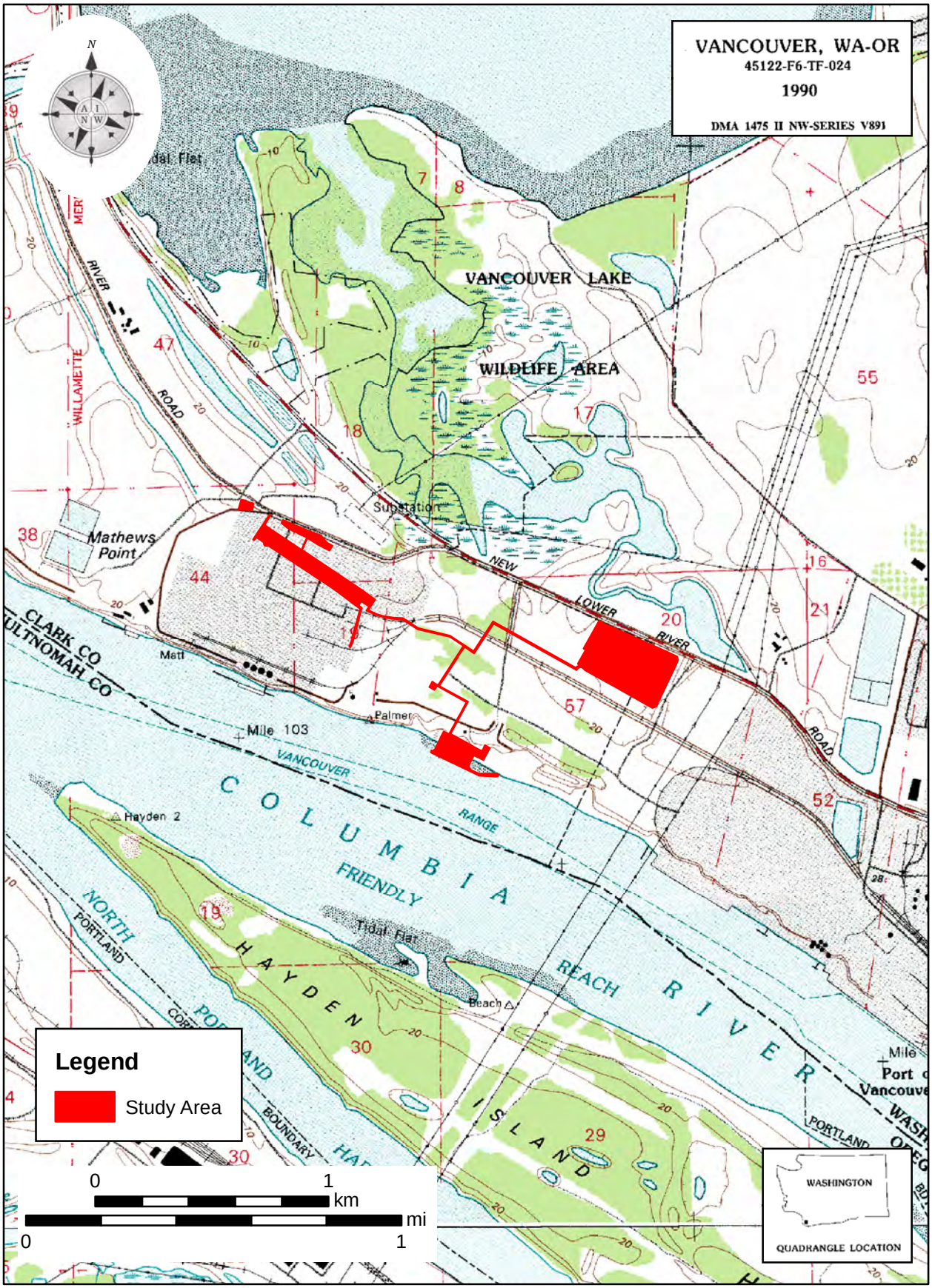

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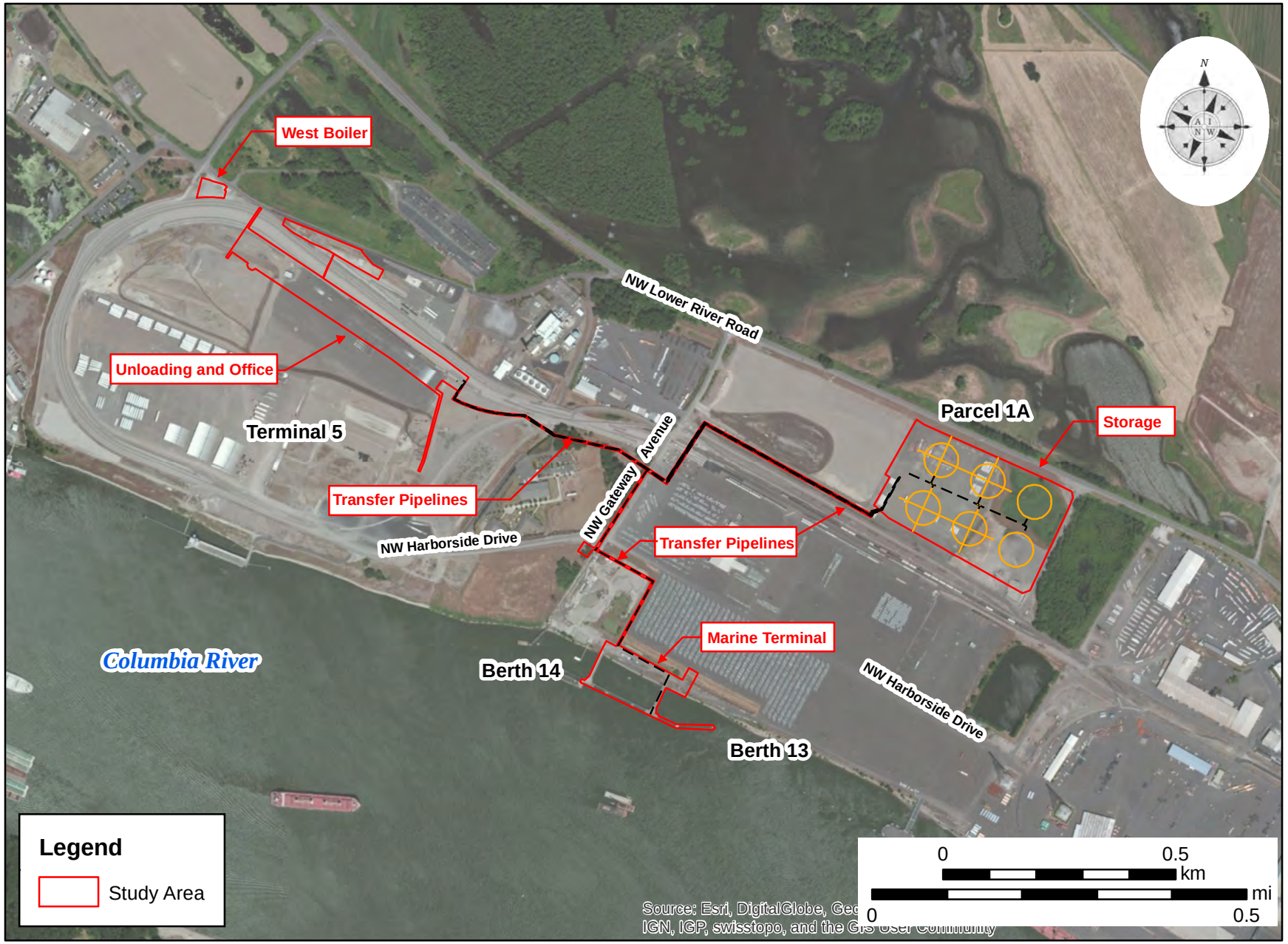

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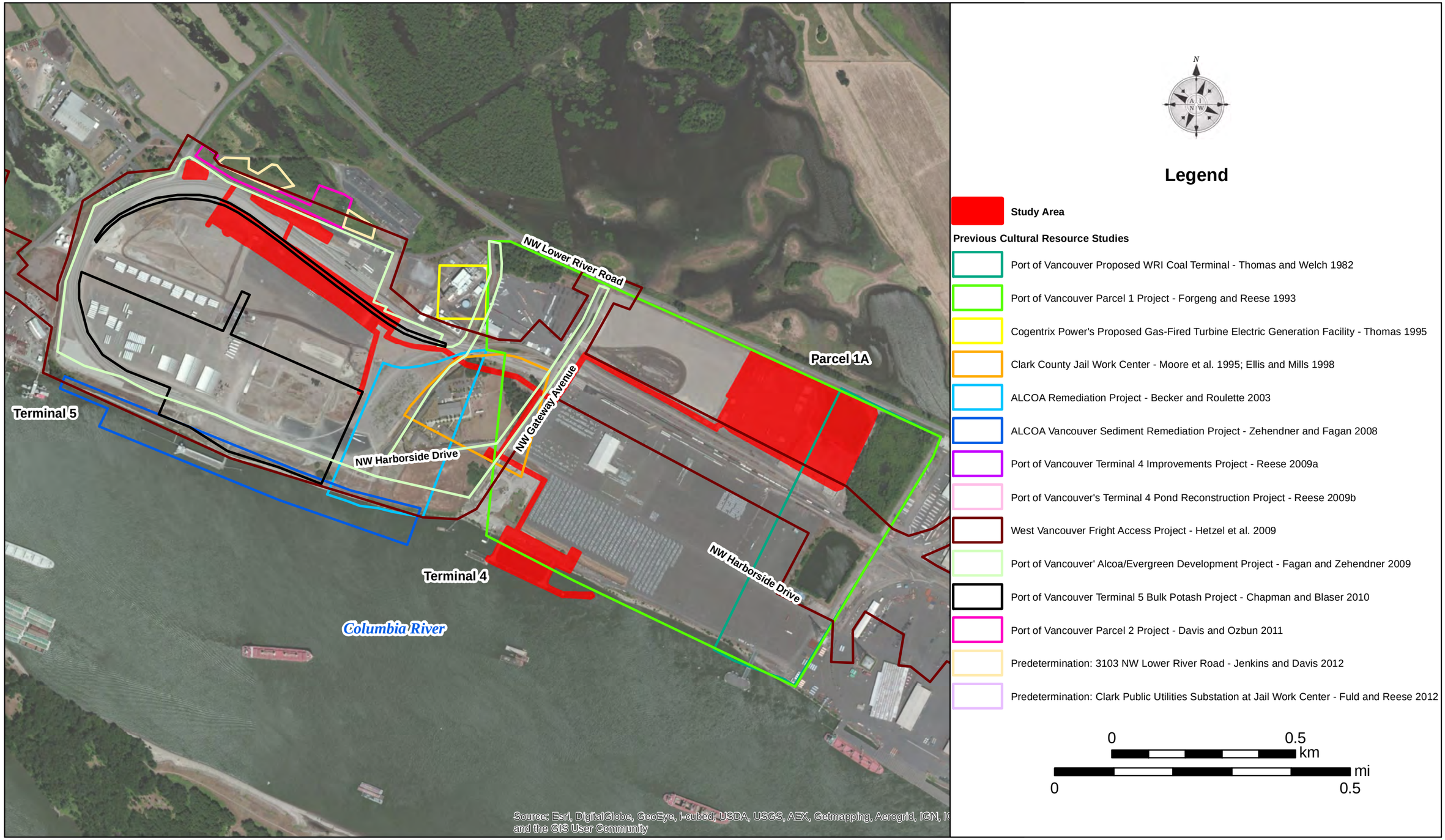

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August 20, 2013

Tony Johnson, Cultural Chair
Chinook Tribe
P.O. Box 368
Bay Center WA 98527

Re: Tesoro Savage Vancouver Energy Distribution Terminal Project
Vancouver, Washington
Cultural Resource Information Request

Dear Mr. Johnson:

I am writing to provide you with information and a request to initiate coordination regarding the Tesoro Savage Vancouver Energy Distribution Terminal that is proposed to be located at the Port of Vancouver (Port) in Vancouver, Washington (Figures 1 and 2, attached). The proposed facility will receive crude oil by freight rail, temporarily store it on site, and pipe it to marine vessels for shipment via the Columbia River.

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Sincerely,

Jo Reese, M.A., R.P.A.
VP/Senior Archaeologist

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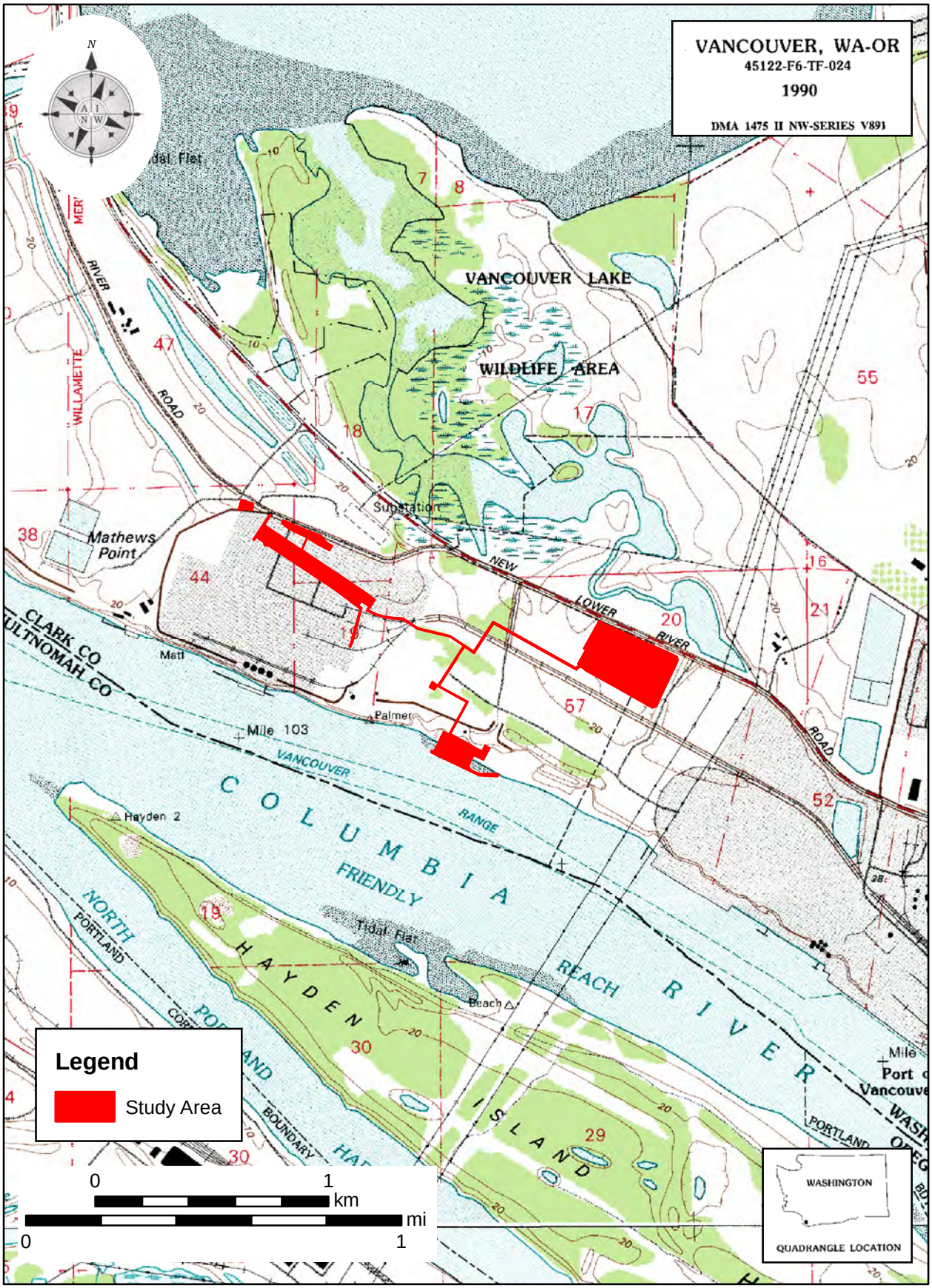

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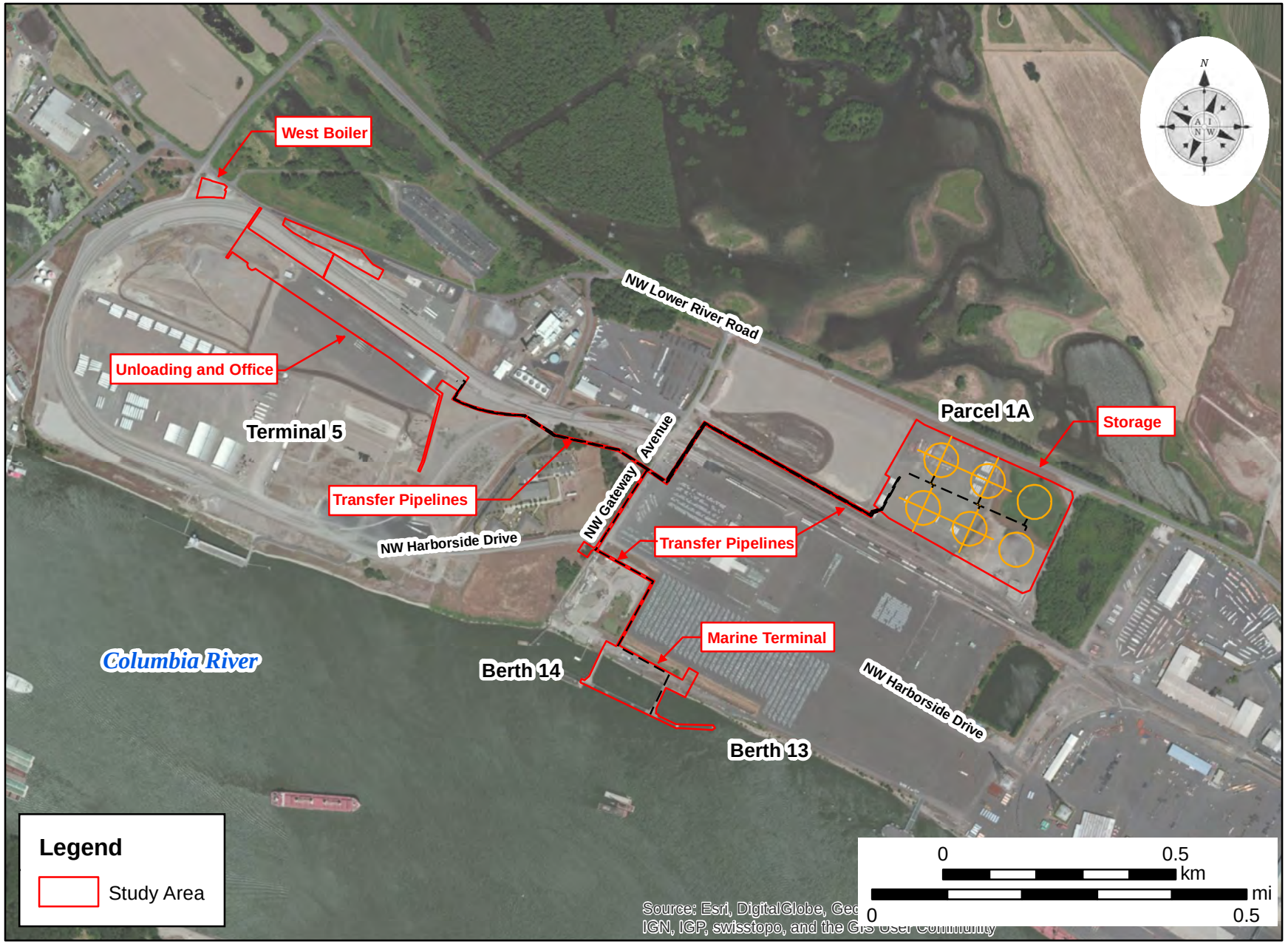

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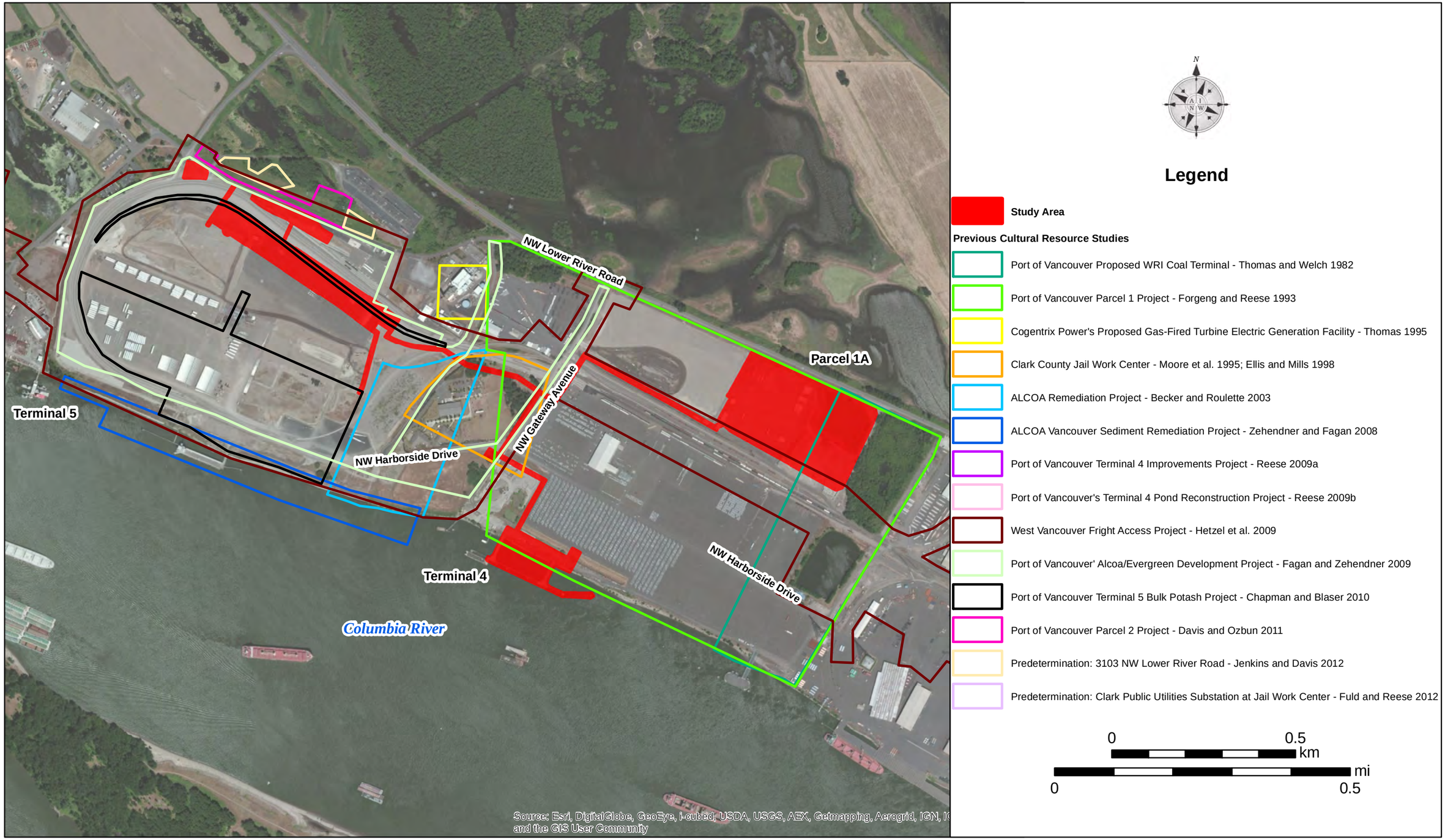

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August 20, 2013

Eirik Thorsgard, MAIS, THPO
Confederated Tribes of the Grand Ronde Community of Oregon
P.O. Box 38
Grand Ronde OR 97347

Re: Tesoro Savage Vancouver Energy Distribution Terminal Project
Vancouver, Washington
Cultural Resource Information Request

Dear Mr. Thorsgard:

I am writing to provide you with information and a request to initiate coordination regarding the Tesoro Savage Vancouver Energy Distribution Terminal that is proposed to be located at the Port of Vancouver (Port) in Vancouver, Washington (Figures 1 and 2, attached). The proposed facility will receive crude oil by freight rail, temporarily store it on site, and pipe it to marine vessels for shipment via the Columbia River.

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The applicant is very interested to learn whether you have information regarding properties, features, or materials within the study area that may be of concern to the Grand Ronde Tribes so that these concerns can be addressed in the cultural resources review included in the application to EFSEC. If you have information regarding cultural resources, please feel free to contact me at 503-761-6605. For information about the project's proposed facilities, you may contact me or contact the environmental planner for the project, Irina Makarow of BergerABAM, at 206-431-2373. Feel free to reply by letter, email, or telephone. You may email me at jo@ainw.com, or if you prefer, you may email Ms. Makarow at Irina.Makarow@abam.com. Thank you very much for your time and consideration.

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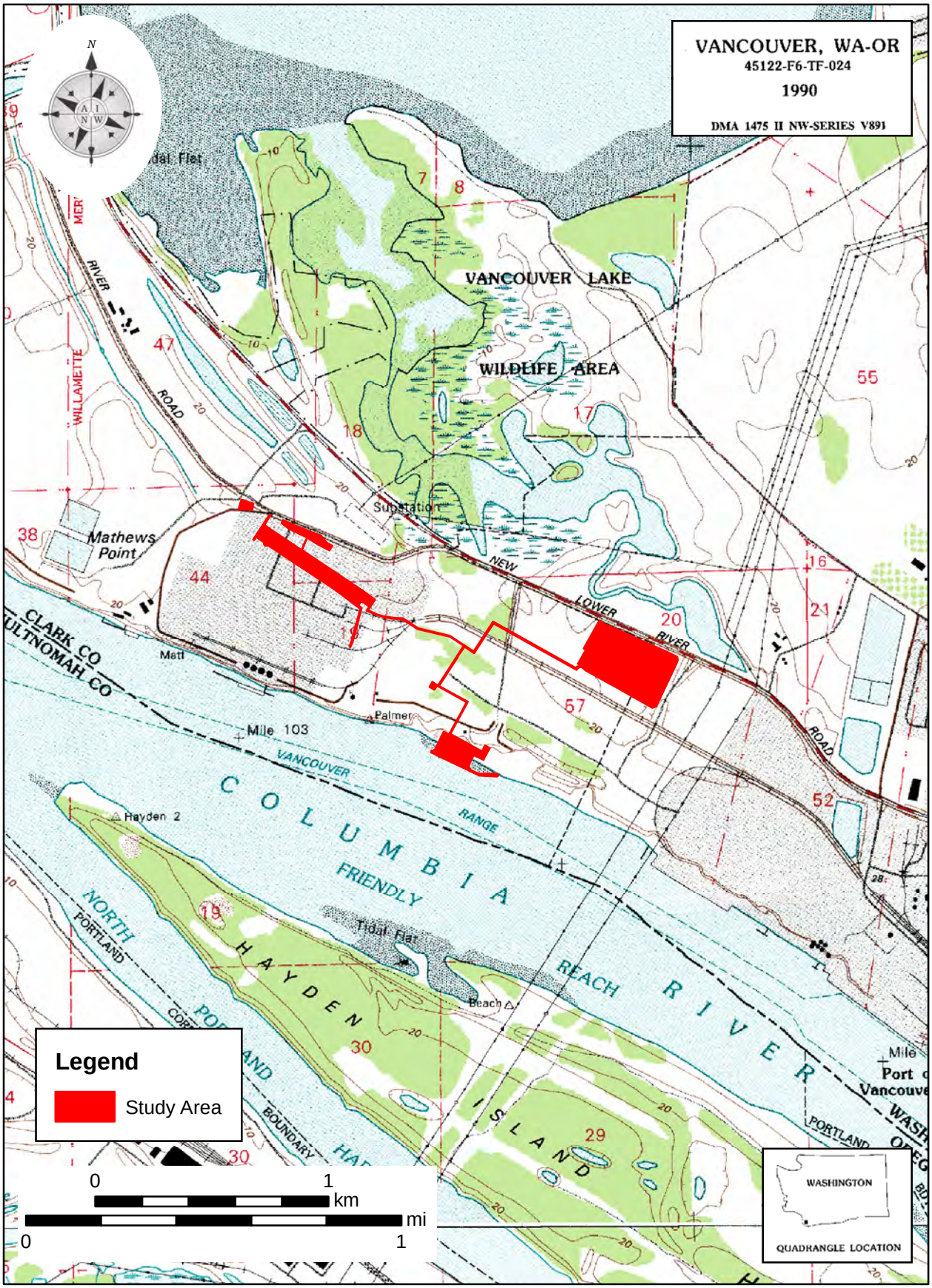

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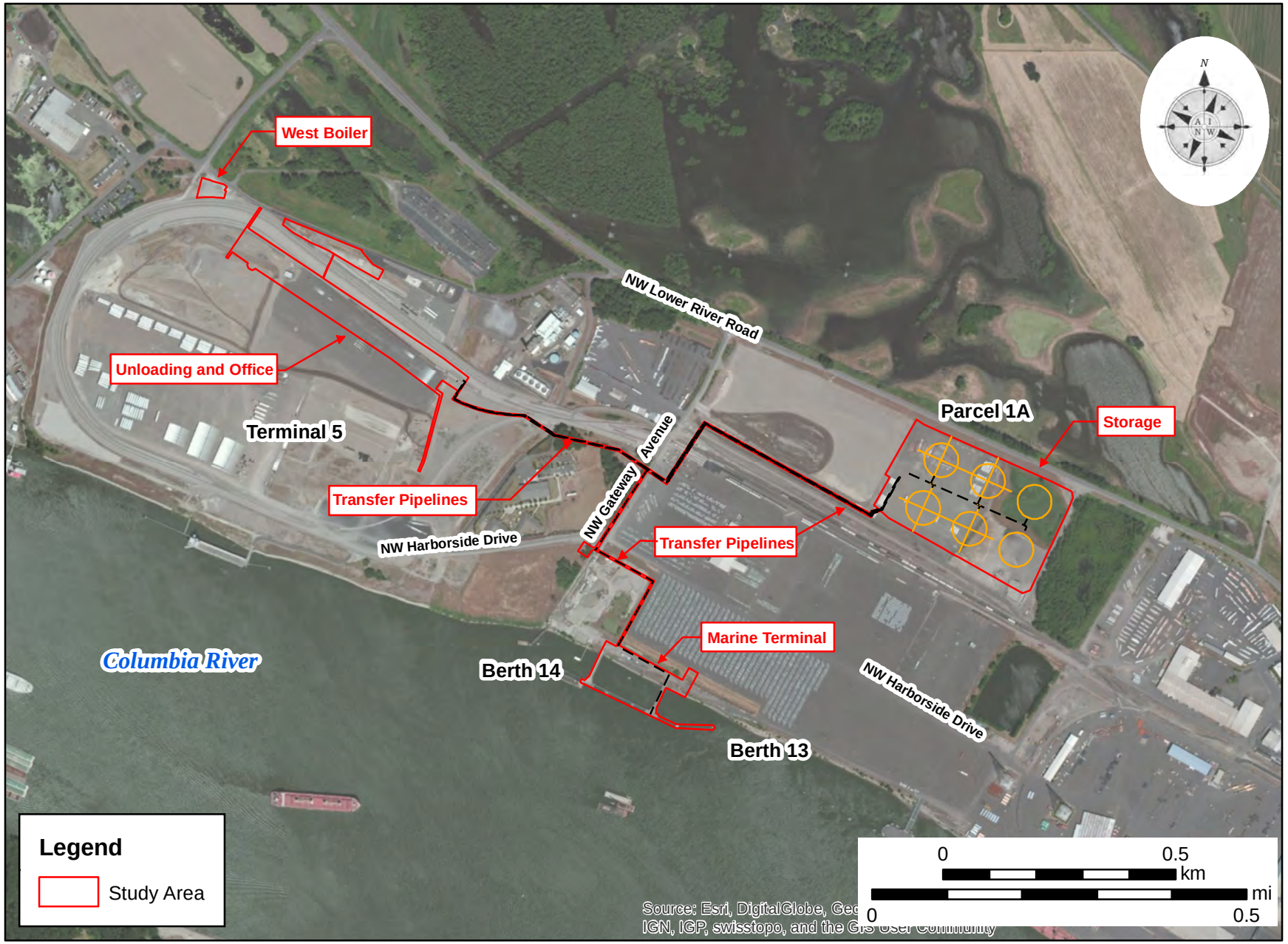

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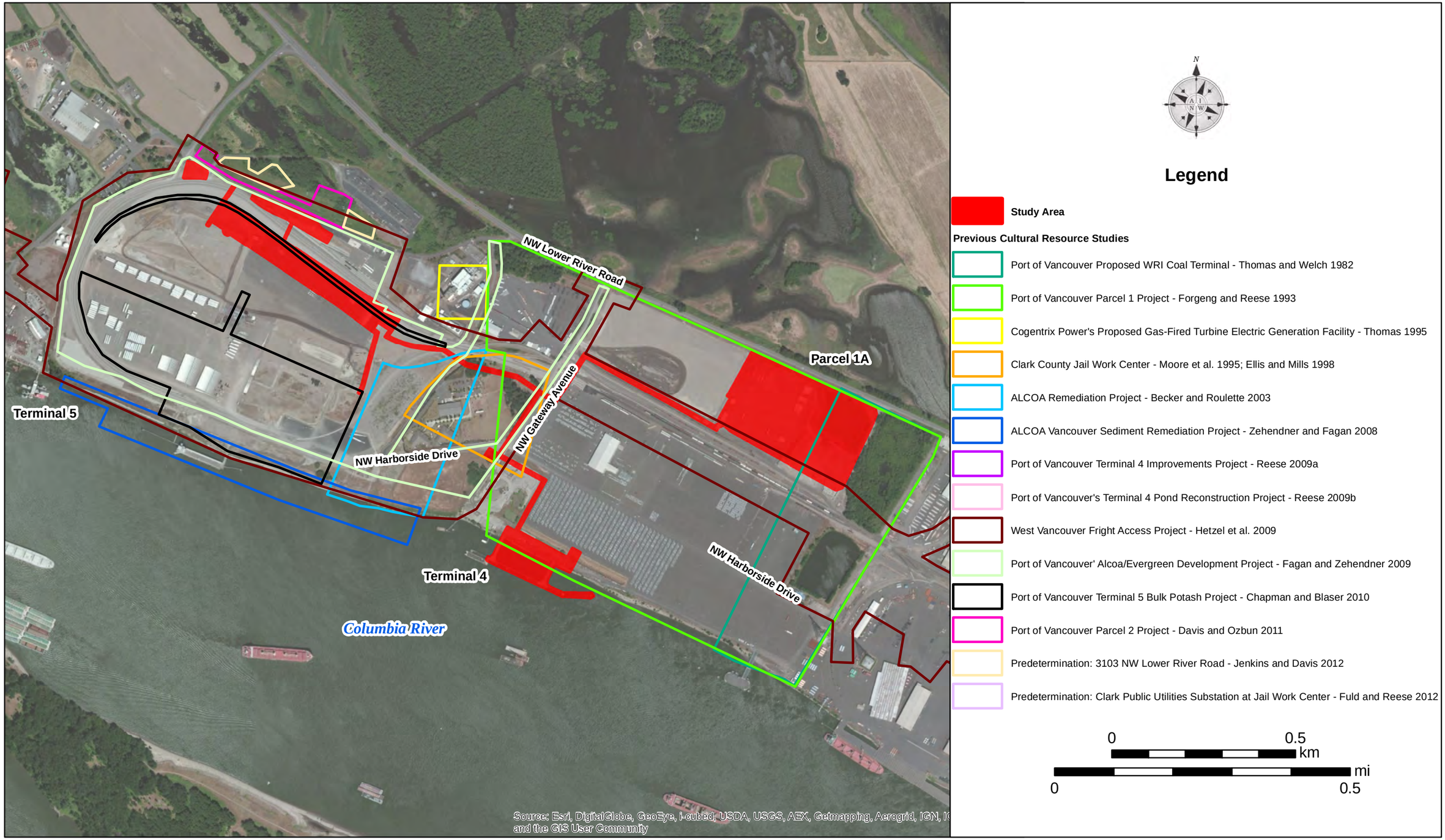

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August 20, 2013

Johnson Meninick, Cultural Resource Program
Yakama Indian Nation
P.O. Box 151
Toppenish WA 98948

Re: Tesoro Savage Vancouver Energy Distribution Terminal Project
Vancouver, Washington
Cultural Resource Information Request

Dear Mr. Meninick:

I am writing to provide you with information and a request to initiate coordination regarding the Tesoro Savage Vancouver Energy Distribution Terminal that is proposed to be located at the Port of Vancouver (Port) in Vancouver, Washington (Figures 1 and 2, attached). The proposed facility will receive crude oil by freight rail, temporarily store it on site, and pipe it to marine vessels for shipment via the Columbia River.

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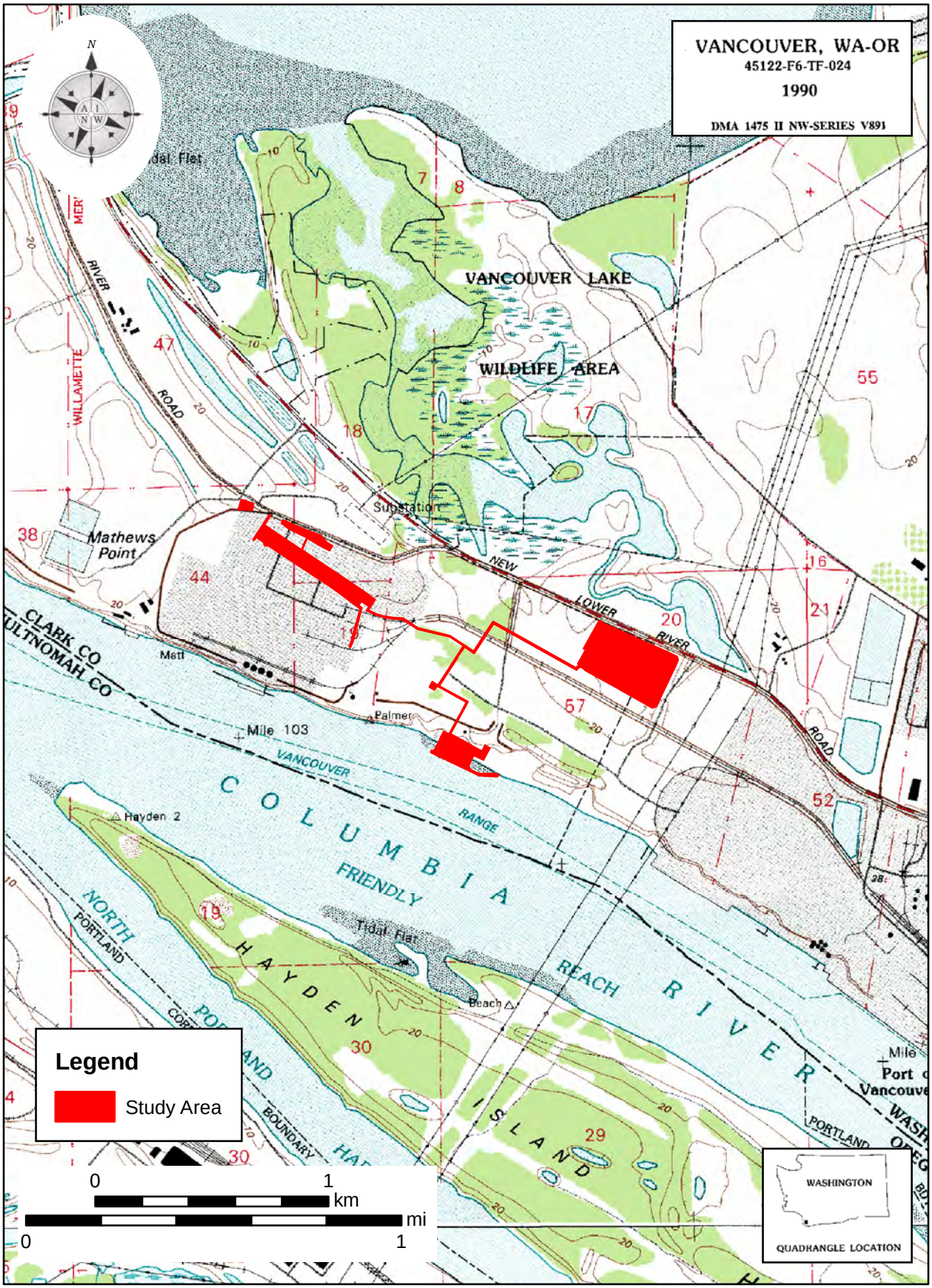

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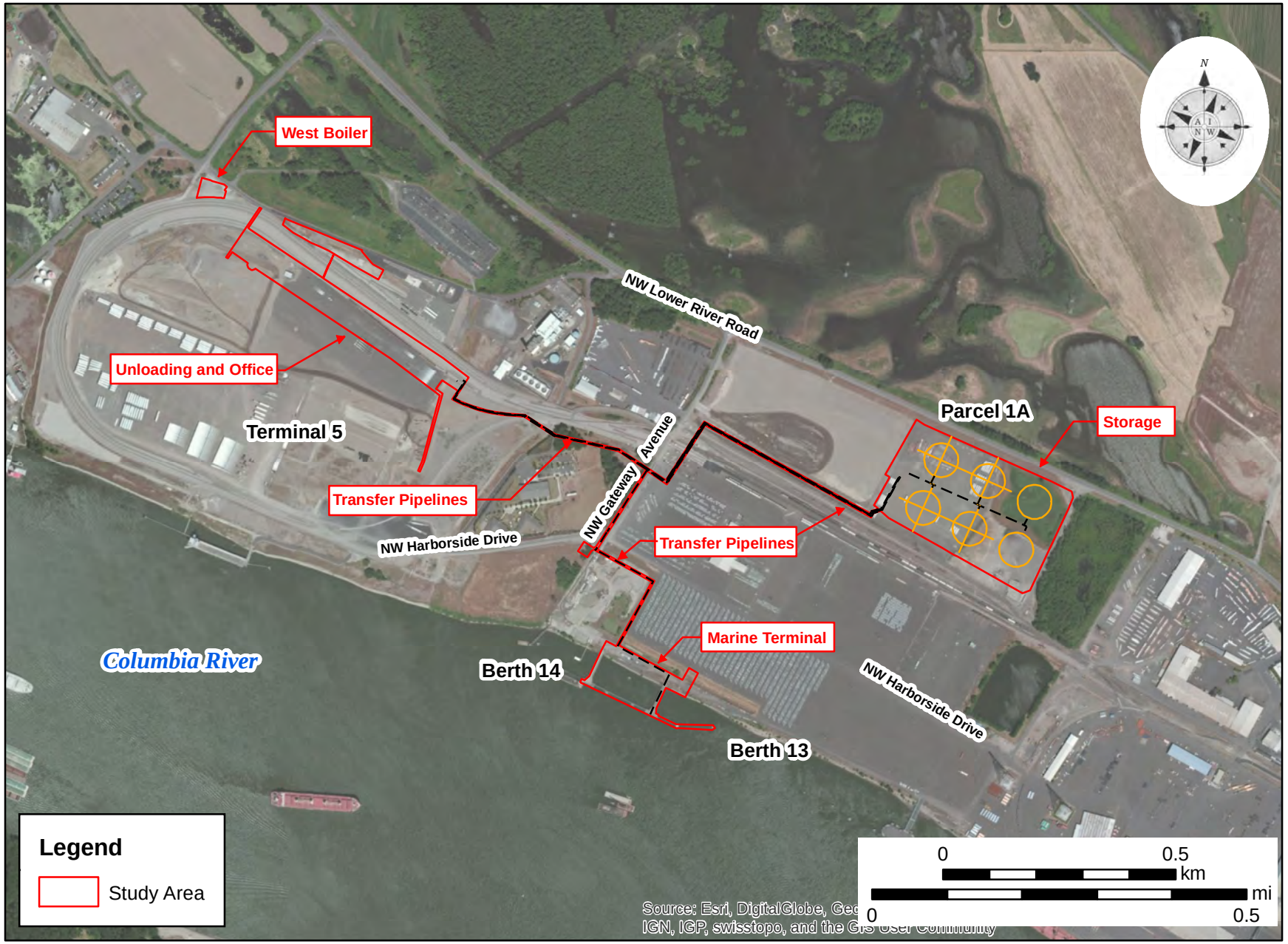

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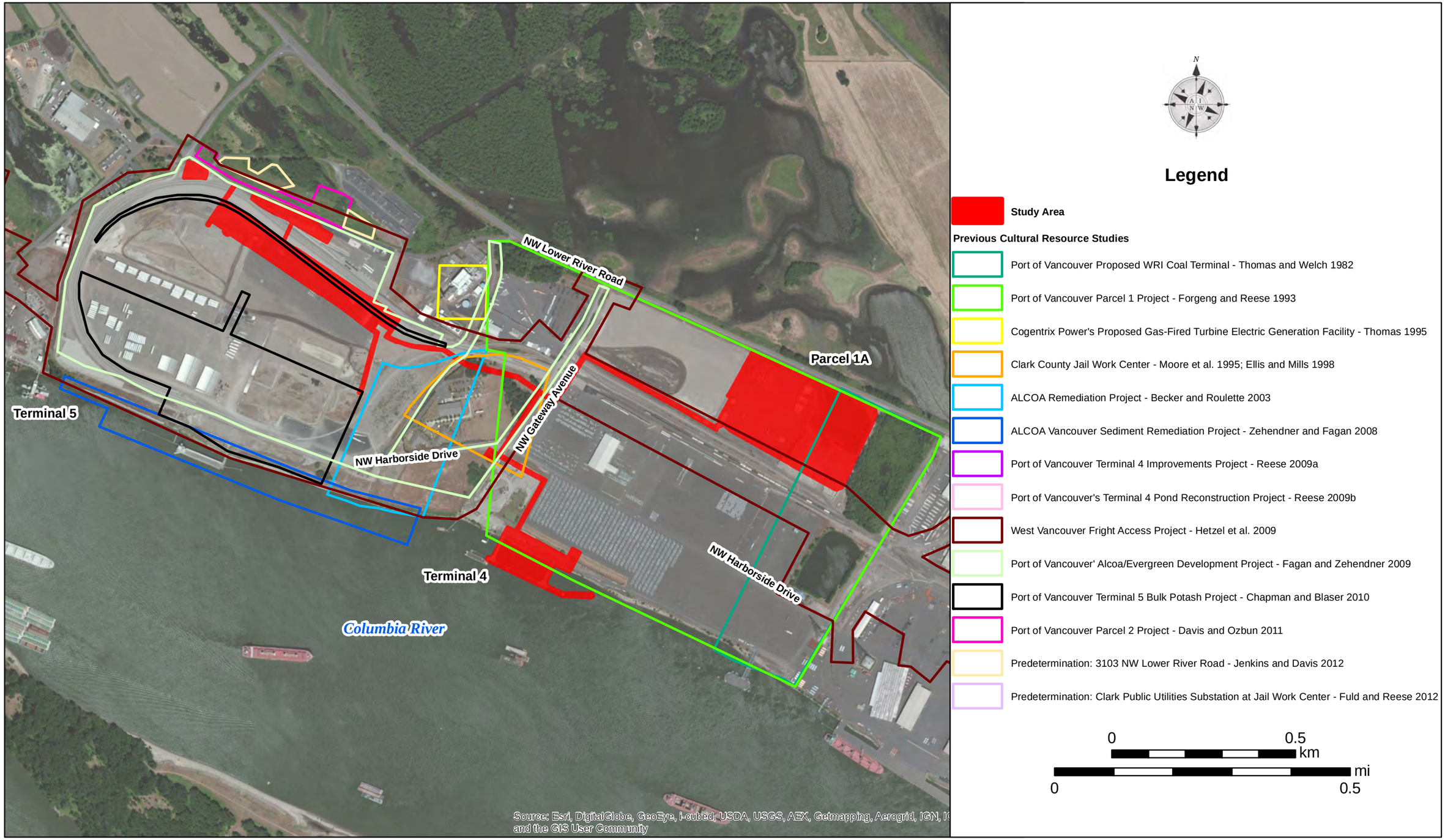

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August 20, 2013

Kate Valdez, THPO
Yakama Indian Nation
P.O. Box 151
Toppenish WA 98948

Re: Tesoro Savage Vancouver Energy Distribution Terminal Project
Vancouver, Washington
Cultural Resource Information Request

Dear Ms. Valdez:

I am writing to provide you with information and a request to initiate coordination regarding the Tesoro Savage Vancouver Energy Distribution Terminal that is proposed to be located at the Port of Vancouver (Port) in Vancouver, Washington (Figures 1 and 2, attached). The proposed facility will receive crude oil by freight rail, temporarily store it on site, and pipe it to marine vessels for shipment via the Columbia River.

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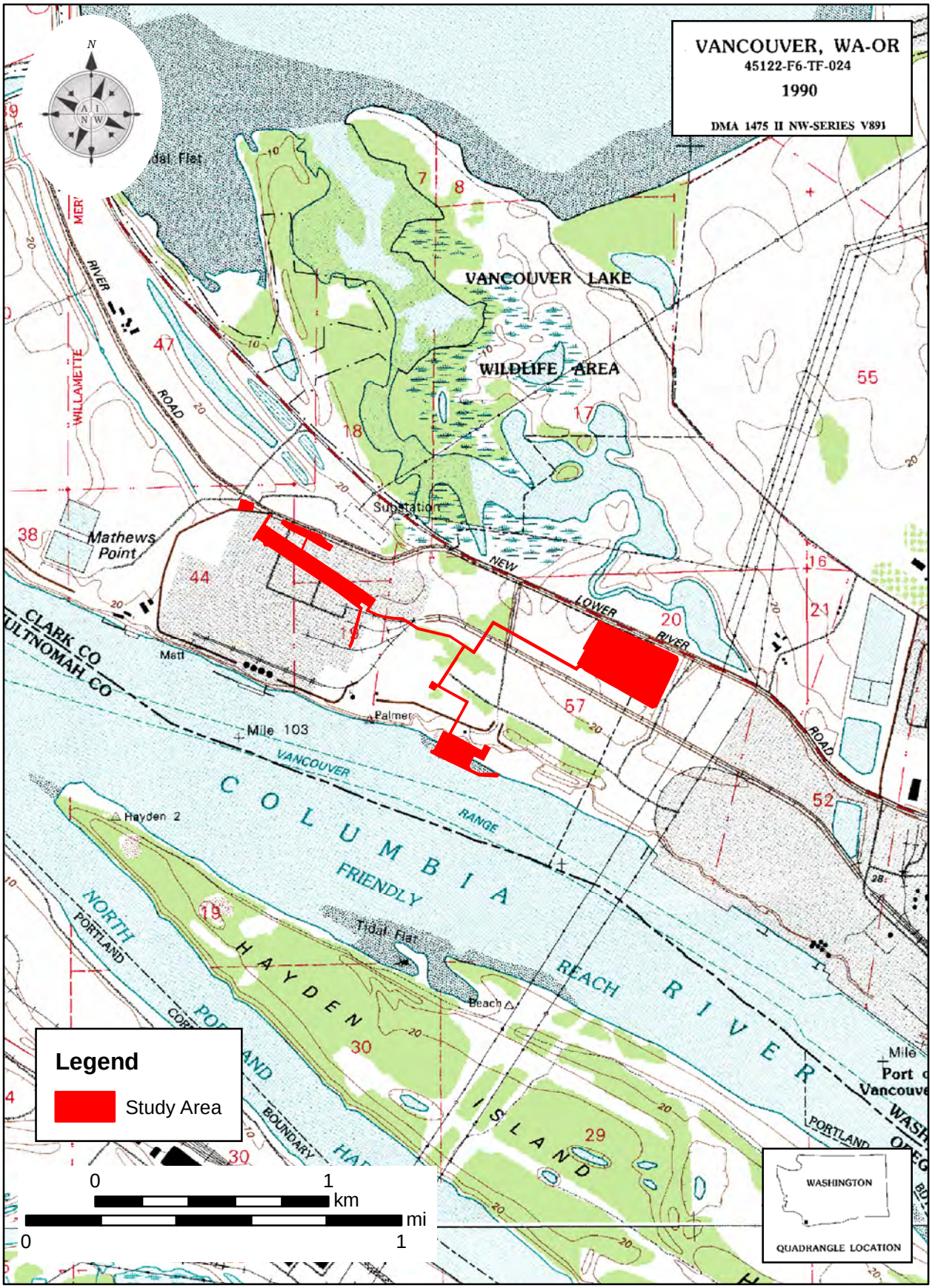

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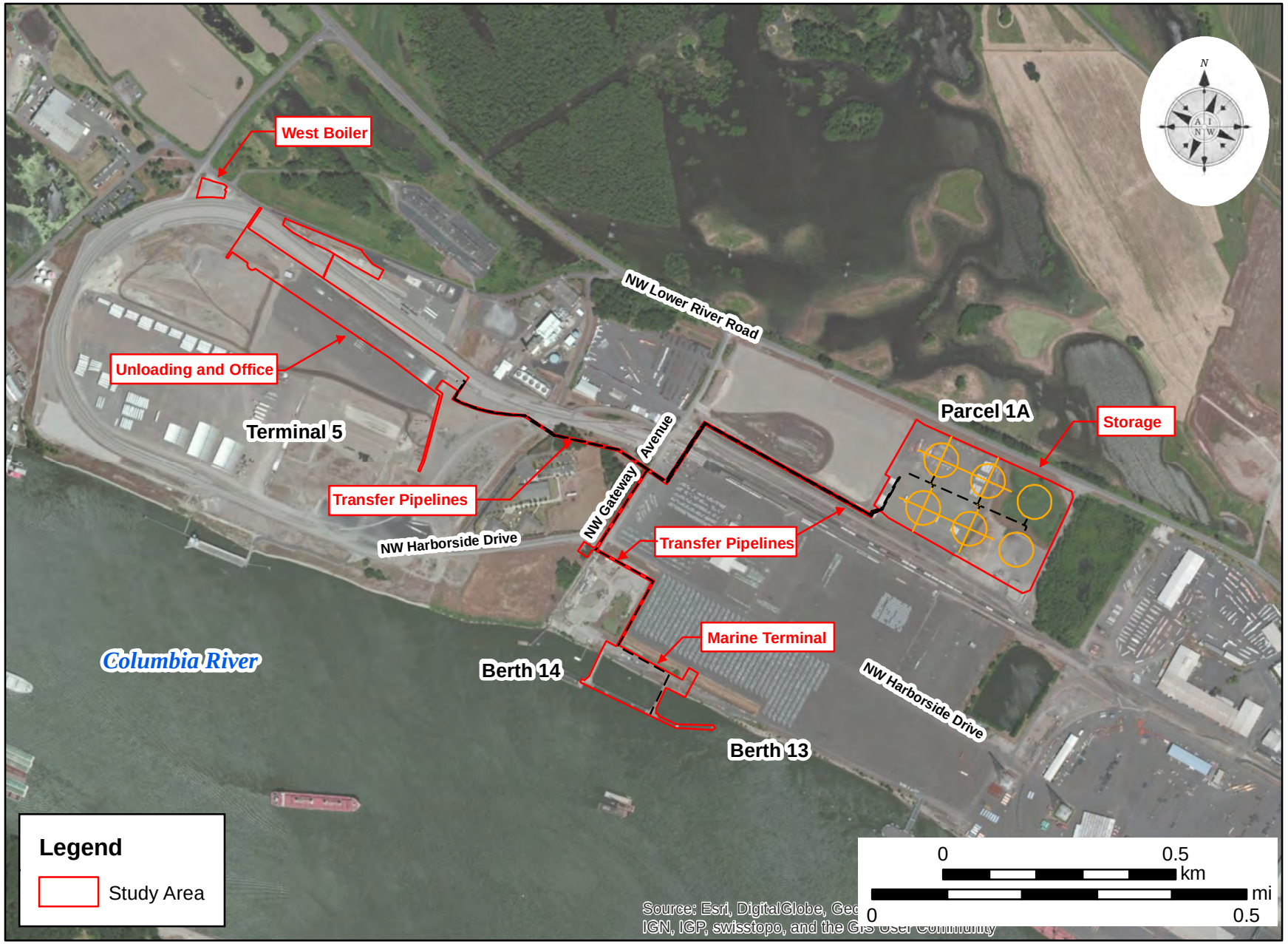

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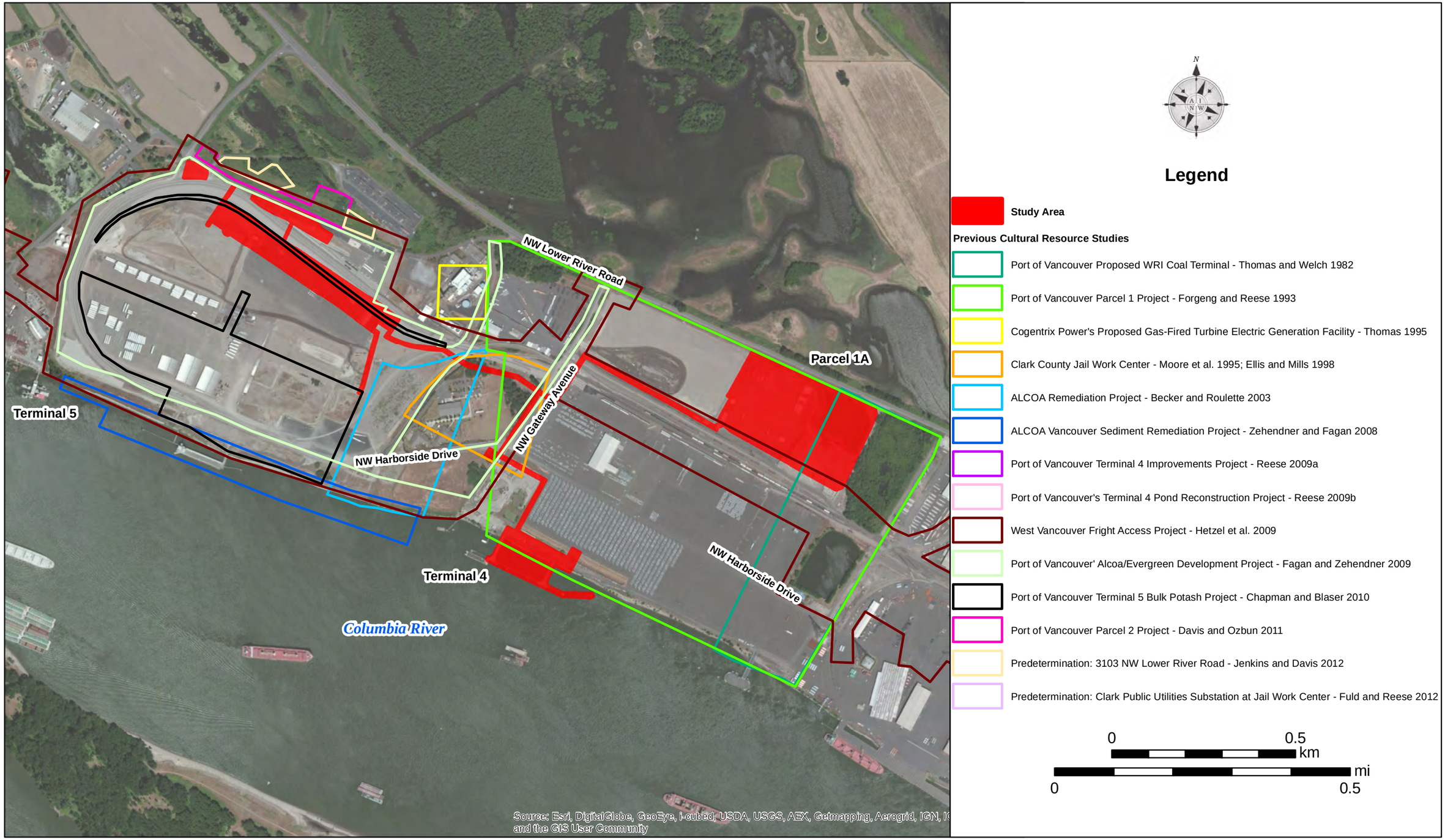

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BergerABAM

1111 Main Street, Suite 300, Vancouver, Washington 98660-2958
360/823-6100 • 360/823-6101 Fax • www.abam.com

Memorandum

Date: August 22, 2013

Subject: Northwest Region Contingency Planning Overview

From: Irina Makarow, BergerABAM

To: David Corpron, Kelly Flint, Savage

Route to: Job No. A13.0267.00

INTRODUCTION

The purpose of the following discussion is to provide an overview of the regulatory framework designed to guide the response of the nation and the region to a spill. The summary below is based on publicly available information regarding the federal regulatory context for contingency planning, the Northwest Area Contingency Plan (NWACP),[1] and the Lower Columbia River Geographic Response Plan.[2]

The first National Oil and Hazardous Substances Pollution Contingency Plan (referred to as the National Contingency Plan or NCP) was developed and published in 1968 when U.S. officials developed a coordinated approach to cope with potential spills in U.S. waters. The 1968 plan provided the first comprehensive system of accident reporting, spill containment, and cleanup, and established a response headquarters, a national reaction team, and regional reaction teams (precursors to the current National Response Team [NRT] and Regional Response Teams [RRT]). Congress broadened the scope of the NCP over the years. As required by the Clean Water Act of 1972, the NCP was revised the following year to include a framework for responding to hazardous substance spills as well as oil discharges. Following the passage of Superfund legislation in 1980, the NCP was broadened to cover releases at hazardous waste sites requiring emergency removal actions. The latest revisions to the NCP were finalized in 1994 to reflect the oil spill provisions of the Oil Pollution Act of 1990. Figure 1 illustrates how these regulatory changes have been implemented over time, and identifies the primary federal regulations now directly applicable to the contingency planning efforts to be implemented by the Tesoro Savage Vancouver Energy Distribution Terminal (Facility), i.e., the Discharge of Oil

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[1] Northwest Area Contingency Plan 2012-2013, http://www.rrt10nwac.com/Files/NWACP/TOC%202012.pdf, accessed 8/11/2013.

[2] Northwest Area Committee, Lower Columbia River Geographic Response Plan, Washington State Department of Ecology, Publication 95-258, Revised November 2013.

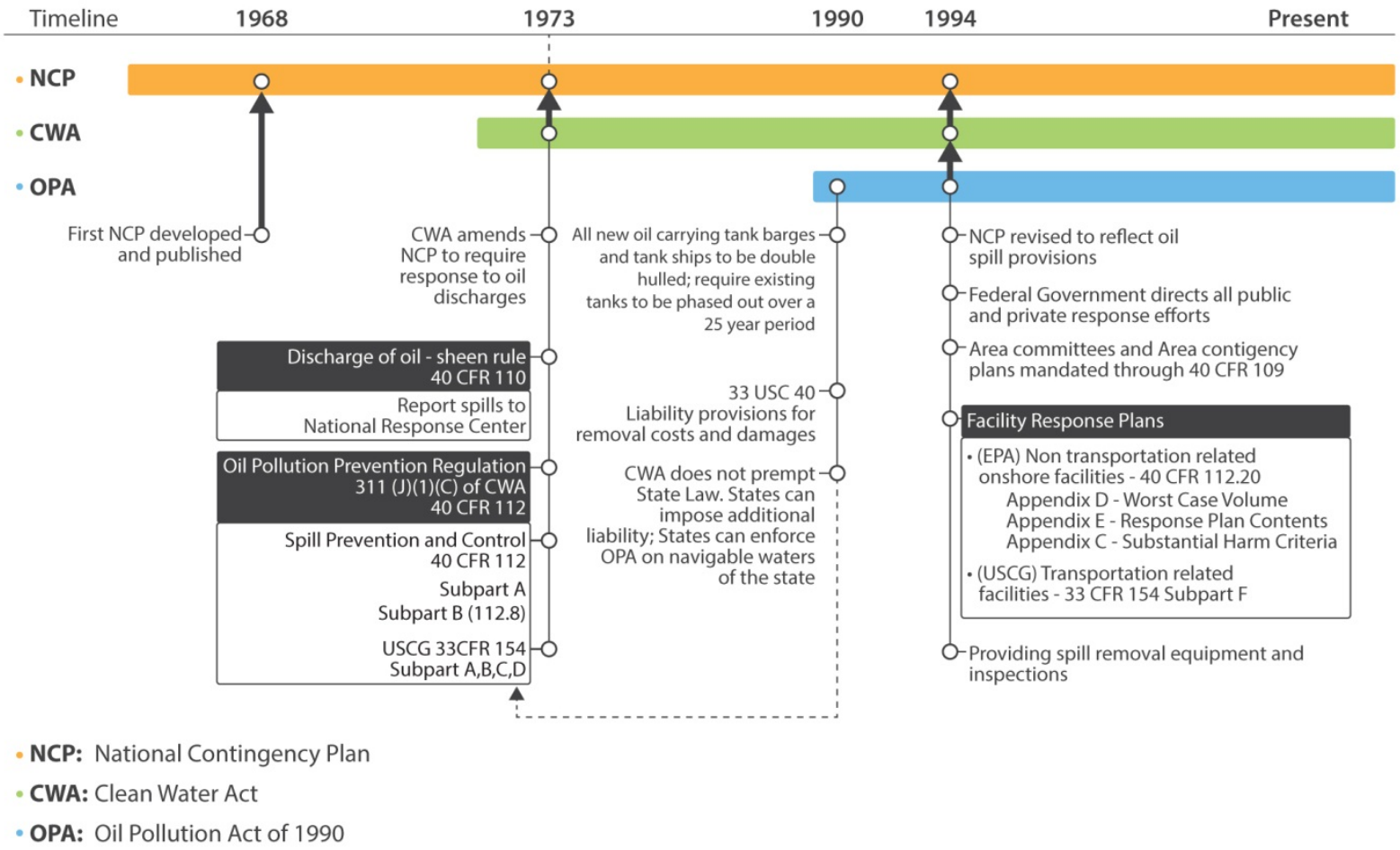

Figure 1. Evolution of Spill Prevention, Response and Contingency Planning Requirements since Inception of the National Contingency Plan

Rule (40 CFR 110), the Oil Pollution Prevention Regulation (40 CFR 112, 33 CFR 154 Subparts A through D), and requirements for facility response plans (40 CFR 112.20 and 33 CFR 154, Subpart F).[3]

This summary is not a comprehensive review of all of the regulatory requirements that apply to the Facility. It is only intended to provide an overview of the comprehensive systems currently in place that the Facility will participate in and be supported by.

NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN

The Federal Water Pollution Control Act (33 USC 1321 et seq.) and the Comprehensive Emergency Response Compensation and Liability Act (CERCLA or Superfund) address the development of a national planning and response system. The NCP is the federal government's blueprint for responding to oil spills and hazardous substance releases. Per sections 311(c)(1) and 502(7) of the Clean Water Act, the NCP is implemented through 40 CFR 300, and applies to, and is in effect for, discharges of oil into or on the navigable waters of the United States, on the adjoining shorelines, the waters of the contiguous zone, into the waters of the Exclusive Economic Zone, or that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States, and releases into the environment of hazardous substances and pollutants or contaminants, which may present an imminent and substantial danger to public health or welfare of the United States. The NCP provides the broad, national priorities and framework to ensure efficient, coordinated, and effective action to minimize the effects of oil and chemical spills. The NCP is published by the U.S. Environmental Protection Agency (EPA) in consultation with the NRT, which consists of 16 federal agencies with responsibilities, interests, and expertise in various aspects of emergency response to pollution incidents.

The NCP establishes and implements a unified command structure for managing responses to discharges through coordinated personnel and resources of the federal government, the state government, and the responsible party. The National Response System coordinates all government agencies with responsibility for human health and environmental protection in a focused response strategy for the immediate and effective cleanup of an oil or hazardous substance spill. It is a three-tiered federal response and preparedness system that supports the pre-designated Federal On-Scene Coordinator (FOSC) and State On-Scene Coordinator (SOSC) in coordinating national, regional, state, tribal, and local government agencies, industry, and the responsible party during a response.

The EPA serves as chair of the NRT and the U.S. Coast Guard as vice-chair, except when activated for a specific incident, when the lead response agency representative serves as chair. The NRT is primarily a national planning, policy, and coordination body and does not respond

[3] Regulations were also implemented for rolling stock (i.e., truck and rail); however, these do not apply to the Facility and are not further discussed in this memorandum.

directly to incidents. The NRT provides policy guidance prior to an incident and assistance as requested by a FOSC via an RRT during an incident. NRT assistance usually takes the form of technical advice, access to additional resources/equipment, and/or coordination with RRTs.

REGIONAL AND AREA CONTINGENCY PLANS

Thirteen regional contingency plans (RCPs) are modeled after the NCP and add information specific to each region. The NCP also establishes RRTs and defines their roles and responsibilities in the National Response System, including coordinating preparedness, planning, and response at the regional level. There are 13 RRTs, one for each of the 10 federal regions and Alaska, the Caribbean, and the Pacific Basin. Each RRT consists of a standing team made up of representatives of each federal agency that is a member of the NRT, as well as state and local government representatives, and also an incident-specific team made up of members of the standing team that is activated for a response. The RRT also provides oversight and consistency review for area plans within a given region. The RRT operating in the Northwest Area has agreed to use the NWACP as the RCP.

Pursuant to the NCP (40 CFR 300), area committees have also been established for each area of the United States that has been designated by the President. The area committees are composed of personnel from federal and state agencies who coordinate response actions with tribal and local governments and with the private sector. Area committees, under the coordinated direction of the FOSC, are responsible for developing area contingency plans (ACPs). Area committees are also required to work with the response community to develop procedures to expedite decisions for the use of alternative response measures.

Designating areas, appointing area committee members, determining information to be included in, and reviewing area contingency plans, have been delegated by Executive Order 12777 of 22 October 1991, to the Commandant of the Coast Guard (through the Department of Homeland Security) for the coastal zone, and to the Administrator of the EPA for the inland zone. As outlined in the NCP 40 CFR 300.5, the "coastal zone" is defined as "all United States waters subject to the tide, specified ports and harbors on inland rivers, waters of the contiguous zone, other waters of the high seas subject to the NCP, and the land surfaces or land substrate, and ground waters, and ambient air proximal to those waters."

The "inland zone" is defined as "the environment inland of the coastal zone excluding specified ports and harbors on inland rivers." The EPA and the Coast Guard have defined the jurisdictional boundary separating the coastal and inland zones. All waterways that mark the boundary between two states (e.g., the Columbia and Snake rivers separating portions of Washington and Oregon) are also the joint, shared responsibility of both bordering states. Spills affecting, or with the potential to affect, shared water must be reported to both states and both states will normally participate in the unified response.

Figure 2 illustrates the interrelationship of national, regional, and area contingency plans, and how facility response plans (FRPs) (i.e., facility contingency plans) are connected to this overall

structure. As noted in Figure 2, vessels carrying oil and hazardous materials are also required to prepare and implement response plans in coordination with the applicable ACPs of the area they frequent and the FRPs of the facilities where they load or unload product.

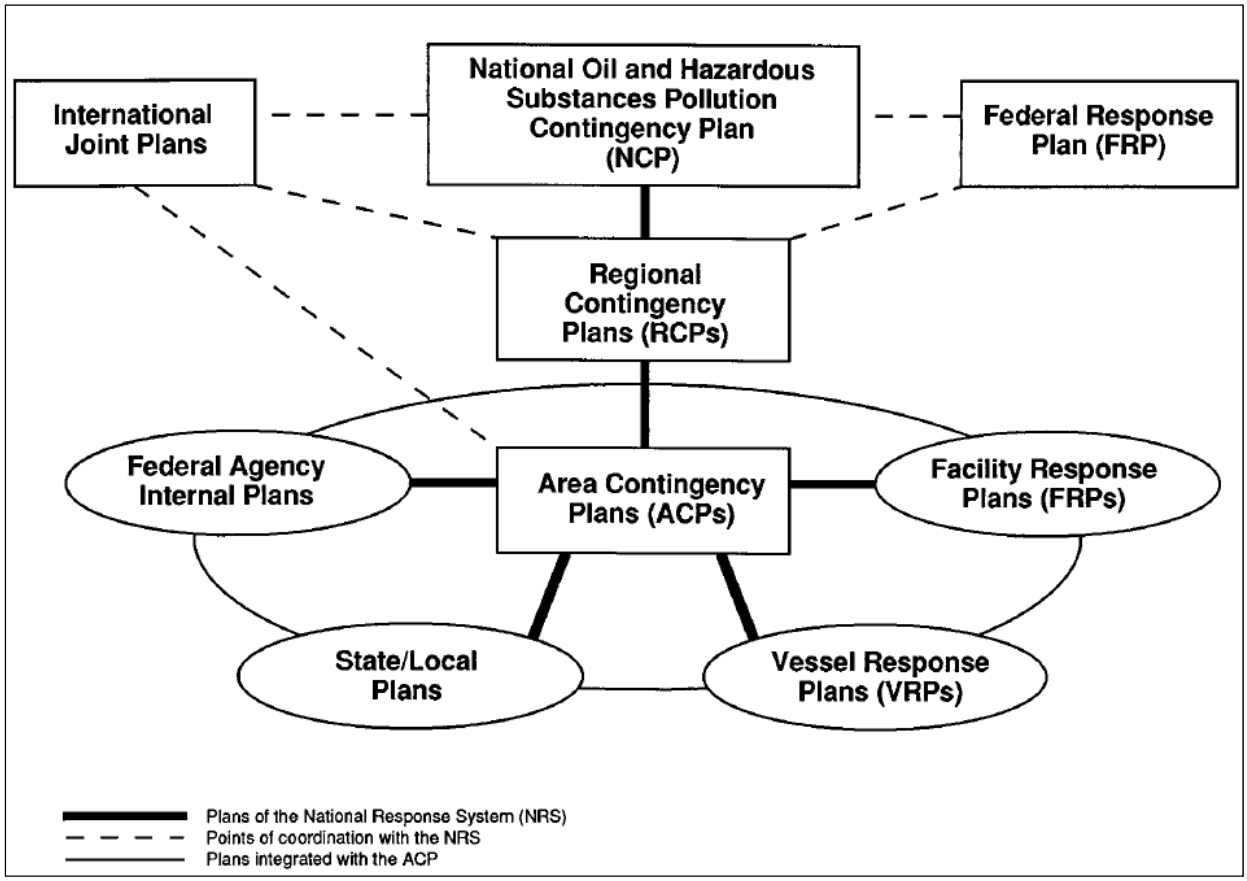

Figure 2. Interrelationship of national, regional, and area contingency plans

In the Northwest Area (defined as the coastal and inland zones of Idaho, Oregon, and Washington), the regional and area groups have joined together to accomplish all planning and preparedness activities and jointly publish the NWACP. To ensure all impacts of a potential release are understood and responded to, a wide variety of organizations participate in the preparation of the NWACP, including regulatory agencies, Tribes, non-governmental organizations, industry and response contractors. Figure 3 is an excerpt from the Region 10 RRT/Northwest Area Committee 2005 Strategic Plan, illustrating the multiple agencies and committee members that participate in the area planning effort.[4]

[4] Regional Response Team/Northwest Area Committee 2005 Strategic Plan (revised February 28, 2008), http://www.rrt10nwac.com/Files/StrategicPlan/090306015646.pdf, accessed August 22, 2013.

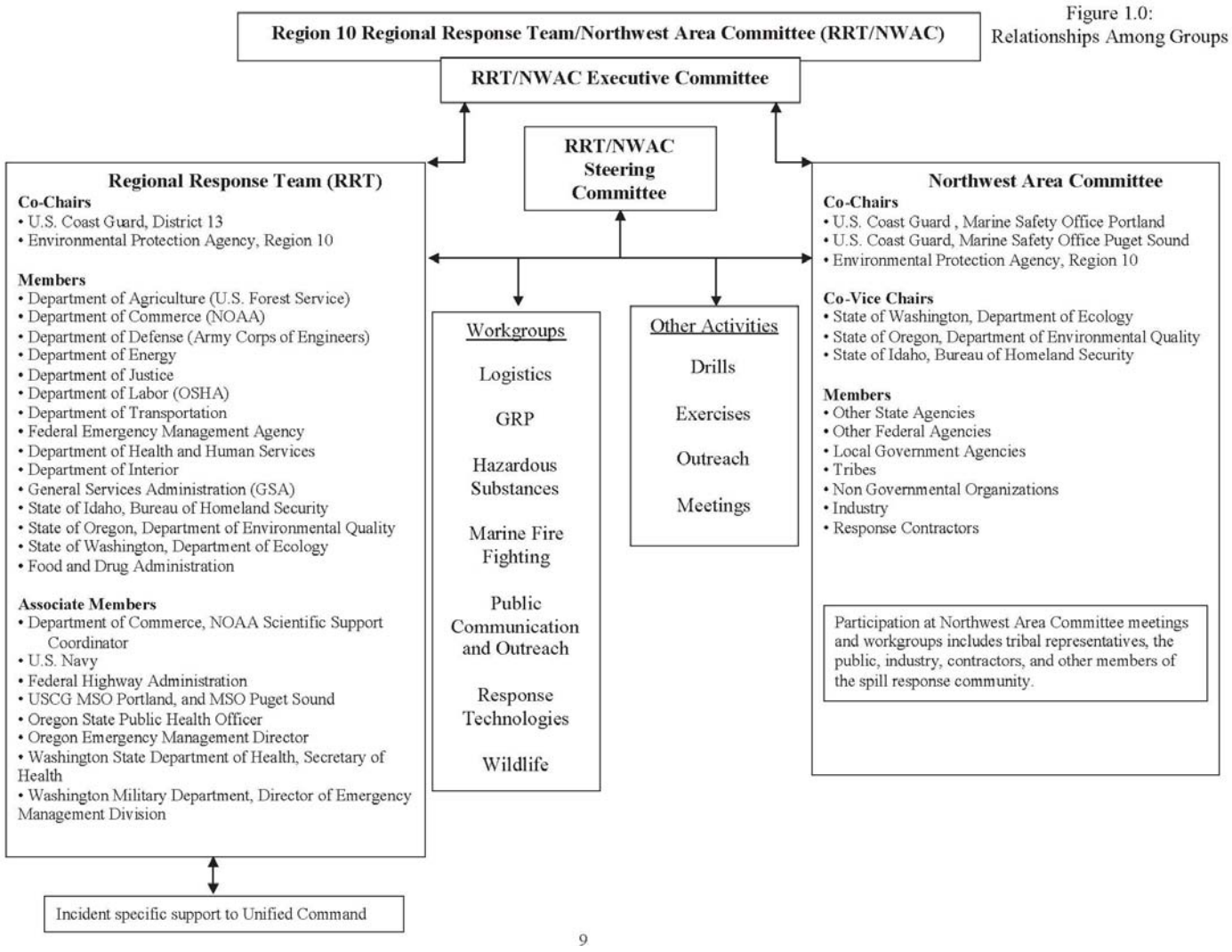

Figure 3. Organization of groups responding to Region 10 incidents

WASHINGTON CONTINGENCY PLANNING

Multiple state agencies also participate in various aspects of spill contingency planning and response. The complexity and jurisdictional characteristics of an incident will determine the level of involvement of federal, state, local, tribal, responsible party, and other responders. The authority for primary response to spills is attributed to the primary state agencies as follows:

- Washington State Department of Ecology (Ecology): Oil spills
- Washington State Patrol (WSP) or other designated local agency per RCW 70.136: HazMat Spills
- Department of Health: Biological and radiological spills
- Emergency Management Division: Disasters

The remainder of this discussion focuses on response to oil spills.

The NWACP has also been adopted as the state's oil and hazardous substance spill prevention and response plan, as required by statute (see Chapter 90.56.060 RCW). This plan applies to the activities of all state and local agencies involved in managing oil and hazardous substance spills where federal, state, and local agencies respond to a spill or potential spill of oil or hazardous substances.

Ecology is designated as the state's lead agency "to oversee prevention, abatement, response, containment, and cleanup efforts with regard to an oil or hazardous substance spill to waters of the state." Washington state law has established Ecology as the predesignated SOSC for all oil and hazardous substance spills in state waters. As such, Ecology is also responsible for supporting federal response actions. In this role, Ecology effectively represents all state agencies and the interests of the state and its citizens. Ecology will respond to any significant discharge or threatened discharge. Ecology will provide local geographic and environmental information; identify and prioritize vulnerable resources in consultation with other resource agencies through the Environmental Unit; fund orphan oil spills through the Oil Spill Recovery Act; and coordinate with other state agencies. The state has devised parallel statutes on water pollution and marine transportation safety that meet, or in some cases exceed, the standards set forth in federal legislation.

The Washington State Emergency Response system is designed to provide coordinated state agency response, in cooperation with federal agencies for effective cleanup of oil or hazardous substance spills. Ecology acts as state incident commander for oil or hazardous substance spills or threatened spills to waters of the state. Ecology provides 24-hour response to oil and hazardous substance spills when any amount of regulated waste or hazardous substance is released to the air, land, or water, or whenever oil is spilled on land or to state waters. As needed, Ecology deploys SOSCs to an incident. The agency maintains spill response teams in Olympia, Seattle, Bellingham, Vancouver, Spokane, and Yakima that provide round-the-clock response service to emergencies that pose an immediate threat to human health and the environment.

Ecology confirms emergency notifications; determines the source and cause of an incident; identifies the responsible party for an oil spill or hazardous substance release; assumes responsibility for incident management and cleanup if the responsible party is unavailable, unresponsive, or unidentified; sets state cleanup standards and ensures that source control, containment, cleanup and disposal are accomplished; assists in monitoring and ensuring the safety of first responders and other personnel; determines the need for and initiates appropriate enforcement actions; coordinates spill response with other state and federal agencies and tribal and local jurisdictions using the National Incident Management System model of the Incident Command System (ICS); establishes a Joint Information Center (JIC) with involved agencies and the responsible party to provide current and accurate information to the community; conducts on-site inspections of commercial vessels and oil handling facilities; investigates the cause of commercial vessel and oil handling facility spills; provides maritime expertise, such as advice on salvage operations; leads, activates, and coordinates the Natural Resource Damage Assessment (NRDA) team; participates in the activities of the Wildlife Branch of the Operations Section of the ICS; and notifies the appropriate resource trustee agency of injury to fish, shellfish, habitat, and other wildlife.

Under the Washington State Emergency Response system, the WSP assumes responsibility as Incident Commander and acts as the lead state agency responsible for cleanup activities when oil and hazardous substance spills occur on state highways. The WSP also assists local jurisdictions with law enforcement and evacuations; represents local jurisdictions as designated Incident Commander; coordinates and maintains liaison with other state agencies involved with an incident; assists in receiving and disseminating warning information; provides communications and technical support to the incident; provides radiological monitoring; provides aerial reconnaissance of the impacted area; coordinates fire resources when an emergency mobilization is authorized for a hazardous substance incident; and provides 24-hour, statewide communications support.

The Washington Military Department's Emergency Management Division (EMD) maintains capabilities to make 24-hour notifications to Ecology, WSP, and other appropriate local, tribal, state, and federal agencies. The EMD also activates the state Emergency Operations Center when required; coordinates state agency response activities within the state Emergency Operations Center, including procurement of state resources, as requested; provides public information officer support to JICs or Incident Command Posts; and provides communication links on an ongoing basis.

During oil spills, the Washington Department of Fish and Wildlife coordinates activities for the rescue and rehabilitation of wildlife injured during oil and hazardous substance spills and releases; assists in identification of fish and wildlife protection needs; and assists in reconnaissance and NRDA efforts.

The state Department of Health is responsible for handling environmental spills and releases involving radioactive substances and biological agents. The department assists in determination of public health impacts to fish and shellfish harvesting and consumption.

The state Department of Natural Resources assists in the identification of aquatic habitat/state lands protection needs. The state Office of Archaeology and Historic Preservation assists in the identification of historic/archaeological resource protection needs. The state Parks and Recreation Commission assists in response activities involving state park lands and property.

Local jurisdictions are usually the first responders to oil and hazardous substance spills and releases. Under the Washington State Emergency Response System, local jurisdictions must designate a local Incident Command agency, usually a fire department, or they may delegate that responsibility to the WSP. Under the Superfund Amendments and Reauthorization Act (SARA), Title III, Local Emergency Planning Committees may be involved with planning, training, and assisting with interagency coordination. They may also activate their local Emergency Operations Center to support on-scene operations, make notifications, and respond to requests for resources and other assistance.

GEOGRAPHIC RESPONSE PLANS

Geographic response plans (GRPs) are an annex to the NWACP and a key element of both facility and vessel contingency plans. GRPs are the final tier in the regional planning effort. GRPs provide a description of sensitive biological, cultural, and economic resources. From an operational perspective, GRPs guide responders in the first 12 to 24 hours of an oil spill by providing prioritized lists of tactical response strategies to be implemented during the early hours of an oil spill (usually before the formation of unified command), and by providing detailed information for booming strategies that could be used to minimize impacts to predetermined sensitive resources. Because the GRPs are the primary tool used during an initial phase of the response and fairly broad in their scope, they are not intended to minimize impacts to all possible sensitive areas that could be affected by an oil spill. Likewise, the GRPs are not intended to be an exhaustive list of all of the tactical strategies that could, or should, be implemented during a spill.

Development of GRPs in the Northwest is a collaborative process. GRPs are developed through workshops and fieldwork involving federal, state, and local oil spill emergency response experts, representatives from tribes, local governments, industry, ports, environmental organizations, pilots, and response contractors. Workshop participants identify resources, develop operational strategies, help prioritize the strategies, and pinpoint logistical support. It is important to involve local governments and local communities in the process of developing a GRP. Fieldwork is conducted to visit the selected sites, confirm the existence of the resource at risk, and further refine the operational strategies. GRP strategies are tested during drills and spills or during the plan development process.

The Washington GRP specifically addresses response activities in the Lower Columbia River.[5] As addressed in the GRP, the Lower Columbia River includes the portion of the river from Bonneville Dam to the estuary at its mouth, a distance of approximately 145 miles, and the lower Willamette River from Willamette Falls to its confluence with the Columbia, a distance of approximately 26 miles. The Lower Columbia portion of the GRP specifically addresses the vicinity of the Port of Vancouver (Port) where the Facility will be located.

The Lower Columbia GRP addresses the specific characteristics of the area to be considered in response activities (including physical features, hydrology, current and tides, winds, climate and risk assessment), provides river booming strategy maps, protection and collection strategies, identifies shoreline characteristics and sensitive resources, and describes the logistical support available in the event of a release. Figures 4 and 5a and 5b are excerpts from the GRP, and illustrate the geographical area-specific planning applicable to the vicinity of the Port. Figure 4 illustrates the current proposed booming strategies along the Willamette and Columbia rivers. Figure 5a identifies the sensitive wildlife resources and their seasonal presence in the vicinity of the Port. Figure 5b identifies the location of sensitive species use areas in the vicinity of the Port. The GRP would be reviewed to take into account the presence of the new Facility, and additional resources for spill control established as they were determined necessary by local, state, and federal responders, as they have been when other new facilities have been established in the Lower Columbia.

[5] Northwest Area Committee, Lower Columbia River Geographic Response Plan (GRP), November 2003, Washington State Department of Ecology Publication No. 95-258 (Revised 11-03), http://www.ecy.wa.gov/programs/spills/preparedness/GRP/ColumbiaRiver/LowerColumbiaRiver.htm, accessed August 22, 2013.

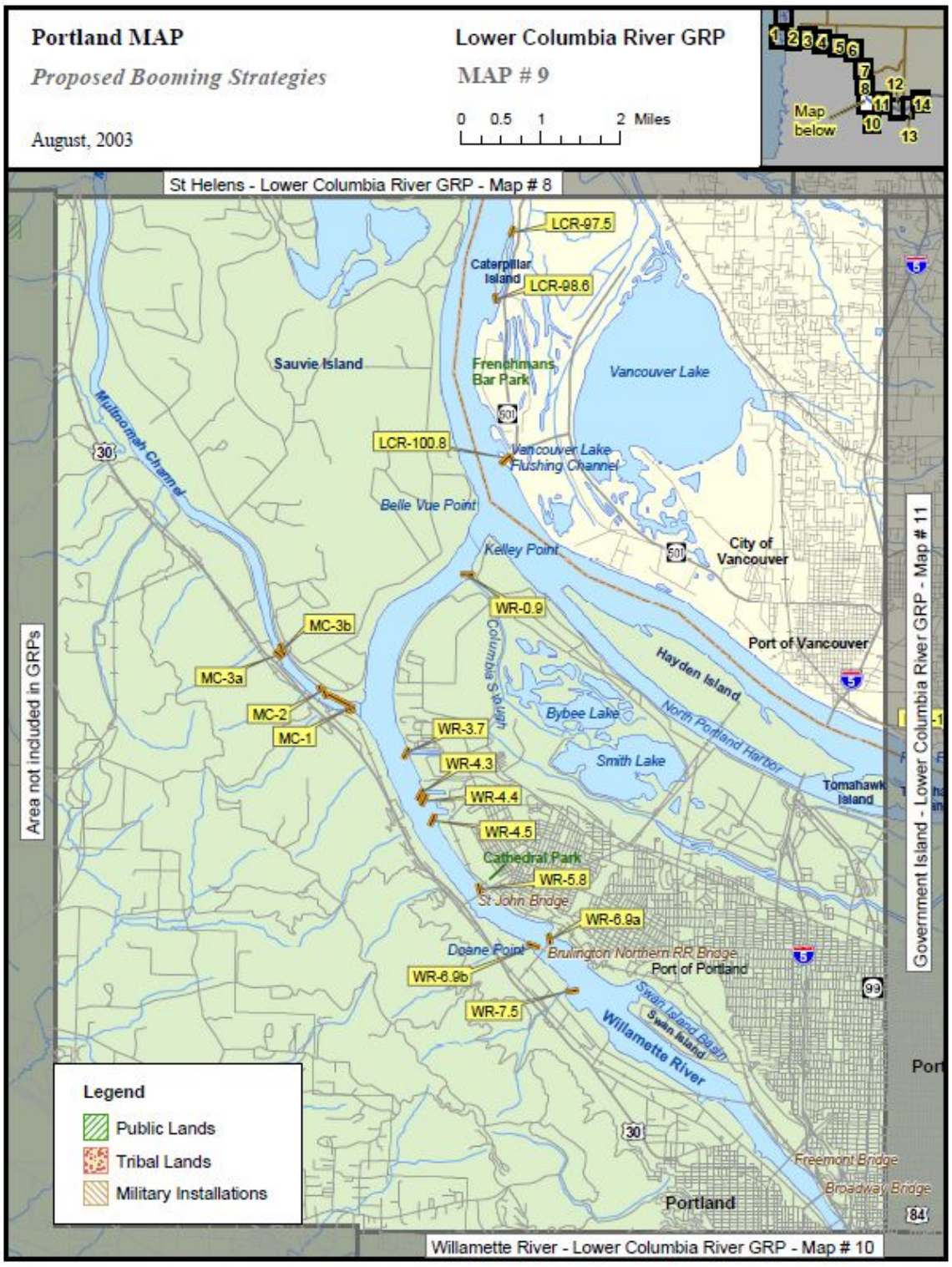

Figure 4. Booming strategies in the vicinity of the Port of Vancouver

LOWER COLUMBIA RIVER WILDLIFE RESOURCES

River Mile 104-110																			
Code	Location	Seabird Colony	Seabird Conc	Waterfowl Conc	Marine Mammal Haulout	Sensitive Nesting Species	Shorebird conc	Flight Exclusion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
WLC-12	West of Lieser Point					**Yes**		**Yes**												
WLC-13	Tomahawk Island					**Yes**		**Yes**												

*** FLIGHT AND GROUND ENTRY RESTRICTIONS**

Flights below 1000 feet require clearance

Sensitive season – Minimize overflight disturbance

Figure 5a. Sensitive wildlife resources and their seasonal presence in the vicinity of the Port of Vancouver

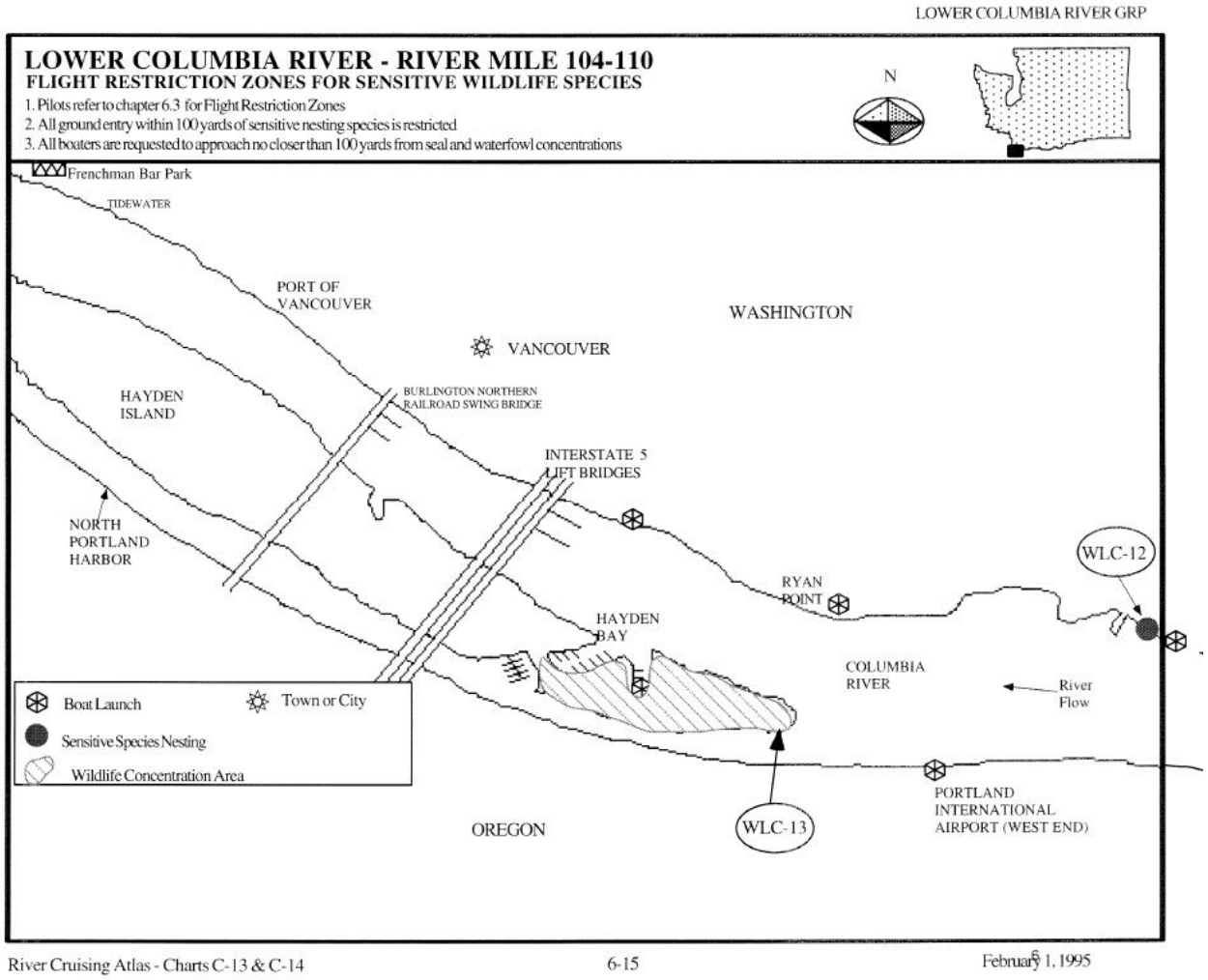

Figure 5b. Location of sensitive species use areas in the vicinity of the Port of Vancouver

LOCAL PLANS

Local emergency response plans are produced by the Local Emergency Planning Committees; the members of these committees are drawn from government agencies, including local fire, police, emergency managers, industry, citizens, and other interested parties. These plans guide local efforts in responding to an oil or hazardous materials spill.

FACILITY RESPONSE PLANS

Facility response plans and vessel response plans comprise the final tier of plans. These are required for oil cargo handling facilities or vessels. These plans detail pollution response action plans for the specific vessel or facility, and must be submitted to Ecology and the Coast Guard/EPA for review or approval, depending on the threat to the environment.

Each owner or operator of a tank vessel or facility required by OPA to submit a response plan does so in accordance with applicable regulations. Facility and tank vessel response plan regulations, including plan requirements for the coastal zone, are located in 33 CFR Parts 154 and 155, respectively. Facility response plan regulations for the inland zone are located in 40 CFR Part 112. Each party responsible for a vessel or a facility from which oil is discharged, or which poses a substantial threat of a discharge, into or upon the navigable waters, adjoining shorelines, or the Exclusive Economic Zone of the United States, is liable for the removal costs and damages specified in Subsection (b) of Section 1002 of OPA. Any removal activity undertaken by a responsible party must be consistent with the provisions of the NCP and the RCP.

The Facility will develop an FRP in consultation with all potential spill responders, and in consideration of the existing response infrastructure that could be called into action in the event of a spill. Through this process, agencies would make a determination as to whether additional regional spill response capability is needed, and where it should be stationed.

INDUSTRY ASSOCIATIONS AND PRIVATE RSPSONSE CONTRACTORS

In addition to the resources made available by local, state, and federal agencies, two private organizations provide emergency and spill response services to the Lower Columbia River area: the Marine Fire and Safety Association (MFSA)[6] and the Clean Rivers Cooperative (CRC).[7] Both of these organizations are financially supported by the industries they serve. Marine vessels berthing at the Facility to load crude oil would take part in the MFSA, whereas the Facility would become a member of the CRC. Together, these two organizations provide all the equipment needed to respond to Group 2, 3, 4 crude oil spills (as defined in WAC 173-182-030), such as product that would be handled by the Facility.

[6] http://www.mfsa.com, accessed August 22, 2013.

[7] http://www.cleanriverscooperative.com, accessed August 22, 2013.

MFSA

The MFSA was established in November 1983. Membership is currently made up of 25 ports and private facilities along the Lower Columbia and Willamette rivers. The members have tasked themselves with developing a system to ensure an adequate, timely, and well-coordinated response to shipboard fires along the 110-mile shipping channel, which includes two states, seven counties, 14 cities, seven port districts, and over 20 fire agencies. MFSA's shipboard fire program is directed by the Fire Protection Agencies Advisory Council (F-PAAC), made up of 12 participating public fire agencies, including the Vancouver Fire Department, Clark County Fire District No. 6, and Clark County Fire & Rescue; Clatskanie Rural Protection Fire District; Columbia River Fire & Rescue; Cowlitz County Fire District No. 1; Cowlitz County Fire District No. 5; Cowlitz 2 Fire & Rescue; Longview Fire Department; Portland Fire & Rescue; Scappoose Rural Fire District; Portland Fire & Rescue and the U.S. Coast Guard - Sector Portland. The MFSA currently provides services to 97 barges, 51 tankers, and 1351 cargo vessels.

In 1991, in response to the Oil Pollution Act of 1990, Oregon and Washington enacted requirements that all commercial vessels over 300 gross tons have an oil spill contingency plan. In order to comply, vessels must either enroll in an umbrella plan covering the Lower Columbia and Willamette rivers, or have their own approved oil spill contingency plan on file with the states. Plans must specify a response contractor and adequate equipment to effectively respond to the worst-case discharge identified in the plan. MFSA developed and maintains a state approved vessel response plan (known as the MFSA plan). Members representing all phases of the maritime industry from both Oregon and Washington participated in the preparation of this plan.

To meet the state requirements, MFSA and CRC joined forces through a memorandum of understanding executed in 1992. The MFSA/CRC partnership makes available the largest inventory of dedicated spill response resources and allows plan coverage for vessels transiting the Lower Columbia and Willamette rivers. As part of this agreement, MFSA contributes financially to co-own response equipment provided by private contractors. MFSA has established a comprehensive network of firefighting and communications equipment located for response activities throughout the Lower Columbia. Table 1 summarizes the MFSA firefighting and communications equipment that is available and spill response equipment co-owned with CRC.

Table 1 - MSFA Emergency Response Equipment

Shipboard Firefighting	Microwave Communications System	Spill Response
• Handheld radios • Generators • Breathing air compressor systems • Gas monitors • Hose • Smoke generators • Ics kits • Booster pumps for cascade systems • Petrogen torch • Smoke ejectors • Life line • Breathing apparatus • Foam (afff-atc) • Slice packs • Co2 equipment • Technical response equipment • Incident commanders' radio interface	• Command and control microwave • Repeater system using simulcast • Technology with continuous VHF FM • Radio coverage between Astoria and Portland/Vancouver	• Regional foam supply & equipment (2 trailers) • Oil containment boom • Wildlife response & rehabilitation unit and equipment • Oil recovery skimmers • Portable radios & repeater systems • Mobile command unit • DP 160 & 250 offloading pumps • Fleet of over 30 vessels

CRC

Founded in 1971 as a non-profit oil spill response organization, CRC was created to provide mutual aid to companies with a vested interest in maintaining an efficient and rapid response to marine spills. CRC has become the region's foremost marine spill solution, with over $ 3 million of equipment dedicated to members and their operations in Oregon and Washington.

CRC is a member-based, not-for-profit dedicated to professional spill response and the prevention of maritime petroleum spills. CRC stages equipment at 14 locations along the Columbia and Willamette rivers, focused especially on environmentally sensitive areas. Table 2 summarizes this equipment.

Table 2 - CRC, Inc. Spill Response Equipment Staged along Columbia and Willamette Rivers

Equipment	Description
Containment Boom	Oil spill containment boom is a floating barrier used to contain oil spilled into water. CRC has 11,400 feet of 12-inch boom, 1,000 feet of 40-inch boom, 45,400 feet of 20-inch boom, and 700 feet of 30-inch boom, totaling 62,600 feet of oil spill containment boom on the Columbia and Willamette rivers.
Workboats	Workboats are functional vessels used to support oil spill response operations. CRC maintains three fast response vessels (FRVs) for rapid response to spills. The vessels are often used in deploying containment boom and assist water recovery operations. CRC also maintains four additional workboats, two large skiffs and three small support skiffs
Oil Spill Response Vessels (OSRVs)	CRC maintains four 34-foot OSRVs outfitted with skimming systems and storage capability for oil spill recovery operations. Each OSRV provides an estimated daily recovery capacity (EDRC) of 3,270 barrels per day.

Equipment	Description
Portable Skimmers	Portable skimmers are mechanical skimming systems used to remove oil from water, maximizing the amount of oil to water recovered. Oil skimmers come in three common types: weir, oleophilic, and drum. CRC maintains 39 portable skimming systems with a total EDRC of 75,545 barrels per day.
Storage Capacity	CRC has six shallow water recovery barges equipped with Lori skimmers having an EDRC of 2,473 barrels per day per barge. In addition, CRC has five shallow water barges, seven 2,500-gallon towable bladders, and 10 1,000-gallon portable fast tanks to store spilled product. In addition, CRC has by agreement two large, 12,000-barrel storage barges and fixed facility storage tanks along the Columbia and Willamette rivers.
Wildlife Response and Rehabilitation System	CRC's state-of-the-art wildlife care equipment is made up of a response & rehabilitation unit, transport unit and rehabilitation shelter. IBR serves as CRC's wildlife response contractor, with experts in wildlife rescue and rehabilitation.
Command and Communications Unit	CRC also maintains a 53-foot trailer outfitted with today's newest technologies, for use as a mobile command post and communications center anywhere on the Columbia and Willamette rivers. The unit is equipped with a conference room that includes whiteboards, teleconference and projection capability, a workspace with computers, satellite phone and internet connections, and a radio communications room equipped with UHF, VHF, and air/ground frequencies among others.

WEST COAST MUTUAL AID

During major and catastrophic spills on the West Coast, it may be necessary to expedite the cross-boundary transfer of additional response capabilities that can be provided only by private contractors. Many of these contractors have signed commitments with facility and/or vessel operators that, if released to another spill, would place them out of compliance with their federal or state/provincial-approved spill contingency plan. The members of the Pacific States/British Columbia Oil Spill Task Force are the primary state and provincial spill prevention and response agencies for Alaska, British Columbia, Washington, Oregon, California, and Hawaii. In an effort to expedite and enhance the response to major West Coast spills, the members of the task force approved and signed the 1993 mutual aid agreement which will be activated by the unified command if additional resources are needed. The purpose of this pre-approved agreement is to specify conditions whereby contingency plan holders may be allowed to meet temporarily reduced response standards in order that their response equipment may be available for mutual aid. This agreement thereby assures that most of the spill response equipment on the West Coast will be available to respond rapidly in the event of a major spill.

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Appendix B.2

Tesoro Savage Vancouver Energy Distribution Terminal
Vancouver, Washington

Spill Prevention Control and Countermeasure Plan (SPCCP)
Preliminary Outline

29 August 2013

Prepared by:

BergerABAM
1111 Main Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.00

TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL
SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN (SPCCP)

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APPENDIX B.2
SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN (SPCCP)

1.0 INTRODUCTION AND FACILITY INFORMATION

1.1 Introduction

This section will provide an introduction and will identify the facility elements subject to regulation under 40 CFR 112.1.

1.2 Name and Address of Facility

This section will identify the name and location of the facility.

1.3 Type of Facility

This section will identify the type of facility addressed by the SPCCP.

1.4 Location and Background

This section will describe the location of the facility and provide a high level overview of the facility elements, and containment measures incorporated in facility design.

2.0 PURPOSE AND SCOPE

2.1 Purpose

This section will describe the purpose of the SPCCP.

2.2 Scope

This section will describe the scope of the SPCCP, and will identify any contractors or response cooperatives that will also provide support services for response activities.

2.3 Location of SPCCP

In accordance with 40 CFR 112.3(e), this section will identify where the SPCCP will be available for on-site review, and where additional copies will be kept.

2.4 Spill Events Requiring Written Reports

In accordance with 40 CFR 112.4, this section will identify the thresholds for reporting spill incidents, when the report(s) have to be submitted and their contents. This section will also identify conditions under which the EPA Regional Administrator can request that the SPCCP be amended, and the process for amendment pursuant to such a request.

2.5 SPCCP Review and Amendment Requirements

In accordance with 40 CFR 112.5, this section will address the conditions that will trigger an amendment of the SPCCP, SPCCP review evaluation every five years, and documentation and certification by a professional engineer of such amendments.

2.6 Plan Conformance

In accordance with 40 CFR 112.7(a)(1), this section will identify how the SPCCP conforms with the requirements of 40 CFR 112, and will discuss interrelationship if this SPCCP with the Facility Response Plan.

2.6.1 Conformance with Other Regulations

In accordance with 40 CFR 112.7 and 112.8, this section will identify how the SPCCP conforms with the requirements of state rules, regulations, and guidelines, if they are more stringent than the federal SPCCP requirements, e.g.:

- Washington Department of Ecology Facility Contingency Plan and Response Contractor Standards (WAC 173-181), which includes notification and spill response requirements;
- The Washington Dangerous Waste (WAC 173-303-145) regulations, which specify requirements for notifications of spills and discharges of hazardous substances. Specifically, spills or discharges of hazardous substances that threaten human health or the environmental must be reported to local and state authorities;
- The U.S. Coast Guard (33 CFR I54.310) and Washington (WAC 173-180(B)) facility Operations Manual requirements.
- The City of Vancouver Water Resources Protection Ordinance (VMC Chapter 14.26).

3.0 FACILITY LAYOUT AND DESCRIPTION

In accordance with 40 CFR 112.7(a)(3), this section will describe the Facility operations, subdivided a follows for the various facility areas:

3.1 Area 200 – Unloading

3.2 Area 300 – Storage

3.3 Area 400 – Marine Terminal

3.4 Area 500 – Transfer Pipelines

3.5 Area 600 – West Boiler Building

4.0 EQUIPMENT FAILURE

In accordance with 40 CFR 112.7(b) this section, and its subsections, will describe potential spill scenarios for each of the Facility Areas, containment measures included in design, response equipment provided, and additional response support available to respond to each spill scenario.

4.1 Area 200 – Unloading

4.2 Area 300 – Storage

4.3 Area 400 – Marine Terminal

4.4 Area 500 – Transfer Pipelines

4.5 Area 600 – West Boiler Building

5.0 STRUCTURAL CONTAINMENT SYSTEMS

In accordance with 40 CFR 112.7(c), this section will address the structural containment systems implemented at the Facility, as applicable.

5.1 Dikes, Berms, and Walls

40 CFR 112.7(c)(1)(i)

5.2 Curbing

40 CFR 112.7(c)(1)(ii)

5.3 Drainage Systems

40 CFR 112.7(c)(1)(iii)

5.4 Weirs, Booms, or Other Barriers

40 CFR 112.7(c)(1)(iv)

5.5 Spill Diversion Ponds

40 CFR 112.7(c)(1)(v)

5.6 Spill Retention Ponds

40 CFR 112.7(c)(1)(vi)

5.7 Sorbent Materials and Additional Mobile Containment Systems

40 CFR 112.7(c)(1)(vii)

6.0 INSPECTION RECORDS

In accordance with 40 CFR 112.7(e), this section will describe the frequency of inspections for evidence of spills, leaks, corrosion, faulty equipment, and dangerous situations, the standards to which the inspections are conducted, and where inspection records are retained. It is anticipated that the following will be addressed in this section:

6.1 Aboveground Tank and Piping Inspection

6.2 Secondary Containment Inspection and Monitoring

6.3 Marine Terminal Loading Inspection

7.0 PERSONNEL TRAINING AND SPILL PREVENTION PROCEDURES

In accordance with 40 CFR 112.7(f), this section will describe spill prevention training, personnel supervision, facility inspections, equipment maintenance, facility security, and specific engineering controls and practices. This section will also identify other documents that address spill prevention and operations procedures.

7.1 Personnel Training

40 CFR 112.7(f)(1)

7.2 Supervision

40 CFR 112.7(f)(2)

7.3 Spill Prevention Briefings

40 CFR 112.7(f)(3)

8.0 SECURITY

In accordance with 40 CFR 112.7(g), this section will describe measures implemented to ensure facility security.

9.0 FACILITY UNLOADING RACKS

In accordance with 40 CFR 112.7(h), this section will describe the facilities related to tanker car unloading, containment measures provided, controls and processes implemented to prevent releases, procedures implemented during the unloading activity, and inspection procedures.

9.1 Unloading Procedures

40 CFR 112.7(h)(1)

9.2 Spill Containment Systems

40 CFR 112.7(h)(1)

9.3 Warning Devices

40 CFR 112.7(h)(2)

9.4 Brittle Fracture

40 CFR 112.7(i)

10.0 SUPPLEMENTAL REQUIREMENTS FOR ONSHORE FACILITIES

In accordance with 40 CFR 112.8, this section will describe how drainage from diked and non-diked areas is restrained to prevent a spill of oil from excessive leaking into the facility drainage system. This section is anticipated to address:

10.1 Drainage from Diked Storage Areas

40 CFR 112.8(b)(1)

10.2 Flapper-Type Drain Valves
40 CFR 112.8(b)(2)

10.3 Drainage from Undiked Areas
40 CFR 112.8(b)(3)

10.4 Diversion System
40 CFR 112.8(b)(4)

10.5 Natural Hydraulic Flow
40 CFR 112.8(b)(5)

11.0 BULK STORAGE TANK AND CONTAINERS
In accordance with 40 CFR 112.8(c), this section will address the design and construction of the bulk storage tanks, inspection procedures, secondary containment, and testing and inspection protocols, as follows:

11.1 Tank Construction
40 CFR 112.8(c)(1)

11.2 Secondary Containment
40 CFR 112.8(c)(2)

11.3 Drainage of Rainwater
40 CFR 112.8(c)(3)

11.4 Buried Metallic Storage Tanks
40 CFR 112.8(c)(4)

11.5 Partially Buried Metallic Tanks
40 CFR 112.8(c)(5)

11.6 Aboveground Tanks Testing and Inspection Protocols
40 CFR 112.8(c)(6)

11.7 Internal Heating Coils
40 CFR 112.8(c)(7)

11.8 Overfill Prevention
40 CFR 112.8(c)(8)

11.9 Effluent Discharge
40 CFR 112.8(c)(9)

11.10 Visible Oil Leaks
40 CFR 112.8(c)(10)

11.11 Mobile and Portable Oil Storage Tanks and Containers
40 CFR 112.8(c)(11)

12.0 FACILITY TRANSFER OPERATIONS
In accordance with 40 CFR 112.8(d), this section will describe transfer operations involving piping and pipelines, including construction methods, protection from corrosion, and examination methods. This section will address:

12.1 Buried Piping Installations
40 CFR 112.8(d)(1)

12.2 Idle Pipelines
40 CFR 112.8(d)(2)

12.3 Pipe Supports
40 CFR 112.8(d)(3)

12.4 Aboveground Pipelines
40 CFR 112.8(d)(4)

12.5 Vehicular Traffic
40 CFR 112.8(d)(5)

13.0 RCRA HAZARDOUS WASTE CONTINGENCY PLAN
This section will describe hazardous wastes that could be generated at the facility, how and where they are managed, emergency coordination responsibilities and procedures, notification requirements in the event of a release and containment and control during emergencies, recurrence prevention measures, and post emergency procedures. This section is anticipated to contain the following subsections:

13.1 Description of Hazardous Wastes

13.2 Description of Hazardous Waste Management Areas

13.3 Emergency Coordinator Responsibilities

13.4 Emergency Response Procedures

13.5 Notification

13.6 Containment and Control during Emergencies

13.6.1 Spills and Releases
13.6.2 Fires and Explosions

13.7 Prevention of Recurrence

13.8 Emergency Equipment

13.8.1 Spills and Releases
13.8.2 Fires and Explosions

13.9 Post Emergency Procedures

13.9.1 Storage and Treatment
13.9.2 Equipment Decontamination and Maintenance
13.9.3 Reporting

13.10 Evacuation Plan

The SPCCP is expected to contain the following appendices.

Appendix A SPCCP CERTIFICATION

Management approval that necessary resources to implement the SPCCP are available, identification of the Designated Responsible Person, and a certification by a Registered Professional Engineer that the SPCCP has been prepared in accordance with good engineering practices.

Appendix B PLAN AMENDMENTS

A log of the dates and summary of SPCCP amendments that have occurred.

Appendix C PLAN REVIEW SHEET

A sample SPCCP review sheet that addresses the SPCCP review process to occur every five years, and certification that the SPCCP review has occurred and whether any changes have been made to the SPCCP.

Appendix D SPCCP TRAINING RECORDS

A compilation of SPCCP training records.

Appendix E INSPECTION FORMS

A compilation of forms used to document inspections conducted under the SPCCP.

Appendix F DOCUMENTATION AND NOTIFICATIONS OF SPILLS

The sequence to report spills to facility personnel and management, and to the applicable local, state and federal agencies, adjacent property owners, hospitals, and spill response contractors.

Appendix G SUBSTANTIAL HARM CRITERIA CHECKLIST

EPA checklist from 40 CFR Part 112 that indicates if an oil spill from a facility could presents a substantial harm. If yes, then a facility oil spill contingency plan is required.

Appendix H DISTRIBUTION LIST

The distribution list of controlled copies of the SPCCP.

Appendix C

Tesoro Savage Vancouver Energy Distribution Terminal
Vancouver, Washington

Preliminary Stormwater Pollution Prevention Plan

29 August 2013

Prepared by:

BergerABAM
1111 Main Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.00

TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL
PRELIMINARY STORMWATER POLLUTION PREVENTION PLAN

TABLE OF CONTENTS

LIST OF ATTACHMENTS

APPENDIX C
PRELIMINARY STORMWATER POLLUTION PREVENTION PLAN

1.0 FACILITY DESCRIPTION AND CONTACT INFORMATION

1.1 Facility Information

Tesoro Savage Petroleum Terminal LLC (the Applicant) is proposing to construct a facility to receive crude oil by rail, store it on site, and ship it by the Columbia River to various consumers and end users located primarily on the West Coast. Unit trains will arrive at the project site and will be stationed on the facility rail loops. The trains will be "indexed" through the unloading area (Area 200), where the crude oil will be gravity drained into the transfer pipeline system (Area 500). The product will be pumped through the transfer pipelines to the crude oil storage tanks (Area 300) where it will be held until the marine vessel loading operation. Marine vessels will arrive and moor at the facility dock (Area 400). Product will be pumped from the storage tanks to the loading area, and loaded on to the marine vessels.

Facility Information

Name of Facility: Tesoro Savage Vancouver Energy Distribution Terminal

Street: 5701 NW Old Lower River Road

City: Vancouver State: WA ZIP Code: 98660

County: Clark

Permit Number: TBD

Latitude: 45º 39' 06" N Longitude: 122º 43' 52" W

Estimated area of industrial activity at site exposed to stormwater: 28± (acres)

Discharge Information

Does this facility discharge stormwater into surface waters? ☐ Yes ☒ No

Does this facility discharge stormwater into a municipal stormwater conveyance system? ☒ Yes ☐ No

SIC Code(s): 5171 "Petroleum Bulk Station & Terminal"

1.2 Contact Information/Responsible Parties

Facility Operator (s):

Name: Tesoro Savage Petroleum Terminal LLC

Address: 5501 NW Lower River Road

City, State, Zip Code: Vancouver, WA 98660

Telephone Number: (801) 944-6600

E-mail Address: generalcounsel@savageservices.com

Fax Number (801) 944-6554

Facility Owner (s):

Name: Port of Vancouver

Address 3103 NW Lower River Road

City, State Zip Code Vancouver, WA 98660

Telephone Number: (360) 693-3611

E-mail Address: info@portvanusa.com

E-mail Address: (503) 735-1565

SWPPP Contact:

Name: TBD

Address TBD

City, State Zip Code TBD

Telephone Number: TBD

E-mail Address: TBD

E-mail Address: TBD

1.3 General Location Map (Optional)

A copy of the general location map for this facility is included in Attachment A.

1.4 Site Map

A site map for this facility is included in Attachment B.

1.5 Stormwater Pollution Prevention Team

Staff Names and/or Title	Individual Responsibilities
Staff Name & Title - TBD Tesoro Savage Petroleum Terminal, LLC	Explanation of that staff person's responsibilities relating to compliance with the permit e.g. SWPPP updates, monitoring, specific BMP maintenance/ implementation, monthly inspections will be provided with Final SWPPP
TBD	
TBD	

The lease holder with Port of Vancouver, Tesoro Savage Petroleum Terminal LLC, is ultimately responsible for compliance with all applicable stormwater and pollution prevention regulations. The terminal will be operated jointly with staff from both Savage Services and Tesoro Corporation. Staff from Savage Services will be responsible for operations of the rail unloading facility, tank farm, boiler buildings, offices, and change rooms. Tesoro Corporation will be responsible for operations at the dock and vessel loading. Responsible staff for both companies will be listed above when assigned.

2.0 FACILITY ASSESSMENT

2.1 Facility Description

Industrial Activity – Industrial activity includes the bulk storage and transfer of crude oil. Crude oil will be shipped into the facility by rail car, stored temporarily on site at a tank farm, and then loaded to marine vessels for transportation to U.S. West Coast refineries. Crude oil transfer within the facility between rail cars, tank farm, and marine vessel loading area will be by transfer pipeline. The maximum amount of crude oil to be stored at the tank farm facility is estimated to be 2,280,000 barrels.

Unit trains will arrive at the project site and will be stationed on the facility rail loops. The trains will be "indexed" through the unloading area (Area 200), where the crude oil will be gravity drained into the transfer pipeline system (Area 500)[1]. The product will be pumped through the transfer pipelines to the crude oil storage tanks (Area 300) where it will be held until the marine vessel loading operation. Marine vessels will arrive and moor at the facility dock (Area 400). Product will be pumped from the storage tanks to the loading area, and loaded on to the marine vessels. In addition to the primary components described above, the facility will include ancillary elements that will support

[1] When a unit train is ready for unloading, the train will pull into the unloading facility and stage the first 30 tank cars for unloading. Upon completion of the unloading of the first 30 tank cars, the train will move forward and position the next 30 cars. This process of staging cars is referred to as "indexing."

the offloading, storage, and loading operations. The primary and ancillary elements are described in detail below. The table below summarizes the primary and ancillary project elements by facility Area.

Facility Area	Primary and Ancillary Project Elements
Rail Infrastructure	• Rail Facility Loops
200 – Rail Offloading	• Rail Offloading Area • Administrative and Support Buildings
300 – Storage	• Product Storage Tanks • Secondary Containment Berm • Area 300 Boiler Building • Area 300 Pump Pit • Area 300 Control Room/E-House • Area 300 Fire Pump and Foam Building
400 – Vessel Loading	• Marine Vessel Loading Hoses and Equipment • Control Room/E-House • Crane Control Room • Dock Safety Unit • Vapor Control Unit • Vapor Blower Skid • Dock Improvements
500 – Transfer Pipelines	• Transfer Piping from Area 200 to Area 300 • Transfer Piping to/from Area 300 to Area 400 • Piping from Vessel Loading to Vapor Control Unit
Area 600 and Area 700 Boiler Buildings	• West Boiler Building • East Boiler Building

Area 200 – Rail Car Offloading

The rail car offloading facility is composed of a covered structure into which the trains will be pulled and indexed and where the unloading will occur. The building that houses the rail car unloading function will be approximately 1,850 feet long by 91 feet wide, with a maximum height of approximately 50 feet. The structure will consist of a steel frame with sheet metal walls. The exterior walls of the offloading facility will be painted a neutral color. The structure will be open on both ends and have sides that stop short of the roof line to allow continuous venting. The structure will have translucent panels for natural lighting, as well as interior lighting.

Approximately five tanks, with a total capacity of approximately 1,000 barrels, will be constructed adjacent to the administrative/support area. These tanks will be connected, and will serve as secondary containment, to a piping system that will receive spills captured in the spill pans. The combined volume of the tanks is sized to contain the entire contents of a single tank car. Product captured in a spill pan will flow by gravity into a dedicated spill collection line, which will be routed from the unloading facility to the spill holding tanks under the existing rail lines. The spill holding tanks will be covered, constructed of steel, and anchored in accordance with applicable seismic design requirements.

The proposed project will require an approximately 3,400-square-foot office building for administrative functions; two additional buildings, one measuring approximately 3,400 square feet and a second measuring 2,500 square feet, will house lockers, restrooms, and other employee support facilities. These elements will be located on the north side of the Terminal 5 loop south of Old Lower River Road. Parking and landscaping will be provided per City standards.

A small maintenance and warehousing building will be constructed on a concrete pad foundation on the south side of the rail car unloading facility. Only light maintenance activities are expected to occur on site; major maintenance, such as pump rebuilds, will be conducted off site.

Area 300 – Storage

The crude oil will be stored in up to six double-bottom, aboveground storage tanks (ASTs) located on 22 acres on Parcel 1A. These tanks will be approximately 48 feet in height and 240 feet in diameter, with a shell capacity of 380,000 barrels each. The maximum amount of product stored in each tank will be 360,000 barrels, to take into account the presence of the internal floating roof and the additional head space required to provide product movement in the event of seismic conditions. The tanks will be painted white.

The field-erected ASTs will be constructed per American Petroleum Institute (API) Standard 650, including a uniformly supported flat bottom, welded carbon steel construction, control of product temperature and internal tank pressure to API specifications, and using appropriate live load characteristics for roof design. Two of the tanks will be equipped with steam manifolds constructed into the bottom of the tanks so that the contents of the tanks can be heated to control viscosity during loading and unloading. All of the tanks will be equipped with mixers to prevent tank contents from stratifying during storage.

Each tank will have a fixed roof to keep precipitation from reaching the inside of the tank and an internal floating roof to control vapor emissions from the tank to the atmosphere. The floating roof will be designed to avoid tipping during operations. The floating roof in the heated tanks will be equipped with a scraping device to ensure free movement of the roof in the event of wax buildup on the storage tank walls.

The double-bottomed tanks will include a leak detection system between the tank floors, and will be cathodically protected to prevent corrosion.

The tanks will be enclosed by a containment berm approximately 6 feet in height. The containment area will be designed with a capacity at least equal to 110 percent of the volume of the largest tank plus precipitation from a 24-hour, 100-year storm event. This capacity reflects the most stringent of Washington spill prevention and control and National Fire Protection Association requirements.

The entire tank containment area will be lined with an impervious membrane to prevent any spills from leaving the containment area via the ground.

Stormwater collected in the bottom of the berm will gravity-drain to the berm area sump. The sump will house three pumps to convey the stormwater through a treatment system before it discharges to the stormwater system. Treatment will consist of a hydrodynamic separator, an oil-water separator, and finally a water quality vault. Prior to pumping water out of the sump to the stormwater system, a visual inspection will be conducted to detect the presence of oil sheen. If no oil sheen is detected, the sump pumps will be started manually; the pumps will shut off automatically when the low level is reached. If oil products are identified through visual inspection, the pump will be emptied to vacuum trucks, and the oily water disposed off site at an authorized location.

Area 400 – Vessel Loading

Piping, jib cranes, a moveable gangway, an observation and control platform, dock safety unit, pipe trays, and lighting will be installed on the existing dock that serves berths 13 and 14. High-velocity hoses will be used to transfer the crude oil from the piping system to the vessel being loaded. The high-velocity hoses will be connected to the grounding grid to protect from the buildup of static electricity. The loading system will incorporate automatic shutoff valves with a maximum 30-second shutoff time.

Area 500 – Transfer Pipelines

A combination of above- and below-ground steel transfer pipelines will convey crude oil from the rail unloading building in Area 200 to the storage tanks in Area 300 and from the storage tanks to the vessel loading system in Area 400. At full build-out, the system will include the following.

Up to three approximately 24-inch-diameter, 1,800-foot-long pipes will collect the crude oil unloaded at the rail unloading stations; one of these pipelines will be electrically heat-traced to ensure that the viscosity of the non-pipeline crude oil will be maintained as it is conveyed out of the unloading building.

Three approximately 24-inch-diameter, 5,500-foot-long pipes will connect the rail car unloading facility to the storage tanks in Area 300; one of these pipes will be electrically heat-traced to ensure that the viscosity of the non-pipeline crude oil will be maintained from the unloading facility to the storage area.

Two approximately 24- to 30 inch-diameter, 5,300-foot-long pipes will connect the storage tanks with the vessel loading system in Area 400.

One approximately 6-inch-diameter, 5,300-foot-long pipe will return crude oil from the vessel loading system back to the storage tanks; this pipe is provided to handle loading process shutdowns and to prevent over-pressure and hammering in the pipe conveyance system.

One approximately 16- to 22-inch-diameter, 600-foot-long pipe will deliver hydrocarbon vapor generated during loading of vessels to the marine vapor combustion/recovery unit (MCVU)

Piping will be constructed of 836 Grade B low carbon steel welded pipe. Aboveground runs of piping will be supported so that the bottom of the piping is approximately 2 feet

off the ground on vertical supports located every 20 to 25 feet. The vertical supports will be fixed on small concrete foundations. Where multiple pipes are placed within the routing pipelines may be either laid side-to-side, or stacked. Expansion loops will be constructed throughout the transfer pipeline runs to accommodate for thermal expansion of the pipelines during operation. Where road or rail crossings occur, the piping will be housed in underground steel casings or raised aboveground for standard American Railway Engineering and Maintenance-of-Way Association clearances; with sealed casings with incorporated leak detection. Runs of aboveground pipeline will be single walled, consistent with industry practice to ensure ease of inspection and maintenance, and in accordance with the applicable requirements of WAC 173-180-340 and 49 CFR 195.246 through 49 CFR 195.254.

The piping system and associated supports and foundations will be designed to applicable seismic protection standards, and will be grounded to protect against the buildup of static electricity during crude oil conveyance. Manual isolation valves will be located on the piping system at the exit of the rail car unloading facility and at the entrance to the storage tank area.

Areas 600 and 700 – Boiler Buildings

Two boiler buildings will be constructed to provide steam for heating of product during offloading and storage operations. The Area 600 West Boiler Building will be located west of the administration and support buildings. This building will have a footprint of approximately 6,000 square feet. The Area 600 boiler building will provide steam to the rail car unloading facility. The building will house four boilers.

The Area 700 East Boiler Building will be located adjacent to the tank storage area; this boiler will provide steam to heat the contents of two of the storage tanks. The Area 700 boiler building will house two boilers. The boilers will be housed in an approximately 3,000-square-foot building.

Regular Business Hours – The facility is planned to operate 24 hours per day, 7 days per week, and 52 weeks per year.

General Layout – The general layout of the facility is shown on the site map included in Appendix B.

2.2 Industrial Activity, Materials Inventory, and Associated Pollutants

The entire project site was associated with previous industrial activities. Sites currently involved in industrial activities include the rail unloading facility, tank farm, and dock area. The west boiler, office and change rooms, and rail unloading facility were previously on the site of the ALCOA Evergreen aluminum plant. The former plant was dismantled and the site underwent extensive cleanup efforts in 2009 removing pollutants from the site. There are several deed restrictive environmental caps where known pollutants remain. These deed restrictive areas are shown on the general layout.

The former aluminum plant site has since been used for outdoor material storage and transfer from rail cars. The tank farm storage area was formerly used for dry material and

cargo storage. The former aluminum plant site has underwent extensive construction activities since the dismantling, including new rail lines, underground utilities, and excavation.

Operations within the facility are limited to the loading, unloading, storage, and transfer of liquid crude oil. Specific operations are described below.

Area 200 – Rail Car Offloading

The rail car offloading facility will be designed to receive and unload both non-heated pipeline quality crude oil unit trains, and heated non-pipeline quality crude unit trains. Two of the unloading tracks will accommodate trains carrying pipeline quality crude oil that can be drained and conveyed without being heated; the third unloading track will accommodate trains carrying non-pipeline quality crude that needs to be heated prior to draining and conveyance to storage. It is expected that the facility will receive up to four unit trains carrying pipeline quality crude oil per day, and up to one unit train carrying non-pipeline quality crude per day, for a total of five unit trains per day.

The 30 unloading stations dedicated to heated non-pipeline quality crude unit trains also will be equipped with steam connections to heat the crude oil to decrease its viscosity and allow it to flow more easily. Steam will be produced in the Area 600 Boiler Building and piped to the unloading facility. Tanks cars that receive steam will be fitted with permanent internal steam manifolds at the bottom of the car. Inlet steam hoses will be connected to each car to allow steam to circulate in the manifold, thereby warming the contents of the tank car. Steam condensate exiting the manifolds will be collected via condensate hoses, and piped back to the steam boilers in a closed loop system.

Unloading will be accomplished with a closed-loop system, i.e., the product will be contained in an enclosed system at all times from when it leaves the rail car to when it enters the storage tanks. During the entire unloading process, the product will never be exposed to the atmosphere. Unloading hoses will be manually connected to the valves on the cars using dry fit connectors, one hose per tank car. Dry fit connectors are designed so that the product in the hose cannot come into contact with the atmosphere. Each hose will be equipped with an automatic shutoff valve. Once the dry fit connector has been secured, the product will gravity-drain from the cars to a collection header.

The collection header collects the flow from a grouping of six cars. The collection headers will be housed in underground trenches running parallel to the rail tracks. A single 9-foot-wide by 5-foot-deep trench will serve the two train tracks dedicated to non-heated crude unloading; a 9-foot-wide by 5-foot-deep trench will serve the single track dedicated to unloading heated crude. Although the primary purpose of the trench is to house the product collection lines, spill collection line, and electrical and data lines, the trench can also act as containment if the collection and spill lines leak.

Each collection header is directly connected to a dedicated pumping station, which transfers the product into a 24-inch-diameter transfer pipeline. One such pipeline will be installed per track, and it will collect the flow from all five groupings of unloading stations on that track. As the product flows from the offloading header to the pumping

stations, it is passed through a basket strainer to remove solids. The pumping stations monitor volumetric flow rate and crude oil density and contaminants (sediment and water), and collect regular samples of the crude for analysis. The discharge of all five unloading pumping stations will be combined into one 24-inch-diameter transfer pipeline per track, which will convey the product to the storage tanks in Area 400. This transfer pipeline is part of Area 500 and is also described in detail below. There will be a total of two non-heated 24-inch transfer pipelines, one per track, from the unloading stations to the tank farm inlet manifold. The discharge of the heated unloading pumping stations will be combined into a separate heat-traced, 24-inch transfer pipe to the tank farm heated inlet manifold.

The collection headers convey the product to pumps that will pump the product to one of three 24-inch pipelines that will convey the product to the storage tanks. The pumps are housed in pump pits. Each of the five pump pits serving the non-heated unloading track will measure approximately 15 feet wide by 34 feet long and 15 feet deep. The five pump pits serving the track unloading non-pipeline quality crude will measure 10 feet wide by 34 feet long and 15 feet deep. Two pumps will serve each offloading header, with one acting as a primary and the second an online spare on standby. During pumping, the product will not come into contact with the vaults; however, the vaults can act as containment if the pumps or piping leak. The trenches and pump vaults will be constructed of concrete and then coated with leakproof sealant.

Area 300 – Storage

Crude oil stored in the tanks will be pumped to the dock for transfer to a ship or barge. Four variable speed pumps will pump the crude oil, with three pumps in operation and one on standby. The pumps will be housed in the tank farm pump pit located on the west side of the storage tank area. It will be equipped with two sump pumps to evacuate any stormwater that collects in it. Stormwater evacuated from the pit will be routed through the treatment and discharge system associated with the containment berm sump described above.

Area 400 – Vessel Loading

The marine vessels will generally arrive at the berth empty. While they are being loaded, vapors from the vessel tanks will be collected and either recovered or combusted to control the emissions released to the air. Piping from the dock will convey the vapors to an enclosed MCVU. Depending on the selected method, this unit will consist of a 50- by 50-foot concrete slab housing equipment and up to two 10- to 15-foot-diameter steel stacks approximately 45 to 50 feet in height.

Area 500 – Transfer Pipelines

A combination of above- and below-ground steel transfer pipelines will convey crude oil from the rail unloading building in Area 200 to the storage tanks in Area 300 and from the storage tanks to the vessel loading system in Area 400. At full build-out, the system will include the following.

Up to three approximately 24-inch-diameter, 1,800-foot-long pipes will collect the crude oil unloaded at the rail unloading stations; one of these pipelines will be electrically heat-

traced to ensure that the viscosity of the non-pipeline crude oil will be maintained as it is conveyed out of the unloading building.

Three approximately 24-inch-diameter, 5,500-foot-long pipes will connect the rail car unloading facility to the storage tanks in Area 300; one of these pipes will be electrically heat-traced to ensure that the viscosity of the non-pipeline crude oil will be maintained from the unloading facility to the storage area.

Two approximately 24- to 30 inch-diameter, 5,300-foot-long pipes will connect the storage tanks with the vessel loading system in Area 400.

One approximately 6-inch-diameter, 5,300-foot-long pipe will return crude oil from the vessel loading system back to the storage tanks; this pipe is provided to handle loading process shutdowns and to prevent over-pressure and hammering in the pipe conveyance system.

One approximately 16- to 22-inch-diameter, 600-foot-long pipe will deliver hydrocarbon vapor generated during loading of vessels to the MCVU.

Areas 600 and 700 – Boiler Buildings

Water circulates through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot boiler combustion gases and radiant heat transfer. Natural gas will be supplied to the boiler buildings from the existing pipeline serving the area. An existing gas line in Old Lower River Road will provide service to the site. Steam from the boilers will be delivered to the point of use via insulated pipelines. The gas-fired boiler may also provide steam to pipes and ancillary equipment and space heating.

Materials and Pollutants

There will be no outdoor storage of materials or products. All crude oil within the facility is contained within rail cars, pipelines, and storage tanks. Small quantities of on-site dust or particulates may be generated by the impervious surfaces, including gravel surfacing. Miscellaneous operational cleaning supplies, solvents, and chemicals will be stored inside protected from stormwater. Select roof runoff will be routed directly to storm drain sewers, and all remaining stormwater runoff will be routed through water quality treatment units.

On-site waste treatment and storage occurs at the following locations.

- West Boiler Building – Pretreatment of west boiler blowdown prior to disposal to the municipal sanitary sewer. The treatment process is continuous and does not require storage for treated wastewater.

- East Boiler Building – Pretreatment of tank farm boiler blowdown prior to disposal to the municipal sanitary sewer. The treatment process is continuous and does not require storage for treated wastewater. Domestic wastewater from an on-site restroom and rainwater falling into the pump basin will be mixed with boiler plant wastewater for discharge to the municipal sanitary sewer.

- Vapor Combustion – Volatile gasses are drawn from docked vessels and piped to the vapor combustion unit (VCU) at the dock area; the VCU treats the gases prior to their discharge to the atmosphere. The VCU does not generate any wastewater.

- Rail Car Spill Containment – In the event of an accidental oil spill within the rail car unloading area, spilled oil would drain into the rail spill pans and, if catastrophic, into secondary containment trenches that extend the full length of the rail car unloading building. Pumping systems would transfer spilled oil to aboveground containment tanks located adjacent to the parking lot by the office and change room facilities. Liquid in the containment tanks will be hauled off site for disposal at a licensed hazardous materials handling facility.

- Foam Fire Protection Systems – The rail car unloading building and storage tanks are equipped with foam retardant fire suppressing systems. In the event that these systems are activated, foam will be contained within the tank farm bermed area or unloading building containment systems. This material will then be hauled off site for disposal at a licensed hazardous materials handling facility.

Industrial Activity/Exposed Materials	Associated Pollutants
Area 200 – Rail Car Unloading	crude oil, sediment, turbidity
Area 300 – Storage Area	crude oil, fire retardant, sediment, turbidity
Area 400 – Vessel Loading	sediment, turbidity
Area 500 – Transfer Pipelines	crude oil
Areas 600 and 700 – Boiler Buildings	sediment, turbidity

2.3 Spills and Leaks

Areas of Site Where Potential Spills/Leaks Could Occur

Location	Outfalls
Area 200 – Railcar Unloading Area	Terminal 5 Outfall
Area 300 – Storage Area	Terminal 4 Outfall
Area 400 – Vessel Loading	TBD
Area 500 – Transfer Pipeline West Boiler Area	Terminals 4 and 5 Outfalls
Areas 600 and 700 – Boiler Buildings	Terminal 5 Outfall

3.0 BEST MANAGEMENT PRACTICES (BMPs)

3.1 Operational Source Control BMPs

3.1.1 Good Housekeeping

- Vacuum paved surfaces with a vacuum sweeper (or a sweeper with a vacuum attachment) to remove accumulated pollutants a minimum of once per quarter.

- Identify and control all on-site sources of dust to minimize stormwater contamination from the deposition of dust on areas exposed to precipitation.

- Keep all dumpsters under cover or fit with a lid that must remain closed when not in use.

3.1.2 Operational Source Control BMPs – Docks and Vessels

- Clean regularly all accessible work, service and storage areas to remove debris, and any other potential stormwater pollutants.

- Sweep rather than hose debris on the dock. If hosing is unavoidable, the hose water must be collected and conveyed to treatment.

- Dispose of greasy rags, oil filters, air filters, batteries, spent coolant, and degreasers properly.

- Drain oil filters before disposal or recycling.

- Immediately repair or replace leaking connections, valves, pipes, hoses, and equipment that causes the contamination of stormwater.

- Use drip pans, drop cloths, tarpaulins, or other protective devices in all paint mixing and solvent operations unless carried out in impervious contained and covered areas.

- Maintain automatic bilge pumps in a manner that will prevent waste material from being pumped automatically into surface water.

- Prohibit uncontained spray painting, blasting, or sanding activities over open water.

- Do not dump or pour waste materials down floor drains, sinks, or outdoor storm drain inlets that discharge to surface water. Plug floor drains that are connected to storm drains or to surface water. If necessary, install a sump that is pumped regularly.

- Prohibit outside spray painting, blasting, or sanding activities during windy conditions that render containment ineffective.

- Do not burn paint and/or use spray guns on topsides or above decks.

- Immediately clean up any spillage on dock, boat, or ship deck areas and dispose of the wastes properly.

- In the event of an accidental discharge of oil or hazardous material into waters of the state or onto land with a potential for entry into state waters, immediately notify the yard, port, marina owner or manager, the Department of Ecology, and the National Response Center at 1-800-424-8802 (24-hour). If the spill can reach or has reached marine water, call the U.S. Coast Guard at (206) 217-6232.

3.1.3 Operational Source Control BMPs – Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots

- Sprinkle or wet down soil or dust with water as long as it does not result in a wastewater discharge.

- Use only local- and/or state-government-approved dust suppressant chemicals, such as those listed in Washington Department of Ecology Publication 96-433, "Techniques for Dust Prevention and Suppression."

- Avoid excessive and repeated applications of dust suppressant chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall or human activity, such as irrigation.

- Apply stormwater containment to prevent the conveyance of stormwater Total Suspended Solids (TSS) into storm drains or receiving waters.

- The use of motor oil for dust control is prohibited. Care should be taken when using lignin derivatives and other high Biological Oxygen Demand (BOD) chemicals in excavations or areas easily accessible to surface water or groundwater.

- Consult with the Ecology regional office in your area on discharge permit requirements if the dust suppression process results in a wastewater discharge to the ground, groundwater, storm drain, or surface water.

3.1.4 Operational Source Control BMPs - Landscaping and Lawn/Vegetation Management

Landscaping:

- Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.

- Do not dispose of collected vegetation into waterways or storm drainage systems.

Pesticides:

- Develop and implement an Integrated Pest Management (IPM) plan and use pesticides only as a last resort.

  An IPM program might consist of the following steps.

  Step 1: Correctly identify problem pests and understand their life cycle.
  Step 2: Establish tolerance thresholds for pests.
  Step 3: Monitor to detect and prevent pest problems.
  Step 4: Modify the maintenance program to promote healthy plants and discourage pests.
  Step 5: Use cultural, physical, mechanical, or biological controls first if pests exceed the tolerance thresholds.
  Step 6: Evaluate and record the effectiveness of the control and modify maintenance practices to support lawn or landscape recovery and prevent recurrence.

- Implement a pesticide-use plan and include at a minimum a list of selected pesticides and their specific uses; brands, formulations, application methods, and quantities to be used; equipment use and maintenance procedures; safety, storage, and disposal methods; and monitoring, record keeping, and public notice procedures. All procedures shall conform to the requirements of Chapter 17.21 RCW and Chapter 16-228 WAC (Appendix IV-D R.7).

- Choose the least toxic pesticide available that is capable of reducing the infestation to acceptable levels. The pesticide should readily degrade in the environment and/or have properties that strongly bind it to the soil. Any pest control used should be conducted at the life stage when the pest is most vulnerable. For example, if it is necessary to use a Bacillus thuringiens as application to control tent caterpillars, it must be applied before the caterpillars cocoon or it will be ineffective. Any method used should be site-specific and not used wholesale over a wide area.

- Apply the pesticide according to label directions. Under no conditions shall pesticides be applied in quantities that exceed manufacturer's instructions.

- Mix the pesticides and clean the application equipment in an area where accidental spills will not enter surface or ground waters, and will not contaminate the soil.

- Store pesticides in enclosed areas or in covered impervious containment. Ensure that pesticide contaminated stormwater or spills/leaks of pesticides are not discharged to storm drains. Do not hose down the paved areas to a storm drain or conveyance ditch. Store and maintain appropriate spill cleanup materials in a location known to all near the storage area.

- Clean up any spilled pesticides and ensure that the pesticide contaminated waste materials are kept in designated covered and contained areas.

- The pesticide application equipment must be capable of immediate shutoff in the event of an emergency.

- Do not spray pesticides within 100 feet of open waters (including wetlands, ponds, and streams), sloughs, and any drainage ditch or channel that leads to open water except when approved by Ecology or the local jurisdiction. All sensitive areas, including wells, creeks, and wetlands, must be flagged prior to spraying.

- As required by the local government or by Ecology, complete public posting of the area to be sprayed prior to the application.

- Spray applications should only be conducted during weather conditions as specified in the label direction and applicable local and state regulations. Do not apply during rain or immediately before expected rain.

Vegetation Management:

- Use at least an 8-inch "topsoil" layer with at least 8 percent organic matter to provide a sufficient vegetation-growing medium. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can substantially improve the permeability of the soil, the disease and drought resistance of the vegetation, and reduce fertilizer demand. This reduces the demand for fertilizers, herbicides, and pesticides. Organic matter is the least water-soluble form of nutrients that can be added to the soil. Composted organic matter generally releases only between 2 and 10 percent of its total nitrogen annually, and this release corresponds closely to the plant growth cycle. If natural plant debris and mulch are returned to the soil, this system can continue recycling nutrients indefinitely.

- Select the appropriate turfgrass mixture for your climate and soil type. Certain tall fescues and rye grasses resist insect attack because the symbiotic endophytic fungi found naturally in their tissues repel or kill common leaf and stem-eating lawn insects. They do not, however, repel root-feeding lawn pests, such as Crane Fly larvae, and are toxic to ruminants, such as cattle and sheep. The fungus causes no known adverse effects to the host plant or to humans. Endophytic grasses are commercially available and can be used in areas, such as parks or golf courses, where grazing does not occur. The local Cooperative Extension office can offer advice on which types of grass are best suited to the area and soil type.

- Use the following seeding and planting BMPs, or equivalent BMPs to obtain information on grass mixtures, temporary and permanent seeding procedures, maintenance of a recently planted area, and fertilizer application rates: temporary seeding, mulching and matting, clear plastic covering, permanent seeding and planting, and sodding as described in Volume II of the stormwater manual.

- Selection of desired plant species can be made by adjusting the soil properties of the subject site. For example, a constructed wetland can be designed to resist the invasion of reed canary grass by layering specific strata of organic matters (e.g., compost forest product residuals) and creating a mildly acidic pH and carbon-rich soil medium. Consult a soil restoration specialist for site-specific conditions.

- Aerate lawns regularly in areas of heavy use where the soil tends to become compacted. Aeration should be conducted while the grasses in the lawn are growing most vigorously. Remove layers of thatch greater than 3/4 inch deep.

- Mowing is a stress-creating activity for turfgrass. When grass is mowed too short, its productivity is decreased and there is less growth of roots and rhizomes. The turf becomes less tolerant of environmental stresses, more disease prone, and more reliant on outside means, such as pesticides, fertilizers, and irrigation to remain healthy. Set the mowing height at the highest acceptable level and mow at times and intervals designed to minimize stress on the turf. Generally mowing only one-third of the grass blade height will prevent stressing the turf.

Irrigation:

- The depth from which a plant normally extracts water depends on the rooting depth of the plant. Appropriately irrigated lawn grasses normally root in the top 6 to 12 inches of soil; lawns irrigated on a daily basis often root only in the top 1 inch of soil. Improper irrigation can encourage pest problems, leach nutrients, and make a lawn completely dependent on artificial watering. The amount of water applied depends on the normal rooting depth of the turfgrass species used, the available water holding capacity of the soil, and the efficiency of the irrigation system. Consult with the local water utility, Conservation District, or Cooperative Extension office to help determine optimum irrigation practices.

Fertilizer Management:

- Turfgrass is most responsive to nitrogen fertilization, followed by potassium and phosphorus. Fertilization needs vary by site depending on plant, soil, and climatic conditions. Evaluation of soil nutrient levels through regular testing ensures the best possible efficiency and economy of fertilization. For details on soils testing, contact the local Conservation District or Cooperative Extension Service.

- Fertilizers should be applied in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface and ground waters. Do not fertilize during a drought or when the soil is dry. Alternatively, do not apply fertilizers within three days prior to predicted rainfall. The longer the period between fertilizer application and either rainfall or irrigation, the less fertilizer runoff occurs.

- Use slow release fertilizers, such as methylene urea, IDBU, or resin coated fertilizers when appropriate, generally in the spring. Use of slow release fertilizers is especially important in areas with sandy or gravelly soils.

- Time the fertilizer application to periods of maximum plant uptake. Generally fall and spring applications are recommended, although Washington State University turf specialists recommend four fertilizer applications per year.

- Properly trained persons should apply all fertilizers. At commercial and industrial facilities, fertilizers should not be applied to grass swales, filter strips, or buffer areas that drain to sensitive water bodies unless approved by the local jurisdiction.

3.1.5 Operational Source Control BMPs – Loading and Unloading Areas for Liquid Material

All Loading/Unloading Areas:

- Place drip pans, or other appropriate temporary containment device, at locations where leaks or spills may occur, such as hose connections, hose reels, and filler nozzles. Drip pans shall always be used when making and breaking connections. Check loading/unloading equipment such as valves, pumps, flanges, and connections regularly for leaks and repair as needed.

Rail Transfer Areas to Above/Below-ground Storage Tanks:

- To minimize the risk of accidental spillage, prepare an "Operations Plan" that describes procedures for loading/unloading. Train the employees, especially fork lift operators, in its execution and post it or otherwise have it readily available to employees.

- Report spills of reportable quantities to Ecology (refer to Section 1.5 for telephone numbers of Ecology regional office).

- Prepare and implement an Emergency Spill Cleanup Plan for the facility (BMP Spills of Oil and Hazardous Substances), which includes the following BMPs:

– Ensure the cleanup of liquid/solid spills in the loading/unloading area immediately, if a significant spill occurs, and, upon completion of the loading/unloading activity, or, at the end of the working day.
– Retain and maintain an appropriate oil spill cleanup kit on-site for rapid cleanup of material spills (see BMP Spills of Oil and Hazardous Substances).
– Ensure that an employee trained in spill containment and cleanup is present during loading/unloading.

- Install a containment pan system within the rails to collect spills/leaks from tank cars and hose connections, hose reels, and filler nozzles.

Loading/Unloading from/to Marine Vessels:

- Facilities and procedures for the loading or unloading of petroleum products must comply with U.S. Coast Guard requirements.

Transfer of Small Quantities from Tanks:

- Refer to BMPs Storage of Liquids in Permanent Aboveground Tanks, and Storage of Liquid, Food Waste, or Dangerous Waste Containers for requirements on the transfer of small quantities from tanks and containers, respectively.

3.1.6 Operational Source Control BMPs – Maintenance of Utility Corridors and Facilities

- Within utility corridors, consider preparing maintenance procedures and an implementation schedule that provides for a vegetative, gravel, or equivalent cover that minimizes bare or thinly vegetated ground surfaces within the corridor, to prevent the erosion of soil.

- Provide maintenance practices to prevent stormwater from accumulating and draining across and/or onto roadways. Stormwater should be conveyed through rail/roadside ditches and culverts. The road should be crowned, outsloped, water barred, or otherwise left in a condition not conducive to erosion. Appropriately maintaining grassy roadside ditches discharging to surface waters is an effective way of removing some pollutants associated with sediments carried by stormwater.

- Maintain ditches and culverts at an appropriate frequency to ensure that plugging and flooding across the roadbed, with resulting overflow erosion, does not occur.

- Operational Source Control BMPs for the Storage of Waste Materials that can Contaminate Stormwater.

3.1.7 Operational Source Control BMPs – Maintenance of Rail/Roadside Ditches

- Inspect ditches regularly, as needed, to identify sediment accumulations and localized erosion.

- Clean ditches on a regular basis, as needed. Ditches should be kept free of rubbish and debris.

- Vegetation in ditches often prevents erosion and cleanses runoff waters. Remove vegetation only when flow is blocked or excess sediments have accumulated. Conduct ditch maintenance (seeding, fertilizer application, harvesting) in late spring and/or early fall, where possible. This allows vegetative cover to be reestablished by the next wet season thereby minimizing erosion of the ditch, as well as making the ditch effective as a biofilter.

- In the area between the edge of the pavement and the bottom of the ditch, commonly known as the "bare earth zone," use grass vegetation, wherever possible. Vegetation should be established from the edge of the pavement if possible, or at least from the top of the slope of the ditch.

- Diversion ditches on top of cut slopes that are constructed to prevent slope erosion by intercepting surface drainage must be maintained to retain their diversion shape and capability.

- Ditch cleanings are not to be left on the roadway surfaces. Sweep dirt and debris remaining on the pavement at the completion of ditch cleaning operations.

- Ditch cleanings, not contaminated by spills or other releases and not associated with a stormwater treatment system such as a bioswale, may be screened to remove litter and separated into soil and vegetative matter (leaves, grass, needles, branches, etc.). The soil fraction may be handled as 'clean soils' and the vegetative matter can be composted or disposed of in a municipal waste landfill.

- Ditch cleanings contaminated by spills or other releases known or suspected to contain dangerous waste must be handled following the Dangerous Waste Regulations (Chapter 173-303 WAC) unless testing determines it is not dangerous waste.

- Examine culverts on a regular basis for scour or sedimentation at the inlet and outlet, and repair as necessary. Give priority to those culverts conveying perennial and/or salmon-bearing streams and culverts near streams in areas of high sediment load, such as those near subdivisions during construction.

3.1.8 Operational Source Control BMPs – Maintenance of Stormwater Drainage and Treatment Systems

- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine whether improvements in O&M are needed.

- Promptly repair any deterioration threatening the structural integrity of the facilities. These include replacement of clean-out gates, catch basin lids, and rock in emergency spillways.

- Ensure that storm sewer capacities are not exceeded and that heavy sediment discharges to the sewer system are prevented.

- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and truck to a local- or state-government-approved disposal site.

- Clean catch basins when the depth of deposits reaches 60 percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin. However, in no case should there be less than 6 inches clearance from the debris surface to the invert of the lowest pipe. Some catch basins (for example, WSDOT Type 1L basins) may have as little as 12 inches sediment storage below the invert. These catch basins will need more frequent inspection and cleaning to prevent scouring. Where these catch basins are part of a stormwater collection and treatment system, the system owner/operator may choose to concentrate maintenance efforts on downstream control devices as part of a systems approach.

- Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catch basin.

- Post warning signs; “Dump No Waste - Drains to Surface Water” or emboss on or adjacent to all storm drain inlets where practical.

- Disposal of sediments and liquids from the catch basins must comply with “Recommendations for Management of Street Wastes” described in Appendix IV-G of the stormwater manual.

- Operational Source Control BMPs for Soil Erosion and Sediment Control at Industrial Sites, Storage of Liquid, Spills of Oil and Hazardous Substances, and Illicit Connections to Storm Drains.

3.1.9 Operational Source Control BMPs – Parking and Storage of Vehicles and Equipment

- Do not hose down the area to a storm drain or to a receiving water. Sweep parking lots, storage areas, and driveways, regularly to collect dirt, waste, and debris.

3.1.10 Operational Source Control BMPs – Railroad Yards

- Implement all required BMPs depending on the pollutant-generating activities/sources at a railroad yard facility.

- Do not allow discharge to outside areas from toilets while a train is in transit. Designated off-site pumpout facilities should be used to service these units.

- Use drip pans at hose/pipe connections during liquid transfer and other leak-prone areas.

- During maintenance, do not discard debris or waste liquids along the tracks or in railroad yards.

3.1.11 Operational Source Control BMPs – Roof/Building Drains at Manufacturing and Commercial Buildings

- If leachates and/or emissions from buildings are suspected sources of stormwater pollutants, then sample and analyze the stormwater draining from the building.

- If a roof/building stormwater pollutant source is identified, implement appropriate source control measures, such as air pollution control equipment, selection of materials, painting galvanized surfaces, operational changes, material recycle, process changes, etc.

3.1.12 Operational Source Control BMPs – Soil Erosion and Sediment Control at Industrial Sites

Cover Practice Options:

- Vegetative cover, such as grass, trees, shrubs, on erodible soil areas

- Covering with mats such as clear plastic, jute, synthetic fiber

- Preservation of natural vegetation, including grass, trees, shrubs, and vines

Structural Practice Options:

- Vegetated swale, dike, silt fence, check dam, gravel filter berm, sedimentation basin, and proper grading.

3.1.13 Operational Source Control BMPs for Storage of Liquid

- Place drip pans beneath all mounted container taps and at all potential drip and spill locations during filling and unloading of containers.

- Inspect tanks or container storage areas regularly for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems. Check containers daily for leaks/spills. Replace containers, and replace and tighten bungs in drums as needed.

- Businesses accumulating dangerous wastes that do not contain free liquids need only to store these wastes in a sloped designated area with the containers elevated or otherwise protected from stormwater runon.

- Drums stored in an area where unauthorized persons may gain access must be secured in a manner that prevents accidental spillage, pilferage, or any unauthorized use.

- If the material is a dangerous waste, the business owner must comply with any additional Ecology requirements as required.

- Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code.

- Cover dumpsters, or keep them under cover such as a lean-to, to prevent the entry of stormwater. Replace or repair leaking garbage dumpsters.

- Drain dumpsters and/or dumpster pads to sanitary sewer. Keep dumpster lids closed. Install waterproof liners.

3.1.14 Operational Source Control BMPs for Storage of Liquids in Permanent Aboveground Tanks

- Inspect the tank containment areas regularly to identify problem components such as fittings, pipe connections, and valves, for leaks/spills, cracks, corrosion, etc.

- Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/ unloading of tanks. Valved drain tubing may be needed in mounted drip pans.

- Sweep and clean the tank storage area regularly, if paved.

- Replace or repair tanks that are leaking, corroded, or otherwise deteriorating.

- All installations shall comply with the Uniform Fire Code and the National Electric Code.

3.1.15 Operational Source Control BMPs for Washing and Steam Cleaning Vehicles/Equipment/Building Structures

- Conduct vehicle washing at an off-site commercial washing facility in which the washing occurs in an enclosure and drains to the sanitary sewer.

- Conduct miscellaneous parts/equipment washing at a designated location within the rail unloading facility, which drains to containment storage for haul off.

- Conduct outside washing operation in a designated wash area with the following features.

  – In a paved area, constructed as a spill containment pad to prevent the run-on of stormwater from adjacent areas. Slope the spill containment area so that washwater is collected in a containment pad drain system with perimeter drains, trench drains, or catchment drains. Size the containment pad to extend out a minimum of 4 feet on all sides of the vehicles and/or equipment being washed.
  – Convey the washwater to a sump (like a grit separator) and then to a sanitary sewer (if allowed by City of Vancouver). A National Pollution Discharge Elimination System (NPDES) permit may be required for any washwater discharge to a storm drain or

receiving water after treatment. Contact the Ecology regional office for NPDES permit requirements.

- The containment sump must have a positive control outlet valve for spill control with live containment volume, and oil/water separation. Size the minimum live storage volume to contain the maximum expected daily washwater flow plus the sludge storage volume below the outlet pipe. The outlet valve will be shut during the washing cycle to collect the washwater in the sump. The valve should remain shut for at least 2 hours following the washing operation to allow the oil and solids to separate before discharge to a sanitary sewer.
- The inlet valve in the discharge pipe should be closed when washing is not occurring, thereby preventing the entry of uncontaminated stormwater into the pretreatment/ treatment system. The stormwater can then drain into the conveyance/discharge system outside of the wash pad (essentially bypasses the washwater treatment/conveyance system). Post signs to inform people of the operation and purpose of the valve. Clean the concrete pad thoroughly until there is no foam or visible sheen in the washwater prior to closing the inlet valve and allowing uncontaminated stormwater to overflow and drain off the pad.
    - Collect the washwater from building structures and convey it to appropriate treatment, such as a sanitary sewer system if it contains oils, soaps, or detergents, where feasible. If the washwater does not contain oils, soaps, or detergents, then it could drain to soils that have sufficient natural attenuation capacity for dust and sediment.

Preventive Maintenance:

- Clean catch basins when the depth of debris reaches 60 percent of the sump depth. In addition, the Permittee must keep the debris surface at least 6 inches below the outlet pipe.

- Inspect all equipment and vehicles during monthly site inspections for leaking fluids, such as oil, antifreeze, etc. Take leaking equipment and vehicles out of service or prevent leaks from spilling on the ground until repaired.

- Immediately clean up spills and leaks (e.g., using absorbents, vacuuming, etc.) to prevent the discharge of pollutants.

Spill Prevention and Emergency Cleanup:

- Store all chemical liquids, fluids, and petroleum products, on an impervious surface that is surrounded with a containment berm or dike that is capable of containing 10 percent of the total enclosed tank volume or 110 percent of the volume contained in the largest tank, whichever is greater.

- Prevent precipitation from accumulating in containment areas with a roof or equivalent structure or include a written plan on how it will manage and dispose of accumulated water if a containment area cover is not practical.

- Locate spill kits within 25 feet of all stationary fueling stations, fuel transfer stations, and mobile fueling units. At a minimum, spill kits shall include:

  - Oil absorbents capable of absorbing 15 gallons of fuel.
  - A storm drain plug or cover kit.
  - A non-water containment boom, a minimum of 10 feet in length with a 12-gallon absorbent capacity.
  - A non-metallic shovel.
  - Two 5-gallon buckets with lids.

- Block, plug, or cover storm drains that receive runoff from areas where fueling, during fueling.

- Use drip pans or equivalent containment measures during all petroleum transfer operations.

- Locate materials, equipment, and activities so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas).

- Use drip pans and absorbents under or around leaky vehicles and equipment or store indoors where feasible. Drain fluids from equipment and vehicles prior to on-site storage or disposal.

- Maintain a spill log that includes the following information for chemical and petroleum spills: date, time, amount, location, and reason for spill; date/time clean-up completed, notifications made and staff involved.

- Condition S3 of the Industrial Stormwater General Permit requires the SWPPP to include the "applicable" Spill Prevention Operational and Source Control BMPs listed in Ecology's SWMMs, or other guidance documents as mandatory.

3.1.16 Operational Source Control BMPs for Spills of Oil and Hazardous Substances

- Prepare an Emergency Spill Control Plan (SCP), which includes:

  - A description of the facility, including the owner's name and address;
  - The nature of the activity at the facility;
  - The general types of chemicals used or stored at the facility;
  - A site plan showing the location of storage areas for chemicals, the locations of storm drains, the areas draining to them, and the location and description of any devices to stop spills from leaving the site, such as positive control valves;
  - Cleanup procedures;
  - Notification procedures to be used in the event of a spill, such as notifying key personnel. Agencies such as Ecology, local fire department, Washington State Patrol, and the local Sewer Authority, shall be notified; and
  - The name of the designated person with overall spill cleanup and notification responsibility.

- Train key personnel in the implementation of the Emergency SCP. Prepare a summary of the plan and post it at appropriate points in the building, identifying the spill cleanup coordinators, location of cleanup kits, and phone numbers of regulatory agencies to be contacted in the event of a spill.

- Update the SCP regularly.

- Immediately notify Ecology and City of Vancouver if a spill may reach sanitary or storm sewers, groundwater, or surface water, in accordance with federal and Ecology spill reporting requirements.

- Immediately clean up spills. Do not use emulsifiers for cleanup unless an appropriate disposal method for the resulting oily wastewater is implemented. Absorbent material shall not be washed down a floor drain or storm sewer.

- Locate emergency spill containment and cleanup kit(s) in high potential spill areas. The contents of the kit shall be appropriate for the type and quantities of chemical liquids stored at the facility.

3.1.17 Operational Source Control BMPs for Illicit Connections to Storm Drains

- Eliminate unpermitted wastewater discharges to storm drains, groundwater, or surface water.
- Convey unpermitted discharges to a sanitary sewer if allowed by the City of Vancouver.
- Obtain appropriate permits for these discharges.

3.1.18 Employee Training

A complete narrative and description of applicable staff training will be provided with the Final SWPPP.

3.1.19 Inspections, Reporting, and Recordkeeping

- Identify facility personnel who will inspect designated equipment and facility areas as required in Condition S7.

- Contain a visual inspection report or check list that includes all items required by Condition S7.C.

- Provide a tracking or follow-up procedure to ensure that a report is prepared and any appropriate action taken in response to visual inspections.

- Define how the Permittee will comply with signature requirements and records retention identified in Special Condition S9, Reporting and Recordkeeping Requirements.

- Include a certification of compliance with the SWPPP and permit for each inspection using the language in S7.C.1.c.

See Attachment D for monthly inspection reporting and record keeping.

3.1.20 Illicit Discharges

Water from washing vehicles or equipment, steam cleaning and/or pressure washing is considered process wastewater. The Permittee must not allow this process wastewater to comingle with stormwater or enter storm drains; and must collect in a tank for off-site disposal, or discharge it to a sanitary sewer, with written approval from the local sewage authority.

During each monthly site inspection, look for signs of illicit discharges, especially during dry weather when stormwater isn't discharging from the site. Each monthly site inspection will include:

- Observations made at stormwater sampling locations and areas where stormwater associated with industrial activity is discharged off-site; or discharged to waters of the state, or to a storm sewer system that drains to waters of the state.

- Observations for the presence of floating materials, visible oil sheen, discoloration, turbidity, odor, etc. in the stormwater discharge(s).

- Observations for the presence of illicit discharges, such as domestic wastewater, noncontact cooling water, or process wastewater (including leachate).

  – If an illicit discharge is discovered, the Permittee shall notify Ecology within seven days.

  – The Permittee shall eliminate the illicit discharge within 30 days.

3.2 Structural Source Control BMPs

Mandatory Structural Source Control BMPs required by Condition S3 of the Industrial Stormwater General Permit.

- Use grading, berming, or curbing to prevent runoff of contaminated flows and divert run-on away from manufacturing, processing, and material storage areas (including loading and unloading, storage, disposal, cleaning, maintenance, and fueling operations).

- Perform all cleaning operations indoors, under cover, or in bermed areas that prevent stormwater runoff and run-on and also that capture any overspray.

- Ensure that all washwater drains to a collection system that directs the washwater to further treatment or storage and not to the stormwater drainage system.

- Condition S3 of the Industrial Stormwater General Permit requires the SWPPP to include the "applicable" Structural Source Control BMPs listed in Ecology's SWMMs, or other guidance documents <u>as mandatory</u>.

3.2.1 Structural Source Control BMPs for Loading and Unloading Areas for Liquid Material

All Loading/Unloading Areas:

- Consistent with Uniform Fire Code requirements (Appendix IV-D R.2) and to the extent practicable, conduct unloading or loading of solids and liquids in a manufacturing building, under a roof, or lean-to, or other appropriate cover.

- Berm, dike, and/or slope the loading/unloading area to prevent run-on of stormwater and to prevent the runoff or loss of any spilled material from the area.

- Large loading areas frequently are not curbed along the shoreline. As a result, stormwater passes directly off the paved surface into surface water. Place curbs along the edge, or slope the edge such that the stormwater can flow to an internal storm drain system that leads to an approved treatment BMP.

- Pave and slope loading/unloading areas to prevent the pooling of water. The use of catch basins and drain lines within the interior of the paved area must be minimized as they will frequently be covered by material, or they should be placed in designated "alleyways" that are not covered by material, containers or equipment.

3.2.2 Structural Source Control BMPs for Storage of Liquid or Dangerous Waste Containers

- Keep containers with dangerous waste or other potential pollutant liquids inside a building unless this is impracticable due to site constraints or Uniform Fire Code requirements.

- Store containers in a designated area, which is covered, bermed or diked, paved and impervious in order to contain leaks and spills. The secondary containment shall be sloped to drain into a dead-end sump for the collection of leaks and small spills.

- For liquid wastes, surround the containers with a dike. The dike must be of sufficient height to provide a volume of 10 percent of the total enclosed container volume or 110 percent of the volume contained in the largest container, whichever is greater, or, if a single container, 110 percent of the volume of that container.

- Where material is temporarily stored in drums, a containment system can be used as illustrated, in lieu of the above system.

- Place containers mounted for direct removal of a liquid chemical for use by employees inside a containment area as described above. Use a drip pan during liquid transfer.

3.2.3 Structural Source Control BMPs for Storage of Liquids in Permanent Aboveground Tanks

- Locate permanent tanks in impervious (portland cement concrete or equivalent) secondary containment surrounded by dike or UL-approved double-walled. The dike

must be of sufficient height to provide a containment volume of either 10 percent of the total enclosed tank volume or 110 percent of the volume contained in the largest tank, whichever is greater, or, if a single tank, 110 percent of the volume of that tank.

- Slope the secondary containment to drain to a dead-end sump (optional), or equivalent, for the collection of small spills.

- Include a tank overfill protection system to minimize the risk of spillage during loading.

3.3 Treatment BMPs

Structure: Rail Offloading Area – Media Filtration Vault
Date of Implementation: TBD
Discharge Point: Connects to existing Port-owned storm drain
Area(s) Treated: Gravel Yard – see plans
Pollutants Removed: Suspended solids, hydrocarbons, metals
Maintenance Requirement(s): Cleaning and debris removal, inspection for replacement of filtration media
Frequency: Monthly

Structure: Office and Administrative Area – Media Filtration Vault
Date of Implementation: TBD
Discharge Point: Connects to existing Port-owned storm drain
Area(s) Treated: Parking areas – see plans
Pollutants Removed: Suspended solids, hydrocarbons, metals
Maintenance Requirement(s): Cleaning and debris removal, inspection for replacement of filtration media
Frequency: Monthly

Structure: Storage Tank Area – Hydrodynamic Separation Unit
Date of Implementation: TBD
Discharge Point: Connects to existing Port-owned storm drain
Area(s) Treated: Tank Farm area – see plans
Pollutants Removed: Debris and larger solids
Maintenance Requirement(s): Cleaning and debris removal, frequent inspection
Frequency: Monthly

Structure: Storage Tank Area – Oil/Water Separators
Date of Implementation: TBD
Discharge Point: Connects to existing Port-owned storm drain
Area(s) Treated: Tank Farm area – see plans
Pollutants Removed: Oil
Maintenance Requirement(s): Cleaning and oil removal, frequent inspection
Frequency: Monthly

Structure: Storage Tank Area – Media Filtration Vault
Date of Implementation: TBD
Discharge Point: Connects to existing Port-owned storm drain
Area(s) Treated: Tank Farm area – see plans
Pollutants Removed: Suspended solids, hydrocarbons, metals
Maintenance Requirement(s): Cleaning and debris removal, inspection for replacement of filtration media
Frequency: Monthly

Structure: Vessel Loading Area – Media Filtration Vault
Date of Implementation: TBD
Discharge Point: TBD
Area(s) Treated: Shoreline portion of the berth – see plans
Pollutants Removed: Suspended solids, hydrocarbons, metals
Maintenance Requirement(s): Cleaning and debris removal, inspection for replacement of filtration media
Frequency: Monthly

Structure: Boiler Buildings Area – Media Filtration Manhole
Date of Implementation: TBD
Discharge Point: Connects to existing Port-owned storm drain
Area(s) Treated: Pavement areas at the West Boiler Area – see plans
Pollutants Removed: Debris, suspended solids, hydrocarbons, and metals
Maintenance Requirement(s): Cleaning and debris removal, inspection for replacement of filtration media
Frequency: Monthly

3.3.1 Mandatory Treatment BMPs required by Condition S3 of the Industrial Stormwater General Permit

- Condition S3 of the Industrial Stormwater General Permit requires permittees to implement Treatment BMPs listed as "applicable" in Ecology's SWMMs, or other approved guidance documents (see Condition S3.A.3).

- The Permittee may omit individual BMPs if site conditions render the BMP unnecessary, infeasible, or the Permittee provides alternative and equally effective BMPs; if the Permittee clearly justifies each BMP omission in the SWPPP.

- Employ oil/water separators, booms, skimmers, or other methods to eliminate or minimize oil and grease contamination of stormwater discharges.

  – Many "off the shelf" oil removal BMPs are available (absorptive booms, skimmers, pads, etc.)

– If an oil/water separator needs to be designed and installed, refer to:
Stormwater Management Manual for Western WA (Vol. V, Ch.11):
http://www.ecy.wa.gov/biblio/0510033.html
Stormwater Management Manual for Eastern WA (Chapter 5.10)
http://www.ecy.wa.gov/pubs/0410076.pdf

- Obtain Ecology approval before beginning construction/installation of all treatment BMPs that include the addition of chemicals to provide treatment (e.g., polymer enhanced sand-filter systems, electro-coagulation systems, etc.)

3.3.2 Applicable Treatment BMPs from Ecology's Stormwater Management Manual for Western Washington

3.3.2.1 Treatment BMPs for Parking and Storage of Vehicles and Equipment

- An oil removal system, such as an API or coalescing plant (CP) oil and water separator, catch basin filter, or equivalent BMP, approved by the local jurisdiction, is applicable for parking lots meeting the threshold vehicle traffic intensity level of a high-use site.

A high-use site is:

- Subject to an expected average daily vehicle traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area: or

- Is subject to storage of a fleet of 25 or more diesel vehicles that are over 10-ton gross weight (trucks, buses, trains, heavy equipment, etc.).

3.3.2.2 Treatment BMPs for Railroad Yards

- In areas subjected to leaks/spills of oils or other chemicals convey the contaminated stormwater to appropriate treatment such as a sanitary sewer, if approved by the City of Vancouver, or, to a CP or API oil/water separator for floating oils, or other treatment, as approved by the local jurisdiction.

3.3.2.3 Treatment BMPs for Storage of Liquid or Dangerous Waste Containers

- For contaminated stormwater in the containment area, connect the sump outlet to a sanitary sewer, if approved by the local Sewer Authority, or to appropriate treatment, such as an API or CP oil/water separator, catch basin filter or other appropriate system (see Volume V of the stormwater manual). Equip the sump outlet with a normally closed valve to prevent the release of spilled or leaked liquids, especially flammables (compliance with fire codes), and dangerous liquids. This valve may be opened only for the conveyance of contaminated stormwater to treatment.

- Another option for discharge of contaminated stormwater is to pump it from a dead-end sump or catchment to a tank truck or other appropriate vehicle for off-site treatment and/or disposal.

3.3.2.4 Treatment BMPs for Storage of Liquids in Permanent Aboveground Tanks

- If the tank containment area is uncovered, equip the outlet from the spill-containment sump with a shutoff valve, which is normally closed and may be opened, manually or automatically, only to convey contaminated stormwater to approved treatment or disposal, or to convey uncontaminated stormwater to a storm drain. Evidence of contamination can include the presence of visible sheen, color, or turbidity in the runoff, or existing or historical operational problems at the facility. Simple pH measurements with litmus or pH paper can be used for areas subject to acid or alkaline contamination.

- At petroleum tank farms, convey stormwater contaminated with floating oil or debris in the contained area through an API or CP-type oil/water separator or other approved treatment prior to discharge to storm drain or surface water.

3.4 Stormwater Peak Runoff and Volume Control BMPs

Volume control facilities are not required for discharge into the Columbia River.

3.5 Erosion and Sediment Control BMPs

Structure: Inlet Protection
Date of Implementation: TBD
Discharge Point: Existing Port owned storm drain system
Area(s) Treated: All areas within construction disturbance boundaries
Pollutants Removed: Sediment and debris
Maintenance Requirement(s): Cleaning and debris removal
Frequency: Monthly

Structure: Silt Fencing
Date of Implementation: TBD
Discharge Point: N/A
Area(s) Treated: All areas within construction disturbance boundaries
Pollutants Removed: Sediment and debris
Maintenance Requirement(s): Cleaning and debris removal
Frequency: Monthly

Structure: Sedimentation Pond
Date of Implementation: TBD
Discharge Point: N/A
Area(s) Treated: All areas within construction disturbance boundaries
Pollutants Removed: Sediment and debris
Maintenance Requirement(s): Cleaning and debris removal
Frequency: Monthly

Structure: Armored Construction Entrance
Date of Implementation: TBD
Discharge Point: N/A
Area(s) Treated: Primary access to and from individual sites
Pollutants Removed: Mud and debris
Maintenance Requirement(s): Cleaning and debris removal
Frequency: Monthly

4.0 SAMPLING PLAN

4.1 Discharge Location(s)

Identify all points of discharge to surface water, storm sewers, or discrete groundwater infiltration locations, such as dry wells or detention ponds.

Discharge ID	Common description	Latitude (optional)	Longitude (optional)	Discharge Type	Comments
1	Storm connection to exist storm sewer at Office Area	45°39'07"	122°43'55"	Existing storm sewer	Exist storm drain discharges to Columbia River
2	Storm connection to exist storm sewer at Unloading Area	45°39'02"	122°43'55"	Existing storm sewer	Exist storm drain discharges to Columbia River
3	Storm connection to exist storm sewer at Tank Farm	45°38'46"	122°42'56"	Existing storm sewer	Exist storm drain discharges to Columbia River
4	Storm connection to exist storm sewer at Dock Area	45°38'35"	122°43'18"	Existing storm sewer	Exist storm drain discharges to Columbia River
6	Storm connection to exist storm sewer at West Boiler Area	45°39'09"	122°44'02"	Existing storm sewer	Exist storm drain discharges to Columbia River

4.2 Identify Each Sampling Location

Identify each sampling location by its unique identifying number such as A1, A2, etc. Include these sampling locations on site map.

Discharge ID	Common description	Latitude (optional)	Longitude (optional)	Discharge Type	Comments
1	Storm connection to exist storm sewer at Office Area	45°39'07"	122°43'55"	Existing storm sewer	Exist storm drain discharges to Columbia River
2	Storm connection to exist storm sewer at Unloading Area	45°39'02"	122°43'55"	Existing storm sewer	Exist storm drain discharges to Columbia River
3	Storm connection to exist storm sewer at Tank Farm	45°38'46"	122°42'56"	Existing storm sewer	Exist storm drain discharges to Columbia River
4	Storm connection to exist storm sewer at Dock Area	45°38'35"	122°43'18"	Existing storm sewer	Exist storm drain discharges to Columbia River
6	Storm connection to exist storm sewer at West Boiler Area	45°39'09"	122°44'02"	Existing storm sewer	Exist storm drain discharges to Columbia River

4.3 Staff Responsible for Sampling

Identify the staff responsible for conducting stormwater sampling. Sampling staff will be identified in the final SWPPP.

4.4 Sample Collection and Handling

Specify the procedures for sample collection and handling; and for sending samples to the laboratory. Specific sample collection and handling details will be detailed in the final SWPPP.

4.5 Submitting Sample Results to Ecology

Specify the procedures for submitting Discharge Monitoring Reports (DMRs) to Ecology.

NOTE: The following excerpt from Permit Condition S9 may be retained to satisfy this requirement:

- The Permittee shall submit sampling data obtained during each reporting period on a DMR form provided, or otherwise approved, by Ecology.
- The Permittee shall submit sampling results within 45 days of the end of each reporting period.

- The first reporting period shall begin on the effective date of permit coverage.

- Upon permit coverage, the Permittee shall ensure that DMRs are postmarked or received by Ecology by the DMR due dates below:

Reporting Period	Months	DMR Due Date
1	January-March	May 15
2	April-June	August 14
3	July-September	November 14
4	October-December	February 14

- DMRs shall be submitted using Ecology's WAWebDMR system or by mail to the following address:

  Department of Ecology
  Water Quality Program – Industrial Stormwater
  P.O. Box 47696
  Olympia, Washington 98504-7696

- Upon permit coverage, the Permittee shall submit a DMR each reporting period, whether or not the facility has discharged stormwater from the site.

- If discharge(s) occurred during normal working hours, and during safe conditions; but no sample was collected during the entire quarter, the Permittee shall submit a DMR form indicating "no sample obtained." If no discharge(s) occurred during the entire quarter or the discharges during the quarter occurred outside normal working hours or during unsafe conditions, the Permittee shall submit a DMR indicating "no discharge."

- If a Permittee has suspended sampling for a parameter due to consistent attainment, the Permittee shall submit a DMR and indicate that it has achieved Consistent Attainment for that parameter(s).

4.6 Sampling Parameters

Identify parameters for analysis, holding times and preservatives, laboratory quantitation levels, and analytical methods. Table 2 lists the parameters that apply to all facilities.

Table 2. Benchmarks and Sampling Requirements Applicable to All Facilities

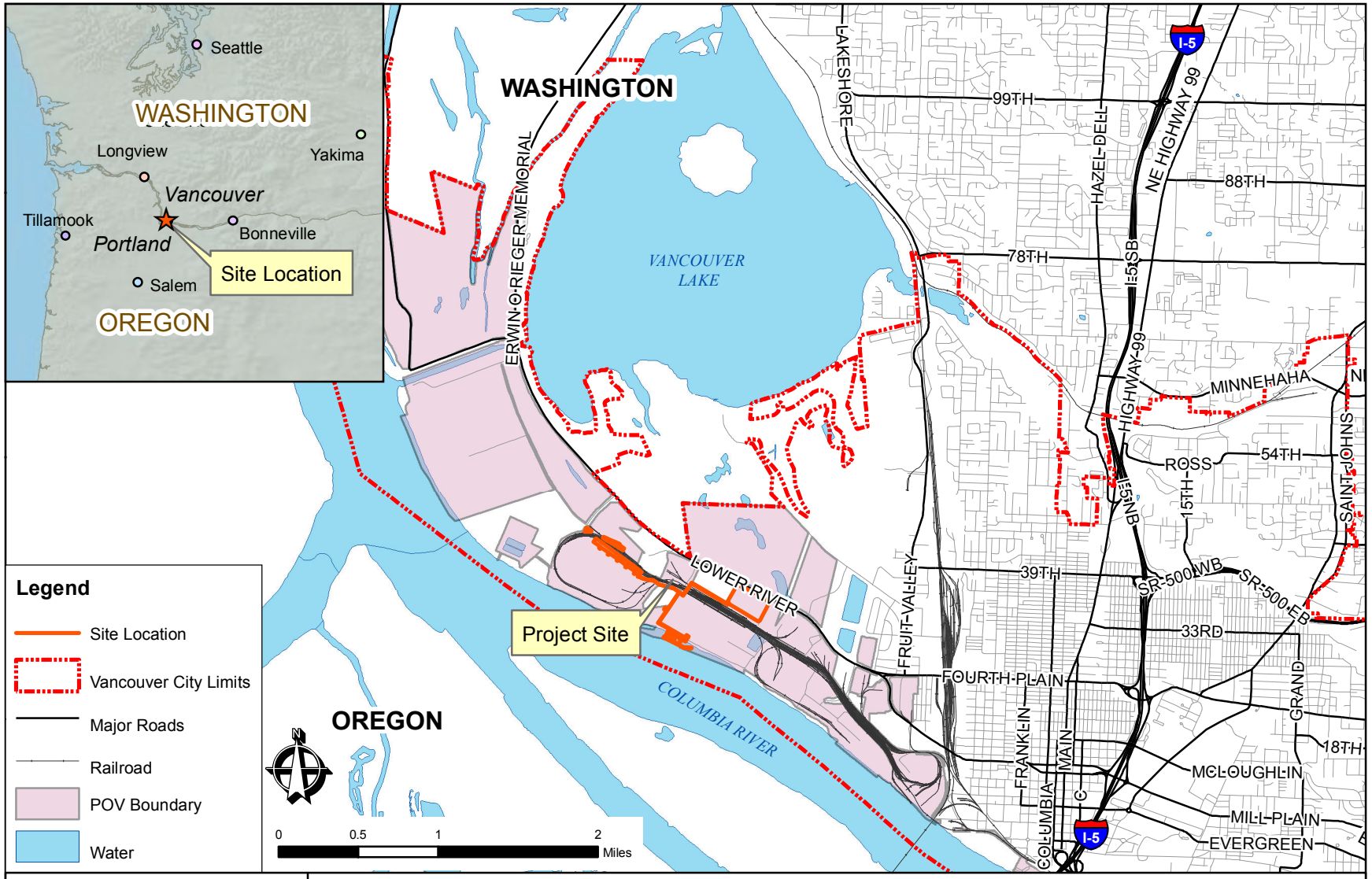
Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency [b]
Turbidity	NTU	25	EPA 180.1 Meter	0.5	1/quarter
pH	Standard Units	Between 5.0 and 9.0	Meter/Paper [c]	±0.5	1/quarter
Oil Sheen	Yes/No	No Visible Oil Sheen	N/A	N/A	1/quarter
Copper, Total	µg/L	Western WA: 14 Eastern WA: 32	EPA 200.8	2.0	1/quarter
Zinc, Total	µg/L	117	EPA 200.8	2.5	1/quarter

a The Permittee shall ensure laboratory results comply with the quantitation level specified in the table. However, if a Permittee knows that an alternate, less sensitive method (higher detection level and quantitation level) from 40 CFR Part 136 is sufficient to produce measurable results in its effluent, it may use that method for analysis.
b. 1/quarter means 1 sample taken each quarter, year-round.
c. Permittees shall use either a calibrated pH meter or narrow-range pH indicator paper with a resolution not greater than ± 0.5 SU.

5.0 SWPPP CERTIFICATION

SWPPP will be finalized and appropriate certification provided prior to the facility starting operations.

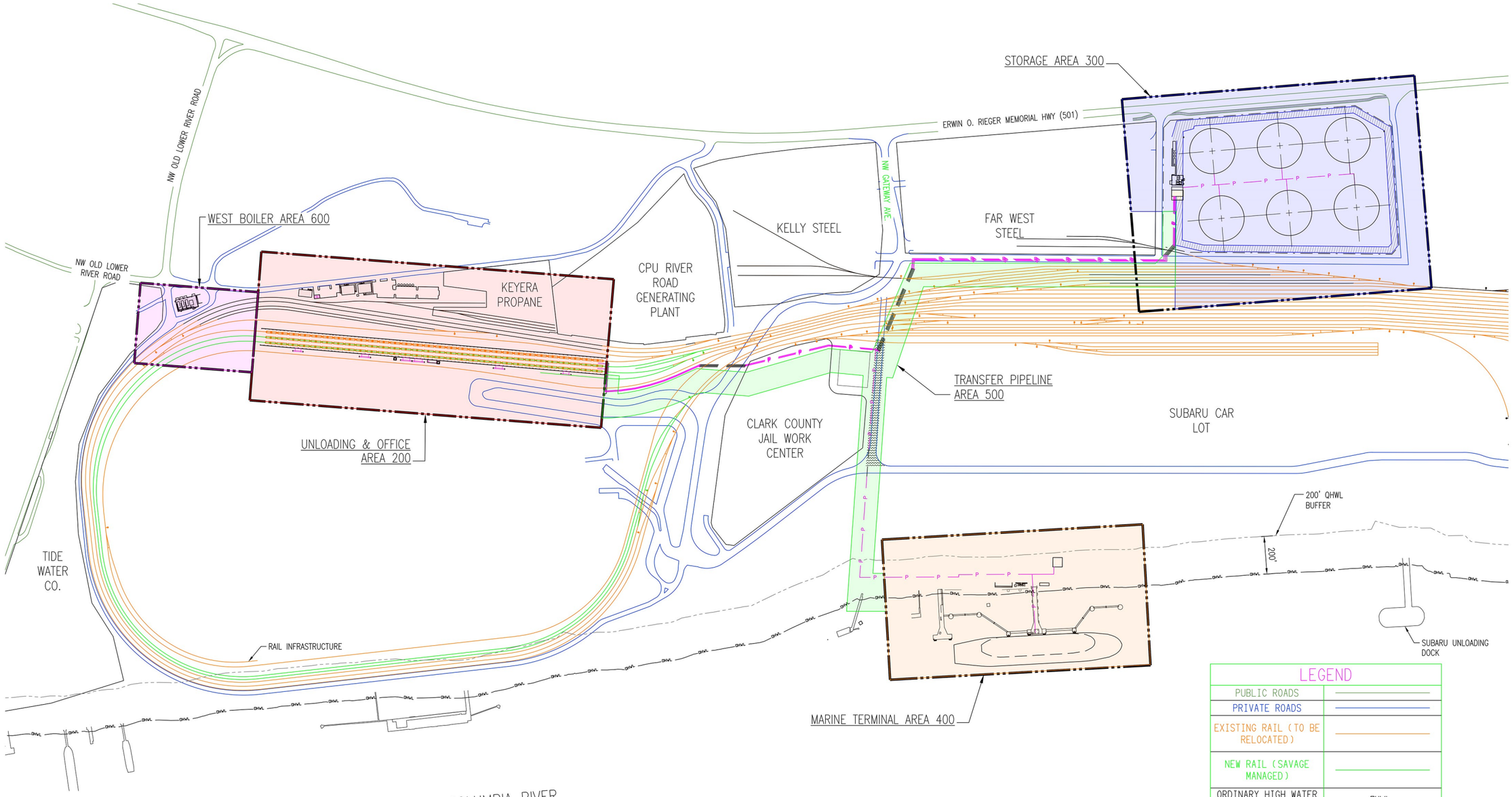
Attachment A
General Location Map



BergerABAM

General Vicinity Map

Attachment B
Site Map



OVERALL SITE – PLAN VIEW
1"=250'

N

LEGEND	
PUBLIC ROADS	
PRIVATE ROADS	
EXISTING RAIL (TO BE RELOCATED)	
NEW RAIL (SAVAGE MANAGED)	
ORDINARY HIGH WATER LINE*	OHWL
OHWL BUFFER	
PIPE LINE	P P
PROPOSED STRUCTURES	
CONTAINMENT BERM	

* OHWL IS APPROXIMATE AND SHOWN FOR ILLUSTRATIVE PURPOSE ONLY

Attachment C
SWPPP Certification Form

ATTACHMENT C
SWPPP Certification Form

The Permittee shall use this form to sign and certify that the Stormwater Pollution Prevention Plan (SWPPP) is complete, accurate and in compliance with Conditions S3 and S8 of the Industrial Stormwater General Permit.

- A SWPPP certification form needs to be completed and attached to all SWPPPs.
- Each time a Level 1, 2, or 3 Corrective Action is required, this form needs to be resigned and recertified by the Permittee, and attached to the SWPPP.

Is this SWPPP certification in response to a Level 1, 2 or 3 Corrective Action? ☐ Yes ☐ No

If Yes:

- Type of Corrective Action?: ☐ Level 1 ☐ Level 2 ☐ Level 3
- Date SWPPP update/revision completed:_____

"I certify under penalty of law that this SWPPP and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate information to determine compliance with the Industrial Stormwater General Permit. Based on my inquiry of the person or persons who are responsible for stormwater management at my facility, this SWPPP is, to the best of my knowledge and belief, true, accurate, and complete, and in full compliance with Permit Conditions S3 and S8, including the correct Best Management Practices from the applicable Stormwater Management Manual. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____	_____
Operator's Printed Name *	Title
_____	_____
Operator's Signature *	Date

* Federal regulations require this document to be signed as follows:
For a corporation, by a principal executive officer of at least the level of vice president;
For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
For a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.

This document shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to the Ecology.

2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Changes to authorization. If an authorization under number 2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of number 2 above shall be submitted to Ecology prior to, or together with, any reports, information, or applications to be signed by an authorized representative.

Attachment D
Industrial Stormwater Monthly Inspection Report

ATTACHMENT D
Industrial Stormwater Monthly Inspection Report

Inspections must be conducted by a person with the knowledge and skills to assess conditions and activities that could impact stormwater quality at the facility, and evaluate the effectiveness of best management practices required by this permit. Retain a copy of the completed and signed form in accordance with Permit Condition S9.C.

See attached Industrial Stormwater Monthly Inspection Report form.

Industrial Stormwater Monthly Inspection Report

Inspections must be conducted by a person with the knowledge and skills to assess conditions and activities that could impact stormwater quality at the facility, and evaluate the effectiveness of best management practices required by this permit. Retain a copy of the completed and signed form in accordance with Permit Condition S9.C.

FACILITY NAME:	**INSPECTION TIME:**	**DATE:**

WEATHER INFORMATION:

- Description of Weather Conditions (e.g., sunny, cloudy, raining, snowing, etc.):
  _____
  _____
- Was stormwater (e.g., runoff from rain or snowmelt) flowing at outfalls and/or discharge areas shown on the Site Map during the inspection: ☐ **Yes** ☐ **No** ☐ **Comments:**
  _____
  _____

I. POTENTIAL POLLUTANT SOURCE AREA INSPECTION AND BEST MANAGEMENT PRACTICES EVALUATION

	Yes	**No**	**Findings and Remedial Action Documentation:** Describe any findings below and the schedule for remedial action completion including the date initiated and date completed or expected to be completed.
SWPPP and Site Map: Have a copy of the SWPPP and site map with you during the inspection so that you can ensure they are current and accurate. Use it as an aide in recording the location of any issues you identify during the inspection. • Is the Site Map current and accurate? • Is the SWPPP inventory of activities, materials, and products current? Any new potential pollutant sources must be added to the map and reflected in the *SWPPP Facility Assessment and Tables 2, 2A, 3, and 5.*			

	Yes	**No**	**NA**	**Findings and Remedial Action Documentation:**
Vehicle/Equipment Areas: ***Equipment cleaning: Check NA if not performed on site. Skip section.*** Is equipment washed and/or cleaned only in designated areas? • Observe washing: Is all washwater captured and properly disposed of? ***Equipment fueling: Check NA if not performed on site. Skip section.*** • Are all fueling areas free of contaminant buildup and evidence of chronic leaks/spills? • Are all chemical liquids, fluids, and petroleum products, on an impervious surface that is surrounded with a containment berm or dike that is capable of containing 10% of the total enclosed tank volume or 110% of the volume contained in the largest tank, whichever is greater? • Are structures in place to prevent precipitation from accumulating in containment areas? – If not, is there any water or other fluids accumulated within the containment area? – Note: If containment areas are not covered to prevent water from accumulating, the SWPPP must include a plan describing how accumulated water will be managed and disposed of.				

Equipment maintenance:	Yes	No	NA	Findings and Remedial Action Documentation:
• Are maintenance tools, equipment, and materials stored under shelter, elevated, and covered? • Are all drums and containers of fluids stored with proper cover and containment? • Are exteriors of containers kept outside free of deposits? • Are any vehicles and/or equipment leaking fluids? Identify leaking equipment. • Is there evidence of leaks or spills since last inspection? Identify and address. • Are materials, equipment, and activities located so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas)? Add any additional site-specific BMPs: _____ _____ _____ _____				

Good Housekeeping BMPs:	Yes	No	NA	Findings and Remedial Action Documentation:
1. Are paved surfaces free of accumulated dust/sediment and debris? • Date of last quarterly vacuum/sweep _____ • Are there areas of erosion or sediment/dust sources that discharge to storm drains? 2. Are all waste receptacles located outdoors: • In good condition? • Not leaking contaminants? • Closed when is not being accessed? • External surfaces and area free of excessive contaminant buildup? 3. Are the following areas free of accumulated dust/sediment, debris, contaminants, and/or spills/leaks of fluids? • External dock areas • Pallet, bin, and drum storage areas • Maintenance shop(s) • Equipment staging areas (loaders, tractors, trailers, forklifts, etc.) • Around bag-house(s) • Around bone yards • Other areas of industrial activity: _____ _____ _____ _____ _____ _____ _____				

Spill Response and Equipment:	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**
Are spill kits available in the following locations? • Fueling stations • Transfer and mobile fueling units • Vehicle and equipment maintenance areas Do the spill kits contain all the permit required items? • Oil absorbents capable of absorbing 15 gallons of fuel. • A storm drain plug or cover kit. • A non-water containment boom, a minimum of 10 feet in length with a 12-gallon absorbent capacity. • A non-metallic shovel. • Two 5-gallon buckets with lids. Are contaminated absorbent materials properly disposed of?				
General Material Storage Areas: • Are damaged materials stored inside a building or another type of storm resistance shelter? • Are all uncontained material piles stored in a manner that does not allow discharge of impacted stormwater? • Are scrap metal bins covered? • Are outdoor containers covered?	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**
Stormwater BMPs and Treatment Structures: Visually inspect all stormwater BMPs and treatment structures devices, discharge areas infiltration, and outfalls shown on the site map. • Are BMPs and treatment structures in good repair and operational? • Are BMPs and treatment structures free from debris buildup that may impair function? • The permit requires Permittees to clean catch basins when the depth of debris reaches 60% of the sump depth. In addition, the Permittee must keep the debris surface at least 6 inches below the outlet pipe. Based on this, do catch basins need to be cleaned? • Are berms, curbing, or other methods used to divert and direct discharges adequate and in good condition?	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**
Observation of Stormwater Discharges: • Is the discharge free of floating materials, visible oil sheen, discoloration, turbidity, odor, foam, or any other signs of contamination? • Water from washing vehicles or equipment, steam cleaning, and/or pressure washing is considered process wastewater and is not allowed to comingle with stormwater or enter storm drains. Is process water comingling with stormwater or entering storm drains? • Illicit discharges include domestic wastewater, noncontact cooling water, or process wastewater (including leachate). Were any illicit discharges observed during the inspection?	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**

II. CORRECTIVE ACTION AND SWPPP MODIFICATIONS DESCRIPTIONS: Additional space to describe inspection findings and corrective actions if needed. Provide brief explanation of the general location and the rationale for the additional or different BMPs.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

III. CERTIFICATION STATEMENTS AND SIGNATURES:

Inspector - Certification: This section must be completed by the person who conducted the site inspection prior to submitting this form to the person with signature authority (see Permit Condition G2) or a duly authorized representative of that person.

☐ The facility is in compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit.

☐ *The facility is out of compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit. This report includes the remedial actions that must be taken to meet the requirements of the SWPPP and permit, including a schedule of implementation of the remedial actions.*

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief."

Inspector's Name – Printed	**Inspector's Signature**	**Inspector's Title**	**Date**

Permittee – Certification:

☐ The facility is in compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit.

☐ *The facility is out of compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit. This report includes the remedial actions that must be taken to meet the requirements of the SWPPP and permit, including a schedule of implementation of the remedial actions.*

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

PRINTED NAME of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**[1]	SIGNATURE of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**[1]	**DATE**

[1]A person is duly authorized representative only if (1) the authorization is made in writing by a person described in Permit Condition G2.A and submitted to Ecology, and (2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated *facility*, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Port of Vancouver Tesoro Savage Petroleum Terminal Project

HSSE Execution, Construction and Commissioning Plan

SAVAGE HSSE Overview

Health, Safety, Security and Environmental (HSSE) Plan

Since January 1998, Savage has maintained a partner company relationship in the American Chemistry Council's (formerly the Chemical Manufacturers Association) Responsible Care® initiative. Savage's interpretations of and commitment to the Responsible Care® Codes of Management Practices are:

Employee Health and Safety: We will protect and promote the health and safety of individuals working at or visiting the Facility. Our employees have the necessary training and resources to perform their work in a safe and prudent manner. Employees attend communication meetings and are given opportunities to participate in developing, implementing, and reviewing health and safety programs. All employees and visitors to the Facility follow safe and environmentally responsible work practices.

Process Safety Management: Procedures are in place to ensure that work is performed safely, effectively and productively. Employees are hired using Savage's comprehensive "Hire Right!" program and trained on applicable work procedures. Each facility has written, process specific operating procedures defining the scope of work, the required personal protective equipment, and the potential hazards. Customer service profiles are maintained on each customer, documenting proprietary and specific service requirements. Equipment is maintained both preventatively and progressively, and documented accordingly. In the event of an occurrence, Root Cause Analysis is performed and corrective actions are implemented.

Community Awareness and Emergency Response: We are committed to emergency preparedness through proper planning, risk assessment and training. We effectively communicate with the community and emergency responders regarding our facilities in an effort to promote emergency preparedness. Where available and practicable, we maintain communication with the Local Emergency Planning Committee (LEPC) and local emergency responders to foster knowledge of our operations and potential hazards. Public concerns about our facilities are addressed on a case by case basis.

Security: We are committed to provide for and promote the general security of our employees, our customers and their products, our facilities and equipment, facility visitors and the general public. Security becomes the responsibility of each employee. It is our intent, where possible, to detect, deter and delay anyone or anything from obtaining unauthorized access to our facilities that would pose a security risk. Security vulnerable assessments are conducted at our facilities to determine security risks and weaknesses. A site specific security plan is developed from the vulnerability assessment. Employees are trained in their responsibilities with regards to the security plan. Security plans are kept confidential and are only shared where necessary.

Pollution Prevention: We are committed to achieving ongoing reductions in the amount of contaminants and pollutants released to the air, water and land. Controls are in place at

facilities to prevent releases of contaminants. We value the communities and physical environments in which we operate. Annual emergency response drills are held in an attempt to reduce or eliminate potential releases into the environment. Work practices are routinely evaluated, through monthly inspections and observations, to ensure proper measures are taken to protect and preserve the environment. Possible waste streams are identified, tracked, recorded and evaluated to ensure proper disposal.

Product Stewardship: We take full responsibility and accountability for the products we handle for our customers, those products we use in providing our services, any by-products that may be generated in the course of our business and our employees are trained to appropriately respond in each instance. We maintain close contact with customers and vendors regarding specific handling instructions. We understand our obligation to protect the health, safety and environment of our employees, our customers and the communities in which we reside. All business is conducted in compliance with government regulations.

Distribution: We take full responsibility for reducing the risk of harm posed by the distribution of the products within our care, custody and control. Employees are trained in proper handling procedures and emergency preparedness and attend safety meetings to develop and maintain the integrity of our distribution practices. We constantly seek creative solutions to improve distribution safety. Inspections and observations are conducted in an effort to preempt distribution failures.

In an effort to maintain an atmosphere of continuous improvement, annual reviews of the above seven codes are performed to ensure that standards are being met. Each at Savage is committed to delivering safe, quality, and environmentally responsible "***Best Value –Worry Free***" service.

Safety Program

Safety is of paramount importance to us. Drawing upon Savage's extensive operational experience, and applying the Savage Hazard Analysis & Prevention System at every stage, Savage designs facilities that are safe, environmentally sensitive, efficient and highly productive. We will implement a strong safe operations plan, which will include:

- Safe operating procedures designed specifically for the Facility and rail operating partners, the product to be handled, and the Facility's operating objectives;
- Safety and emergency procedures that are integrated with the Facility's and the Port's own procedures;
- Implementation of Savage's Lead Safety

VPP
Voluntary Protection Programs
An OSHA Cooperative Program

Specialists and Safety Specialists systems on site, together with ongoing safe operations training; and

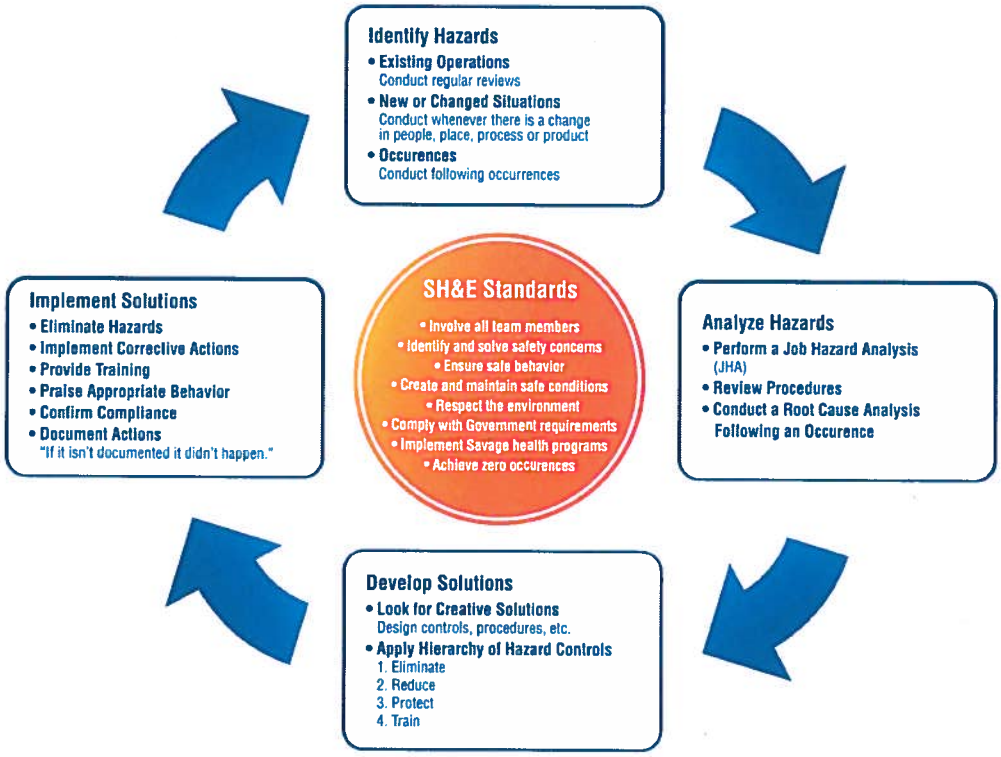
- Access to Savage's safe operations programs and industry training, including OSHA, FRA and HAZMAT training.

Safety Specialist Program:
The objectives of our Safety Specialist Program is to have the front line employees be active team members and actively involved in the safety program, instill Savage's safety standards and the Savage System into the hearts of our front line safety team, provide safety assistance with the manager at the operation level by implementing Savage's proprietary SHAPS program and S^7 operating system, create an environment where we have Safe Behaviors and Safe Conditions, and create a level of Zero Occurrences.

Savage trains operations managers and individual operators to be Lead Safety Specialists and Safety Specialists. Over 40 percent of our current work forces have been trained in these programs.

Savage Hazard Analysis and Prevention System (SHAPS)
SHAPS is Savage's proprietary system used to identify and mitigate hazards. A summary of our SHAPS model in visual form is included below.

SAVAGE Hazard Analysis & Prevention System (SHAPS)



Environment

We recognize and respect the beauty and uniqueness of the area in which the Port is located, and understand its part in the greater ecosystem. We bring to the Port the expertise and commitment of Savage to operate the Facility in an environmentally responsible manner.

Spill Prevention and Response

While we have active programs to test and improve our ability to effectively respond to a spill, our focus is on prevention.

Hydrogen Sulfide (H_2S)

Hydrogen Sulfide (H_2S) is ever present in many industrial processes as a by-product and also during the decomposition of organic matter containing sulfur. H_2S can be found in, but not limited to: refineries, drilling operations, blowouts, tank gauging, tank batteries and wells, recycled drilling mud, and water from sour crude wells. H_2S may also be found in most processes present at sulfur terminals. Savage has extensive experience with H_2S through our sulfur, refinery and crude oil transloading operations.

- All employees will be provided awareness training and testing through Savage's Hazard Analysis & Prevention System in order to be familiar with the potential hazards and proper safe work procedures to follow if exposed to this health hazard. The training will be provided prior to working in any job with potential exposure to H_2S operations;
- Savage will issue personal H_2S monitors to all employees.

Training Program

Savage employees are trained on safe work practices, processes, policies, rules, regulations and site specific operational items. The most important asset at all of our operations is our PEOPLE. We employ the highest quality people by way of Savage "Hire Right, Train Right, Treat Right" program. This program identifies the attributes that best fit the individual operation and incentivizes our people to ask the question; "How can we become better tomorrow than we are today?"

New and Existing Employees

All employees must complete all site specific hazard/customer specific training and site regulatory requirements training before receiving the following training: Employees must complete the New Hire Railroad Operations (RO) Training and pass the associated exams.

Employees in training must complete the following to the satisfaction of a qualified trainer:

- Baseline procedures,
- Site specific procedures,
- Job specific training,
- Pass the written exam(s),
- Pass proficiency exam(s)

Employees may complete the baseline training prior to completing the New Hire RO Training, in a non-production area or a safe location as long as the employee is under the direct and immediate supervision of a trained and qualified employee.

Employees must complete the Port specific training regarding On Track Safety (OTS) along with any additional Port required training.

NOTE:* Any employee **NOT having completed documentation of his/her training must be under the direct and immediate supervision of a trained and qualified employee while performing the new job or task.

HSSE Management

The Health, Safety, Security, and Environmental (HSSE) execution plan provides an overview of relevant HSSE topics and their application to the construction and commissioning of the Tesoro Savage Petroleum Terminal (the "Project"). Tesoro Savage Petroleum Terminal LLC, the Project owner, intends to contract with Savage to manage the construction and commissioning of the Facility.

The objectives of this HSSE Execution Plan are:

- To clearly state the Project HSSE objectives and expectations and provide a tool for the Project Team to use in achieving them;
- To detail the Project organization, responsibilities and methods of management control as they relate to HSSE; and
- To provide an overview of relevant HSSE topics and their application during the Project.

Savage Rules of Safety establish the minimum requirements for the safety procedures to be followed during the Project. Although embedded in each of these rules, it is important to emphasize that:

- Work will not be conducted without a pre-job risk assessment and a safety discussion appropriate for the level of risk.
- All persons must only undertake work for which they are trained and competent, medically fit and sufficiently rested and alert to carry out.
- Engineering controls, work practices and personal protection equipment will be used as per the risk assessment and minimum site requirements.
- Emergency response plans, including rescue plans, will be developed from a review of credible potential emergency scenarios, and will be established before commencement of work.
- Everyone has the right and obligation to stop work that is unsafe.

The Project Team will incorporate Savage Safety Rules through the use of policies for each of the elements.

Where contractor procedures are more rigorous than Savage procedures, the contractor procedure will take precedence and must be followed by the contractor.

Project Objective

The Tesoro Savage Petroleum Terminal (the "Facility") will include the capability to transload North American crude oil from railcar to storage and then to vessel for distribution to refineries on the North American west coast. The Facility will include rail car unloading stations, crude oil storage tanks, vessel loading infrastructure, and associated piping and equipment, and will be capable initially of handling up to two unit trains of crude oil per day, with the potential for near-term expansion to handle up to four unit trains per day. Benefits include:

- Economic benefits to Washington State
- Long-term supply chain benefit (North American vs. imported crudes)
- Reduce ANS dependency as ANS production declines
- Diversify the feedstock options (crude slate and intermediates)

General HSSE Requirements

The expectation is that all contractors will follow all of the Savage HSSE guidelines and procedures for the Project. This includes, but is not limited to:

- Contractors' HSSE Handbook
- Contractor Process Hazards Handbook
- Recycle program (including disposal of fabrication extras)
- Contractor Qualifications
- Savage Safety and Health Manual

Specific HSSE Requirements

Possible Chemical Exposure

- H_2S – MSDS
- Utility Water – MSDS
- Crude - MSDS
- Diesel - MSDS
- Crude Additive 1 - MSDS
- Crude Additive 2 - MSDS

Principles

The following principles will guide the collective Project Team in all Project activities:

- There is no task so important that the time cannot be taken to do it safely.
- People are our most important asset.
- Communication is the key to injury prevention.
- All injuries, property damage and environmental incidents are preventable.
- Everyone is expected to stop unsafe work.
- Near miss reports are a gift. Elimination of little things will prevent larger things from occurring.
- Addressing safety in the planning phase of a job saves time and prevents incidents
- Effective safety management and leadership are good business.

Project HSSE Policy

Everyone who works for Savage is responsible for getting HSSE right. Good HSSE performance and the health, safety and security of everyone who works for us are critical to the success of our business.

Our goal is simple - No accidents, No harm to people, and No damage to the environment.

We continue to drive down the environmental and health impact of our operations by pollution prevention, reducing waste, emissions and discharges, and using energy efficiently.

Culture

Savage has a well-established HSSE program and a history of best-in-class safety and environmental performance. Although nothing is being taken for granted, the Project Leadership Team expects to benefit from this tradition of safe work performance.

Workforce

The Project is located in Vancouver, WA. The area is home to a local contractor workforce. The duration of the Project and its timing in relation to other projects in the area should allow for a stable, well trained workforce. Each contractor will be responsible for screening its employees to determine their appropriateness for a role and for assuring their competency.

SAVAGE and Business Unit Alignment

The HSSE Execution Plan as outlined in this document was developed in alignment with Savage HSSE goals, expectations and standards as presented in the following:

- Savage Rules of Safety
- Group Defined Practice for Assessment, Prioritization & Management of Risk
- Reporting HSSE and Operational Issues
- Group Defined Practice for Incident Investigation
- Savage Control of Work Standard
- HSSE Review of Projects

Project HSSE Goals

We are convinced that, through a dedicated commitment to HSSE, a goal of ZERO incidents is achievable.

Project HSSE Targets

Output Metrics			Input Metrics	
Days Away From Work Cases	0		To be decided	
Recordable Injury Frequency Rate (RIF)	0.35		Joint Safety Observations Completed	
Loss of Primary Containment (LOPC)	0			
Environmental Reportable Incidents	0		Pre-Task Assessments Completed	

We are committed to completing this Project incident and injury free. Our commitment to safety is absolute and never ending. We care about the health, safety, and security of every worker, neighbor, and customer, and we will protect the environment in which we operate.

By following procedures and policies, performing risk assessments, upholding the responsibilities in Control of Work, and practicing and expecting safe work activities from others, we can make this Project incident and injury free.

HSSE Training Expectations

Training expectations include HSSE-related, project-specific training for the Project Team members and the construction contractors' supervisory personnel, as well as turnover and pre-commissioning training for the Construction Management and Commissioning personnel.

Orientation

All personnel are required to complete the Safety Orientation Training program before performing work on site.

- Training for individuals who are making deliveries, but not performing other work onsite, may be limited to the Driver's Site Safety Orientation video.
- Visitors will be escorted by a Project Team member or by suitably qualified contractor personnel at all times. The Visitor Orientation program is provided by the HSSE Team.
- The use of the Escort Policy must not be used to circumvent training requirements.
- Authorization for escort training and the authority to escort Project visitors is provided by the Project HSSE Manager.

Contractor Specific Safety Orientation

Prior to performing any work onsite, new contractor employees must receive all required contactor-specific safety training required for their role. In addition, the contractor-specific training must detail the Project specific risk assessment procedure.

Each contractor Safety Execution Plan must include a safety training matrix that identifies the training provided to each employee, by role, trade or other grouping.

Project Specific Safety Orientation

Completion of a Project Specific Safety Orientation is required for unescorted access to the Project site. The orientation will be facilitated by the Project HSSE Manager and the Project Manager, or their designees.

Specialized Training

Specialized HSSE Training (i.e. Safety Tech, HazOp, COW, etc.) may be required for certain roles within the Project Team. The Project HSSE Manager will coordinate this training as needs are identified.

Safety Committees

Safety committees are a recognized way to increase the effectiveness of the overall safety program. The Project recognizes the value of these committees and the empowerment they provide the contractors.

Petroleum Terminal Project Craft Safety Committee

The Project will maintain a cross functional safety team to provide a forum for addressing safety and health concerns related to field construction activities. The team will be comprised of hourly/craft employees with staff support. All contractors performing field construction activities on the Project must have representation on the Project Safety Team. Terms of Reference are included in Appendix 5.

Safety Meetings

Safety meetings differ from safety committees in their intent and format. The Project requires both safety committees and safety meetings.

Toolbox Talks

Daily toolbox talks are required for all groups prior performing field work. The talks should be specific to the work to be performed that day (Permits, PPE requirements, JSAs, PTAs, etc.). These should be led by a work crew member and be a *conversation about the topic, not a presentation*

Weekly All-Hands Safety Meetings

At the start of each work week, an all-hands meeting will be held. General safety information will be shared along with an update on the weeks planned scope. These informal meetings will be co-lead by the Construction Manager and HSSE Manager or their delegates.

Monthly Safety Meeting

Each contractor must have a monthly safety meeting with their onsite employees to provide a forum for an extended conversation about a project-specific training topic.

All-Hands Safety Meetings

The Project will present the content from the all-hands meetings. The content may be modified at the discretion of the Project HSSE Field Coordinator to ensure relevancy to the Project.

Communications

Effective communication is critical to the success of the Project. Communication occurs in many forms, including email, groups meetings, and individual face-to-face. When it comes to HSSE concerns, it is important that we communicate quickly and completely so that appropriate action can be taken to mitigate the concern.

Policies & Procedures

Relevant and Project policies & procedures will be available to all contractors through online access. Hard copies of the most relevant Health & Safety Procedures will be kept in the Permitting Trailer for easy reference.

Meetings

Meetings are effective for sharing consistent information with multiple people. They do not replace the need for individual face-to-face communication. Meeting participation should be broad enough to meet the objectives of the meeting, but attendance should also be consciously limited to only those who are required.

Radio Communication

The ability to effectively communicate has direct safety implications. Project radio traffic will occur on Savage's radio system. Radio channels on the radio system will be assigned and a chart will distributed.

Contractors may choose to operate on their own radio systems; however, select personnel for each contractor must also carry Savage radios. At a minimum, all Project safety personnel will be available on Savage radios.

HSSE Leadership

The Project Team will demonstrate HSSE leadership by incorporating HSSE elements into a variety of Project activities. This HSSE Execution Plan and its details must be supported by all team members.

Demonstration of HSSE Leadership

All team members will:

- Start each meeting with a relevant HSSE discussion topic.
- Share lessons learned to aid in raising HSSE awareness.
- Participate in all HSSE related training.
- Actively report, investigate and embed learning from safety opportunities and near misses.

Additionally, Project Leadership Team (PLT) members will:

- Review all new and outstanding HSSE issues and risks, their status and projected resolution date
- Actively engage workers in conversations about the risks of the work they are performing and to solicit ideas for minimizing these risks as well as ideas for improvements to the processes in place to control these risks.

HSSE Organization

The Project Leadership Team is committed to ensuring sufficient HSSE resources for the duration of the Project. Field roles will be filled by a combination of Savage and/or Savage trained contractor safety professionals. Staffing levels will be regularly reviewed and may be adjusted based on the quantity and risk of the work being performed. The Project HSSE Manager, in consultation with the Project Manager and the HSSE Manager, will determine the minimum HSSE staffing levels for each phase of the Project.

Project Safety Organization

The Project will include a dedicated HSSE Manager whose focus will be to lead the development and delivery of the HSSE Execution Plan requirements in a consistent and effective manner to achieve outstanding HSSE performance. The Construction Management Team (CMT) will include HSSE Manager who will work closely with the contractors to help them interpret the Project and safety requirements.

Each contractor will be required to develop a detailed Construction Execution Plan (CEP), with emphasis on safe execution of the work. The CEP must include safety staffing levels in addition to the other requirements outlined elsewhere in this document. The CEP will be reviewed and agreed during a pre-mobilization review with the contractor's leadership team and the PLT.

A contractor safety representative must be onsite at all times project work is being performed, regardless of the nature of work or crew size. Exceptions must be approved by the Project HSSE Manager.

HSSE Interface Requirements

The Project will maintain alignment with HSSE philosophy, performance expectations and culture. To ensure this, the Project will routinely interact with HSSE resources from the HSSE

team. The Team will aim for collaboration and transparency on design features and construction practices.

Savage's HSSE Team for the Project is interfacing and providing resources as follows:

- Coby Long, CSP is the Savage HSSE Director, and is considered a key stakeholder for HSSE related issues for this Project. The PLT will enroll him in relevant issues, successes, and staffing requests.
- Coby Long or approved designee is the Site Lift Authority. He will approve each critical lift plan as well as participate in the Day of Lift review

The Project HSSE Manager is the single point of contact for coordination of these resources.

HSSE Assurance Processes

The Project will use a variety of assurance processes to ensure good HSSE practices will be included in the design. These include;

- Ergonomics evaluation of the unloading rack work station duties using HITRA or other techniques.
- Evaluation of the personal exposures to hydrocarbons for the unloading work activities and determining PPE required.
- Fire Hazard Analysis of the process and the required fire protection systems.
- Hazard Operability (HazOp) studies of the final design.
- Constructability Review of safety issues.

These assurance processes will be identified in the Engineering Schedule to ensure they are completed at the appropriate time.

HSSE Roles and Responsibilities

It is expected that everyone on the Project, regardless of their role, be actively engaged in safety. Personal commitment to uphold the safety values of the Project will be sought from each individual on the Project team.

All Project Team Members

All Project Team Members must:

- Stop work that is unsafe
- Demonstrate HSSE commitment through their actions
- Actively participate in HSSE meetings and Risk Review meetings
- Share lessons learned
- Work in a manner which prevents accidents, eliminates harm to people and does not damage the environment.
- Participate actively in the Project's Risk Identification Meetings
- Understand the Environmental Policy and their role in its implementation.
- Be aware of the potential environmental aspects and impacts of the operation.

- Acquire training as outlined in this HSSE Management Plan.
- Align the Projects overall objectives with Savage's overall safety goals.
- Document field observations

Project Leadership Team

The Project Leadership Team must:

- Lead development of the site specific Project HSSE Execution Plan.
- Ensure that resources are in place to execute an effective HSSE program (i.e. HSSE organization, permitting, training, equipment, qualified personnel, finance and time).
- Develop and assign personnel performance objectives for implementing the HSSE Execution Plan.
- Ensure that Project contractors and suppliers are in alignment with the HSSE goals of the Project.
- Evaluate and select contractors who adhere to the high HSSE expectations of the Project.
- Engaging contractor leadership to ensure their full participation in the HSSE Management of their employees.

Commissioning Team

- Participate and encourage the successful implementation of the HSSE Execution Plan
- Ensure compliance with the Project HSSE Policies.
- Engage in conversations about hazard identification and mitigation.
- Participate in communication with stakeholders regarding Project activities as well as activities that may impact the Project.
- Lead preparation for and communication of the introduction of process hazards into the Project Brownfield site.

Construction Management Team

The Construction Management Team must:

- Schedule work in such a manner to minimize Simultaneous Operations (SIMOPS) risks.
- Document field observations,
- Ensure compliance with and Project HSSE Policies,
- Engage the workforce in conversations about the risk of the work being performed.
- Ensure that task performance remains consistent with the terms of the permit and risk assessments, and intervenes to stop work any time the conditions warrant.

HSSE Team

Project HSSE Team must:

- Listen to field workers concerns and suggestions, ensuring they are addressed appropriately.
- Ensures personal and process safety elements of the Project, from concept through design, construction & commissioning are given their due attention.
- Coordinate with the business unit on environmental permitting requirements.

- Maintain Project HSSE records and documentation.
- Compile Project HSSE scorecard data.
- Monitor and assign responsibility for completion of HSSE action items included in the Project Risk Register.
- Coordinate the input of data into Savage's system of record for tracking incidents.
- Maintain relevant environmental documentation and records.
- Conduct HSSE management and technical oversight for Project's contractors.
- Conduct Project Specific Safety Orientations.
- Daily validation of Brownfield and Non-Brownfield conditions and review of Brownfield and Non-Brownfield site safety conditions.
- Reinforce positive HSSE behaviors and actions of Project personnel.
- Provide HSSE assurance through field and recordkeeping audits.
- Participate in daily toolbox meetings.
- Review risk assessments to ensure they accurately recognize the tasks, hazards and controls.
- Verify implementation and execution of the HSSE Execution Plan, compliance with the Savage Rules of Safety and associated contractor HSSE plans and procedures

HSSE in the Execute Phase

The hazards of the Project are comprised of a combination of existing site hazards along with the hazards and safety risks created as a result of the work scope. The site hazards will vary depending on the exact *location* of the work while the Project hazards vary based on the *nature* of the work. When risk assessing the work, it is critical that both types of hazards are addressed and appropriate controls be put in place to minimize the likelihood on an incident.

Work on the Project has been broken into two categories; OSBL and ISBL. ISBL stands for Inside Battery limits and refers to work that will occur in a designated area in the immediate vicinity of the new Project being built (and outside of the existing perimeter fence). This includes extensive civil work. The vast majority of the ISBL work will occur within an area that has been defined as a "Brownfield" construction site. Although there are operating facilities surrounding the Project, the site itself is comprised of native soils and clean fills. The surrounding facilities are: Keyera, Clark County Public Utilities, Far West Steel, Subaru, BHP Billiton, Clark County Correctional Facility and Cal Portland.

OSBL stands for Outside Battery limits and refers to work that will occur outside the immediate area of the new Project (and inside of the existing perimeter fence). This includes much of the tie-in work that will occur throughout the Facility. This work is often within the battery limits of other operating facilities. It is especially important to discuss site hazards when risk assessing this work. All Port of Vancouver site work practices, policies & procedures must be adhered to for work.

Because of these differences, work rules and safety procedures may vary between OSBL and ISBL. The Control of Work process is one example where significant differences will exist. To

minimize confusion and drive consistency, separate teams will be utilized for execution of ISBL and OSBL work.

Brownfield Site Hazards

The following are recognized as the primary site hazards associated with the Project work location:

Proximity to operating facilities and live rail lines (Fire/Explosion/Spill/Toxic Release)

Project work is occurring directly east of operating facilities as named above. The hazard of operating facilities is a constant exposure. Constant awareness of the nearby facilities will be maintained, and communication plans will be in place to ensure the Project is notified in the event of an operational issue that could result in personnel exposures.

Traffic

The worker/vehicle interface is a recognized hazard. The Project logistics plan must address this exposure by identification of designated walk routes, cross walks and vehicle access points. Significant soils excavation and hauling will be required in this Project. An excavation and hauling safety plan will be developed in the Define Phase after contractor selection. Traffic flow and staging of materials will need to be coordinated to minimize impacts to the Project as well as activities (plot plan with lay down and traffic flow will be developed in Define). Any required closures will need to be coordinated with operations, maintenance and construction to minimize impacts to operations. Construction equipment cleanliness needs to be reviewed to minimize impacts to sewer systems and storm water. We will need to evaluate the need for a contained wash area to minimize mud tracking in the construction sites and on public roads.

Project Hazards

In addition to common construction hazards, the following are recognized as the primary hazards associated with the Project work scope:

Confined Space Entry

Confined space work may occur throughout the Project. Any work that requires personnel entry into drums, tanks, towers, vaults, and trenches deeper than 4 feet, must have a Confined Space Entry permit. Excavations may also require a Confined Space Entry Permit, based on configuration. The HSSE Manager will evaluate all excavations to determine if an entry permit is required. Contractors must ensure that the Attendants and Entrants are adequately trained. The Confined Space Entry Policy will be used for all Project confined spaces.

Each confined space will be equipped with a continuous gas monitor per the Continuous Monitoring policy. Exceptions will need to be approved in advance by the Project HSSE Lead. Also, as part of the Emergency Response and Rescue Plan, all confined space entries will be reported to the Shift Superintendent daily.

Cords & Hoses

Cords and hoses must be routed in a manner to minimize trip hazards and the potential for damage to the cords or hoses from passing equipment and vehicles. When overhead routing is not possible, controls must be in place to increase visibility and prevent damage. At no time must vehicles or equipment be permitted to pass over unprotected cords or hoses.

Elevated Work Platforms

Work from elevated work platforms is common in construction and can reduce the risks associated with building scaffolding or working from ladders for short duration work. At the same time, these tools introduce a variety of risks to the jobsite. Elevated work platforms may only be used for their intended purpose as specified by the manufacturer. They may not be rigged from or used as a crane. Workers must work with their feet on the floor of the basket and wear a full body harness and lanyard fixed to manufacturer provided and approved attachment points in both scissor and boom style lifts. An Elevated Risk Assessment or Risk Assessed Procedure is required for any transfers from work platforms at elevation.

Excavation/Ground Disturbance

The Project has significant scope around the excavation of a large volume of dirt. Extensive underground surveying will be conducted in the area to ensure it is safe to perform excavations in the area. Underground obstructions may exist within the Project boundaries so proper planning and execution of subsurface work is essential. For purposes of permitting any ground disturbance activities, the Project will follow the Excavations, Trenching, and Shoring and Pile-driving policy.

Falling/Dropped Objects

Falling objects pose a risk wherever work is performed at elevation. Control of objects at height via toe boards, netting, proper rigging and tool lanyards is our primary control measure. Secondary controls may include control of personnel working below elevated work. Flagging may only be used as the primary means of falling object protection when other controls have been determined to be infeasible. When flagging is used for falling object protection, the use of red "Entry Requires Special Permission" flagging is required. Each contractor's Safety Execution Plan must address how falling object protection will be achieved.

At a minimum, netting is required on all elevated platforms and scaffolding during construction.

Falls from Elevation

The Project will follow the Fall Protection Policy while working at heights. Contractors will be required to; provide their employees with approved fall protection equipment, ensure that employees are trained and, ensure that they follow this procedure. As part of the pre-task risk assessment, appropriate fall protection and restraint or arrest systems, including appropriate tie off points, must be defined. Fall Protection Policy includes scaffold and ladder specifications as it relates to fall protection and working at heights and must also be followed.

All elevated work, regardless of the height, must be performed from an appropriate ladder or work platform. At no time may work be performed while standing on piping, pumps, buckets, chairs, wooden boxes or other surfaces not designed as work platforms.

Flagging & Barricading

The Project will follow the Policy for flagging and barricading. Barricades and flagging must be removed by the group completing the work as soon as it is safe to do so. Each week, at a minimum, all flagging across the site must be removed and work zones re-established at the start of the next shift.

Hand/Portable Tools

Improper use of tools is a leading cause of injury. Tools may not be modified from their original design and may only be used for their intended purpose. All guards must remain in place while the tool is in use. If an acceptable tool is not commercially available and one needs to be modified or manufactured onsite, a risk assessment must be conducted and be approved by the HSSE Manager.

When equipped with a removable handle, the handle must remain in place unless it creates a physical obstruction. Prior to removal, the task must be documented on the Pre-Task Assessment (PTA) for the work and the PTA must be signed by a contractor safety representative. The handle must be replaced immediately following the task for which it was removed.

When using MAG drills, the power supply must be tagged where the extension cord is supplied power and the drill must be physically secured (chained or strapped) to prevent falling in the event of a power failure.

It is important to have the right tool for the job. The use of cheater bars or double wrenching is expressly prohibited.

Hot Work

The entire Project Non-Brownfield has been classified as a fabrication area. Hot work within the designated Non-Brownfield will not require a Safe Work Permit, continuous monitoring or a dedicated fire watch. However, work areas must still comply with the following;

- Work areas must be free of combustible materials,
- A fire extinguisher or water hose must be available at the work site,
- Sparks must be contained to the immediate work area, and
- Shielding must be adequate to prevent flash burns

Hot work that occurs outside the Non-Brownfield will be managed in accordance with the Safe Work Permits Policy.

Housekeeping

Everyone is responsible that their area is kept in a safe, clean condition at all times. This includes the removal and proper disposal of nails and other debris. Satisfactory working conditions and the safety of all depends upon your housekeeping habits. A deliberate roll back of each work areas must occur daily at the end of the shift. Tools and materials may remain staged, but all debris must be cleaned up and disposed of.

Knives

The improper use of utility and pocket knives is a common cause of injury on construction Projects. This is often the result of using the wrong tool for the task (i.e. stripping wire with razor knifes or knife cutting zip ties). Contractors must actively manage the use of knives and keep their use to a minimum. Wire strippers, side cutters, scissors and safety cutters are generally safer alternatives to knives. When physically possible, these safer options must be used.

When knives are determined to be the most appropriate tool for the task, they must be used with a cut resistant glove. At a minimum, a level 2 (ANSI/ISEA 105-2005) glove must be worn on the opposite hand.

Lifting (Crane)

The Project will follow the Lifting Policy for all lifts. The contractor will be required to fill out any Critical Lift Certificates needed, and provide the technical specifications of the lift. Savage HSSE will facilitate the required Elevated Risk Assessment. The Lift Authority will approve each critical lift prior to commencement as well as participate in the Elevated Risk Assessment.

As part of the Emergency Response and Rescue Plan, all critical lifts that should not be shut down in the case of an evacuation will be reported to the Shift Superintendent. This report must include the names of specific individuals authorized to remain behind to secure the load to a safe position in the event of an alarm.

Personnel under Loads

Personnel access must be restricted while lifting operations are underway. This may be achieved through the use of flagging or spotters. The only time personnel may be under a suspended load is while performing approved multi-lift rigging. At no other time may a person be positioned under a live load. Tag lines must be used to control the load to allow control while maximizing the distance between the handler and the load.

Lifting (Manual)

Improper manual handling of materials cause more injuries than any other work activity. Incorrect lifting is the number one cause of back injuries and also accounts for many hand and foot injuries. Each contractor's Safety Execution Plan must address manual material handling including weight limits for single person lifts.

Mobile Equipment Operations

Safe operation of heavy equipment requires supervision, adequate risk assessment/management, competent operators and proper maintenance of the equipment. Trucking and heavy equipment operations are one of the Projects greatest exposures and will require active oversight. Prior to the start of excavation activities, the contractor must provide a detailed Excavation Safety Plan that includes components to ensure oversight, adequate risk assessment/management, competent operators and proper maintenance of the equipment. At a minimum, yellow high visibility vests will be required for all ground personnel working in the vicinity of mobile equipment operations. Spotters are required for all vehicles and equipment backing. The only exceptions are passenger vehicles backing from designated parking spots.

Personnel Baskets

The use of a crane to hoist employees in a personnel basket is prohibited except when the use of conventional means is determined to pose a greater risk. All lifts using a personnel basket are considered critical lifts. No Personnel Basket lifts are anticipated on this Project.

Pile Driving

If the Project scope calls for the installation of piles will be done in compliance with the Excavations, Trenching, and Shoring and Pile-driving policy, the contractor must develop a Plan that specifically addresses the health & safety issues associated with the pile driving operations, including material handling methods, pile lifting, site logistics, SIMOPS, and PPE requirements.

Powered Work Platforms

All powered work platforms such as Scissors Lifts, JLG, or other must:

- Have a documented written inspection prior to being put into use on site.
- Have a daily pre-user (documented) inspection.
- Have all occupants in a fall protection harness and tied off at all times during lift operation.
- Only be operated by a trained/qualified operator.
  (In the event of an emergency situation anyone can operate ground controls to bring the platform to the ground to assist in exiting the area and or rescue)

Scaffold Requirements

All requirements outlined in the Scaffold Safety policy must be followed for Project scaffolding. In addition, within the Area, the following requirements apply:

- Swing gates must be used at all access points
- Fixed toe boards must be installed around each work platform.
- Netting must be installed to the top rail to provide falling object protection on all scaffold decks
- Green tags indicate a scaffold is complete and there are no identified hazards. Yellow tags must be used whenever hazards exist, such as head knockers, holes in deck, uneven decking, etc. The need for a harness will be determined by the competent

scaffold builder and contingent upon the nature of the hazard. Harness requirements must be noted on the yellow tag.

Slips, Trips & Falls

Slips, trips and falls associated with non-risk assessed activities remains a leading cause of injury within Savage. The construction site will be managed to minimize hazards associated with slips, trips and falls. Designated walk routes must be established and maintained in good condition. Hazardous ground conditions must be immediately corrected, flagged or barricaded. Employees will be prohibited from taking short-cuts through un-improved areas or areas of active construction.

Soil Disposal Plan

This Project may require large quantities of soil to be removed from project site and replaced with structural fill material. As much of this soil as possible will be re-used within the Facility while the balance will be transported offsite to an approved disposal facility. This activity would generate a significant amount of traffic, which must be managed by the selected hauling contractor. Trucking activity has the potential to cause community complaints if not properly managed. The contractor must provide a detailed Excavation, Transportation & Disposal Safety Plan that includes expectations related to onsite stockpile operations and management of issues likely to result in community complaints including truck routing, cleaning procedures and schedule. All soil disposal will be done in accordance to local, state and federal laws.

Safety Activities

A variety of proactive safety activities will occur through the duration of the Project that are intended to help deliver on our goal of no accidents, no harm to people, and no damage to the environment. Our objective is to identify and correct the little things before incidents occur.

Safety Observations

Documentation of field safety observations is expected of the Construction Management, Project Leadership and HSSE Teams. A schedule will be created that will pair Savage and contractor representatives for joint safety tours. The results of these observations will be reviewed and the data analyzed to identify trends or specific items needing attention. These results will be discussed with the Companies involved as well as shared with the Project Safety Team for Project-wide impact.

Compliance Assurance

A primary role of the HSSE Manager is compliance assurance. Their regular field presence and intimate knowledge of both the Project and site HSSE expectations allows for timely and constructive feedback to the workforce. As opportunities are identified, the HSSE Manager will provide coaching and guidance to help bridge any gaps between the Project's expectations and the performance observed.

The Project HSSE Manager will coordinate routine audits of key elements of the contractor's safety programs to assure they are being carried out as described. These audits will be both formal and informal and include reviews of both field activities and supporting documentation.

Investigations

All events requiring formal investigations, including injuries, incidents and near misses, will be entered into Savage's S7i System. All investigations will be coordinated by the Project HSSE Manager. The Project will use the classification system for determining the appropriate level of incident investigation based on the severity or potential severity of the event.

General Safety & Health

The following section outlines additional Project health and safety expectations not identified in the Site Hazards or Project Hazards sections above.

Complacency

Early success can often lead to complacency, where satisfaction is accompanied by a decrease in awareness of actual danger or deficiencies. A concerted effort to address complacency will continue for the duration of the Project. Variation of routine is important. This can include changing formats of meetings, safety stand-downs, etc.

Emergency Preparedness and Response

The Project will coordinate the Emergency Preparedness plans with the Port of Vancouver and Vancouver Fire Department. As such, all conditions of the EPP will apply to the Project.

Emergency preparedness drills will be conducted at the start of the Project to familiarize everyone with the appropriate parts of the emergency response plan.

Exceptions or deviation from Existing Safety Policies

Exceptions from established written Safety and Health procedures at the Project require a formal exception as will be outlined in the Safety Manual. Exception requests cannot be approved if it is in conflict with WISHA or other government laws or regulations. Exception requests related to the Project must be coordinated through the Project HSSE Manager. Recommendation for approval must include the relevant SME. The Project Manager is the approving Manager for all Project exception requests.

Hazard Communication & Access and Control of Exposures to Chemicals-

Contractors must have a written Hazard Communication Program and ensure that their employees and subcontractors have received the required training in accordance with WA DOSH requirements. Contractors will provide the Project HSSE Team with Material Safety Data Sheets (MSDSs) for review and approval for all new chemicals brought in to the. The Project HSSE Team will gain approval prior to the chemicals entering the site.

Contractors must ensure that all containers and properly labeled, secured, and that spill prevention measures are in place.

Industrial Hygiene Assurance and Monitoring

Health for the Project team will be managed by:

- Including health issues as a topic for HSSE review meetings
- Assuring that all Project team members follow site PPE requirements
- Providing training that reviews site specific health hazards (noise, toxic vapors, etc)
- Identifying, assessing, and mitigating health hazards as part of job task risk assessments
- Reviewing any new chemicals brought on site.
- Conducting Industrial Hygiene audits (Health Team)

Line of Fire

On nearly every job there is something which could hit, spray, pinch or crush. The first priority should be to eliminate these hazards. If this is not possible, we want people to focus on moving themselves out of the line of fire. Awareness training on "Line of Fire" recognition must be included in each contractor's Project specific safety training and covered in toolbox meetings.

Management of Change

Temporary and permanent changes to organization, personnel, systems, process, procedures, equipment, products, materials or substances cannot proceed unless a Management of Change (MOC) process is completed. This must include:

- a risk assessment conducted by all areas impacted by the change
- development of a work plan that clearly specifies the timescale for the change, and any control measures to be implemented regarding:
    - equipment, facilities and process
    - operations, maintenance, inspection procedures
    - training, personnel and communications
    - documentation
- authorization of the work plan by the responsible person(s) through completion

The Project will meet the requirements of major projects, including application of Management of Change from the Define Stage HAZOP through Execute and turnover to operations. All changes to equipment and facilities will follow the Project's Change Management Procedure. If the change is considered to impact safety, the existing Management of Change procedure must be used for the ISBL as well as the OSBL.

Personal Protective Equipment (PPE)

All Project employees must use approved safety equipment and maintain equipment in accordance with OSHA and Savage requirements. For contractor personnel, the PPE requirements for the Project will be reviewed at the new hire orientation. Personnel must be trained on the use of any required PPE before beginning work.

In addition to the requirements outlined in the procedures above, the Project has the following PPE requirements:

- High visibility vests will be worn by all personnel in the Brownfield and Non-Brownfield. Requirement to wear vests may be waived by the Project HSSE Manager as conditions warrant.
- Dust goggles are required under face shields when chipping or grinding concrete and are also required when working in dusty or dirty conditions.
- Face shields must be worn over safety glasses when using impact guns, grinders, or other particle producing tools or work.
- Workers full names must be visible on the front of their hard hats
- Fire Retardant Clothing (FRC) will not be required for the portion of the work until hydrocarbons are introduced.

Safety & Health Policies

Other Safety and Health Policies may be applicable to the Project. Prior to mobilization in the field, each contractor must perform a gap analysis to identify discrepancies between their policies and the policies or expectations. The gaps will be evaluated and the final decisions will be agreed and documented prior to commencing work in the field.

Simultaneous Operations

Because of the high density of work that will occur on the Project, management of Simultaneous Operations is an essential element of our safety program. Initial risk assessments often occur well before the day of work and various tasks in the same area may be risk assessed by different people. It is often hard to predict what other work may be occurring on the day work will be executed. For this reason, it is essential that a review of Simultaneous Operations occur as part of the Pre-Task Assessment (PTA) before each and every job task is started. Coordination and communication between adjacent crews is essential to the safe execution of the work. This coordination and communication is an essential element of the permit to work process.

Workers are expected to periodically review and update their PTA cards as needed throughout the day. Changes in hazards, including new SIMOPS, should be documented.

Smoking Policy

In accordance with the Smoking Policy, smoking is prohibited inside the fence line, and on Savage property except for specially marked areas located in the parking lots. The purpose of this policy is to control ignition sources within the Facility as well as reduce exposure of personnel to harmful second hand smoke. Smoking is permitted only is specially marked areas and smoking material must be left in vehicles or in the break facilities. Smokers are required to minimize the amount of time spent in smoking areas and are asked to keep the areas clean.

Transportation

As outlined in the Transportation and Traffic Safety Policy Savage standards and Federal security regulations require stringent processes for limiting the number of vehicles in the to

only those necessary for safe and efficient operations. If there is any means of transportation other than a personal vehicle that will allow you to do your job safely and effectively, you are expected to use it. This may include using a company vehicle, taking the shuttle, walking, or riding a bicycle.

Contractors bringing company vehicles inside the fence requires prior permission from the Senior Project Manager or Construction Manager. Drive-in access determinations will be based on an assessment of role, need and primary work location and controlled through the individual's Vancouver ID badge. The Security Superintendent has the authority to grant or deny the request for drive-in access.

Driving a vehicle on Savage property requires completion of the Safe Driving Training video. While driving on Savage property, all vehicle occupants must wear seat belts at all times. Additionally, the driver is not to use two-way radios or cell phones while driving. If the driver is to take a call or use a radio, he or she must pull over prior to doing so. Use of personal vehicles inside the fence is prohibited unless special permission is obtained from the Senior Project Manager.

If the Evacuation Alarm sounds, pull over the vehicle immediately, turn off the engine, and walk to the safest evacuation area. Do not to drive the vehicle until the All-Clear has sounded.

BNSF Track Operation

Contractors operating equipment near the BNSF Track should stay 150 feet from the nearest rail. Barricades should be put up off the BNSF right of way indicating where the contractors and their employees can work safely.

Prior to beginning work on live track the contractor-In-Charge must notify a BNSF representative of the need, and specifically the location where the work will be done. A job briefing must be conducted with the Railroad representative. Referenced in 49CFR214, Subpart C, which requires some form of On-Track Safety briefing prior to fouling any track.

If contractors have to work within the BNSF right of way contractor employees need to have the BNSF safety training.

- Rail Security Awareness Training
- Contractor Orientation Training

Contractors Working Around Live Tracks

Contractors must follow the following policy when working on or around live track:

- Green, Yellow/Red, and Red Flag Protection must be used on live tracks to warn train crews of men or equipment working on or around the track.

- Always be on alert to moving equipment. Contractor employees must always expect movement on any track, at any time, in either direction.
- Do not walk or step on the top of the rail or any other track components
- In passing around the ends of standing cars, engines, roadway machines or work equipment, leave a minimum of 25 feet between yourself and the end of the equipment. Do not go between equipment if opening is less than 50 feet.
- Before crossing over tracks, look in both directions.
- Do not sit on, lie under, cross over between cars.
- No tools or equipment are left close to any live track.
- All contractor employees must have and be wearing identification.
- All contractor employees must be wearing the proper Personal Protective Equipment.
- All Project employees will attend the Port of Vancouver's Rail Safety Training.

Contractor's equipment must be safe to operate if equipment is not safe to operate the equipment must be removed from the site.

Treatment of Injuries

Contractors must provide the means to provide first-aid and keep appropriate first aid supplies readily available. Savage employs a medical service PC365 to be used as well when dealing with non-critical injuries. Emergency Medical Technicians are also available around the clock to assist as needed through the Vancouver Fire Department, Station 1.
All injuries, regardless of the severity, must be reported to Savage per the guidelines outlined in the Incident Reporting section of this document.

Control of Work

The majority of the Project scope of work will be conducted within a defined and controlled area identified as the "Brownfield".

Brownfield Permit to Work

The majority of the Project scope of work will be conducted within a defined and controlled area identified as the "Brownfield". A risk assessment was conducted to identify the boundaries of the Brownfield. In general, this area contains no process hazards or non-construction energy sources. With the absence of these hazards, the risk profile of the work site changes, allowing the use of a specialized Permit to Work procedure more appropriately designed for managing construction risks. The Brownfield Permit to Work Procedure will be used as the basis for all ISBL work in the Petroleum Rail Project. It will be modified as needed to address the specific hazards and needs of the Project.

Non-Brownfield Work

Project work to be conducted outside of the defined boundaries of the Brownfield and within the fence line will be performed under the Port's standard Control of Work Policies.

The Project team will use the unit's existing Area Authority for permitting activities. The detailed permit issue process will be documented and communicated to the construction contractors prior to field activities commencing.

Energy Isolation

To maintain Brownfield condition, Lock Out Tag Out (LOTO) Policy requires that all hydrocarbon process piping to remain physically separated (air gapped) from the existing systems. It also requires that all other systems remain air gapped or, a detailed isolation strategy to be developed for the system.

The Project will follow the Electrical Safety Policy and Control of Hazardous Energy Procedure (LOTO). We will also adhere to the Blinding Policy. Energy isolation must be considered during the development of individual job packages, with consideration toward any source of electrical, hydraulic, mechanical, pneumatic, chemical, thermal, or any other energy connected to a source.

Connections to utilities (utility water, potable water, temporary electrical power, firewater, plant air & instrument air) can be made within the Brownfield for field checks and hydro testing without impacting the Brownfield status, provided approved procedures are in place to manage the energy source. These connections must be coordinated with the unit Operations Representatives. All other systems must remain isolated utilizing an air gap.

Operations will define isolation requirements for each system prior to turnover. Upon turnover, Operations will assume ownership of the master isolation and blind list.

Risk Assessments, ASAPs

All risk assessments will be developed by the contractor performing the work, with input from Savage. JSAs will be done as tasks are identified in the Execute Stage. Any Abnormal Safety Assessment Plan (ASAP) will be done using the Savage Vancouver ASAP procedure #150 (see references at the end of this document for location of current procedures).

Security

The Facility is a Maritime Transportation Security Act (MTSA) as well as a CFATS and DOT regulated facility. The Project will comply with all site security requirements.

Project Access

All workers will be issued a Savage ID badge for entry and access into the ISBL area, and are required to keep this badge on them at all times. In addition, a Project specific decal will be provided to individuals who have completed the Project specific orientation. This decal is required for unescorted access within the defined Project boundaries.

Transportation Workers Identification Credential (TWIC)

A valid TWIC card is required of all individuals entering the Facility. There are no exceptions to this requirement for Project workers. Individuals without a TWIC card require an approved escort. TWIC cards do not have to be carried on the workers person in the field. Access to the TWIC Zone must be done in accordance to the Port of Vancouver Facility Security Plan.

Project Escort Requirement

Individuals who have not received Project specific orientation must be accompanied by an individual who has had this training. This requirement is Project specific and in addition to the requirements outlined in the Escort Policy.

Traffic Control/Blockage of Roadways

If a roadway must be blocked or access restricted as a result of Project work, advanced planning and notification to stakeholders is required. The Project will follow the policy for Road Closures. All road closures and traffic control activities will be coordinated through the Project HSSE Lead or his delegate.

Tools & Materials

Any tools, materials or equipment being brought out of the Facility require an authorized Material Gate Pass. These passes may be obtained from the Project HSSE Lead. All items are subject to inspection prior to release.

Environmental Compliance

The Project is committed to socially and environmentally sound operations. We will undertake our activities in a manner that is environmentally responsible with the aspiration of "no harm to people and no damage to the environment."

Permitting Overview

Permitting will be handled by the Savage Environmental department and will include the appropriate EFSEC permitting as well as required Federal Permits

All permit conditions applicable to operation of the new equipment will be included in the training materials.

Soil

A detailed plan will be developed for the management of soil being excavated for this Project. Fill material will be segregated and managed separately from native soils. An environmental representative will be onsite as needed during excavation to help distinguish between these materials. Potholing will be conducted near the BNSF track, and at selected locations within the Brownfield area. Soils that are subject to Restricted Covenants must be separated from non-impacted soil, and disposed of according to the waste management plan.

Storm Water

A detailed plan will be developed for the management of storm water from the Project site. Prevention of contamination is crucial. Any hydrocarbon or chemical spills, regardless of the size, must be reported to the Project HSSE Lead. This includes fuel, engine and hydraulic leaks from equipment. Minimization of sediment entrainment is also a high priority. This is accomplished through the use of Best Management Practices (BMPs). Diversion of storm water from the site in a manner inconsistent with the plan is prohibited.

One of the specific BMPs required on the Project is the placement of secondary containment under all bulk chemicals and gasoline or diesel powered portable equipment in all areas that do not drain to the oily water sewer. Self-propelled mobile equipment is exempt from this requirement.

Recycling

A recycling center will be established within the Project site. It is important that any recyclable materials remain free from contaminants and be placed in designated containers. The recycling center will have containers for the collection of aerosol cans, aluminum cans, small metal, safety warehouse returns, plastic, glass and cardboard.

Portable Equipment

Notification to the Project HSSE Lead is required for temporary emission sources and any portable engines exceeding a prescribed limit that are used in the Project, to determine potential regulatory impacts.

Waste

The Project Management team will assure that all design and construction work for the Project considers the environmental compliance requirements of Federal, State, and local agency permits as well as all Savage Group Defined Practices.

Incident Management

All incidents are preventable. In order to achieve World Class HSSE performance, each incident that occurs must be reported, reviewed and the learnings shared. The process outlined in the Incident Investigation, Notification and Reporting Policy will be followed during the Project.

Any work-related safety incident, including first aid, must be reported immediately. The following notifications are required:

- Savage Shift Supervisor
- Project HSSE Lead, who will coordinate entry into S7i

A written incident report is required to be submitted by **the *end of the current shift*** for all injuries, including first aid incidents. Determination of OSHA record keeping requirements will be the responsibility of the Company incurring the injury.

Types of incidents where reporting is required include; workplace injuries and illnesses, vehicle accidents, spills, environmental releases, near hits, major incidents (MIAs) and high potential incidents (HIPOs).

A detailed investigation should be carried out for all serious or major incidents (injury, illness or damage) and any minor accident or near-miss that had a high potential of being a major one. Less serious incidents should be investigated with a degree of rigor appropriate to the potential for loss or injury. The principles employed are the same.

A Project team contact list and emergency contact information can be found in Appendix A of this plan.

Shared Learning

It is the intent of the Project to incorporate lessons learned from both internal and external sources. Specific effort will be made to capture lessons learned on our own project. Learning will be shared widely across the Project in a timely manner so they may be incorporated into pre-task planning, design and constructability and education and training materials.

HSSE Lessons Learned

The learning from safety performance reviews, audits, investigations, and verification activities must be documented and used in improving future performance.

- Learning will be systematically captured and subject to periodic formal review to identify system improvements for future activities.
- Contractors will be included in sharing of lessons learned and encouraged to share lessons from their activities.
- Specific effort must be made to solicit feedback from frontline employees on best practices observed along with ways to improve processes and reduce the risk associated with future work activities.

When a contractor's work has been completed, the Project Team will evaluate major contractors' HSSE initiatives and performance and provide feedback on effectiveness at the close of the contract.

The Project HSSE lead will document and implement the Project's safety lessons learned.

Monitoring Performance

HSSE performance metrics (leading and lagging) indicators are established and communicated throughout the Project organization. Project leadership regularly reviews the HSSE performance metrics to determine progress against objectives and targets and what management system changes are necessary.

Key Performance Indicators

Reporting will be consistent with requirements for the Vancouver reporting system already in place. The Project HSSE Lead will report this data on a weekly basis for incorporation with the overall statistics.

Inputs to be tracked and reported:

- Safety training provided for every employee working on the job site
- Observation audits / theme audits conducted and action items closed
- Joint field audits by Savage and contractors
- Incident investigations completed
- To be decided

Outputs to be reported:

- Hours Worked
- Major incidents and High Potential incidents
- Injuries/Illnesses
- Near Misses
- Environmental incidents

General Performance Monitoring of Contractors

HSSE performance and compliance must be measured and reviewed on a regular basis during execution.

- Regular performance reviews of each contractor should be established, with appropriate senior and line management attendance.
- Subcontractor performance and compliance should be visible and verified.
- Contractors are accountable for reporting of all incidents incurred by their subcontractors.
- Contractors delivering outstanding safety performance should be considered for positive recognition.
- Contractors that fail to deliver the required performance improvement, or experience further breaches of the safety boundary conditions, should be considered for reduced work share, suspension, or contract termination, depending on the severity of the breach.

HSSE Rewards and Recognition System

Working safely is a base expectation of everyone on the Project. Simply doing so will not be a basis for reward on the Project. Instead, the PLT is looking to recognize and reward individuals who go above and beyond this base expectation and become actively engaged in delivering an outstanding outcome.

The reward and recognition program for the Project will use a variety of methods to recognize individuals, including periodic giveaways at the discretion of PLT. Only individuals providing

direct support to the Project are eligible to receive Project Safety Rewards. In establishing reward criteria, the following guidelines must be used:

- Rewards should promote discretionary behaviors that are above and beyond base requirements.
- Preference is for individual recognition/employee participation. Although at times, team or small group recognition can also be appropriate.
- Specific action by the individual should be required for the individual to receive the reward.
- Rewards should be based on leading indicators, not results.

Safety Leadership Award

A "Safety Leader of the Week" program will be established to recognize the individual or crew that best demonstrated the Extraordinary Safety Leadership Behaviors. Individuals may be nominated by anyone using a simple nomination card available in the lunchroom and in the permit trailer.

Reporting Recognition

"Thank You" reward cards will be given to individuals who identify, address and report near misses, unsafe conditions or unsafe behaviors on Project Make a Difference cards. We will also reward individuals that recognize best practices, make H&S suggestions or share process safety or quality concerns. These reward cards can be redeemed for a variety of nominal gifts or collected towards higher valued items.

Great Catch Program

The quality of items submitted is more important than the quantity. To promote quality reports, a "Great Catch" program will be established. Special awards will be made to individuals who submit reports on items that were especially difficult to identify, provide high learning value or may have resulted in a significant impact if unidentified. Great Catch awards will be issued at the weekly all-hands meetings so the learning can be shared across the Project.

Milestone Recognition

Milestone recognition may include proactive measures of safety activities in addition to the traditional recognition of the results (i.e. hours worked without incident). In general, targets will not be promoted ahead of the milestone. In addition, associated recognition programs must be structured to ensure they do not discourage incident reporting.

Company Specific Recognition Programs

In addition to the general recognition program outlined above, each contractor, at its discretion, may operate company specific safety recognition programs. These programs are independent of Savage and should be managed exclusively by the contractor company. To comply with Savage Code of Conduct and IRS requirements, at no point may cash or cash equivalents (i.e. gift cards, gas cards, etc) be exchanged between Savage employees and contractors.

Commissioning

Commissioning consists of the period after System Turnover has been achieved, but before Start-Up. System Turnover is complete when; Pre-commissioning activities have been completed and documented, System turnover documentation (including Non-Destructive Examination (NDE) and other field Quality Control (QC) records) are delivered to the Quality Assurance Manager and Project Turnover Coordinator, "A & B" punch-list items have been completed, and the immediate respective work areas are left in an uncluttered clean condition with all combustible materials removed. Commissioning includes those activities connected with operating equipment or facilities to prepare them for a safe, reliable start-up. This can include steam blows, system purging, introduction of inert fluids and utilities, chemicals loading, trip and alarm testing and final checking of system tightness and cleanliness.

Operations and Maintenance Competency Assurance

The Project Team will interface with operations and maintenance to ensure that existing or new personnel are capable of performing the jobs and are adequately trained to do so. Operating and maintenance procedures and training requirements will be developed prior to commissioning.

Commissioning and Hand-over Requirements

During commissioning planning, environmental aspects and impacts of the commissioning activities should be evaluated.

Prior to the commencement of commissioning activities, training requirements for the commissioning team should be established and training completed. In addition, all work procedures should be evaluated for compliance with Savage HSSE expectations and any deficiencies corrected. A HITRA will be performed on the actual off-loading work activities to ensure that ergonomic and other safety exposures have been addressed. Personal exposure monitoring will also be conducted during the off-loading operation to document health exposures and the selection of proper PPE.

The Commissioning Team will incorporate HSSE into commissioning and handover planning, procedures and systems.

Pre-Startup Safety Review (PSSR)

Prior to start-up of a system, a pre-startup safety review of the system will be performed and documented, and all deficiencies will be corrected.

Pre-startup safety reviews (PSSR) are conducted to ensure construction of the Project is complete, and all training, procedures, documentation, and programs are in place and ready for safe startup and operation. All findings, recommendations and open actions from the PSSRs MUST be completed and closed out before equipment commissioning begins.

Process Safety Information

The Project Team will compile and supply the following process safety information to the Operating Team and the Document Control group:

- Safety Critical List of Equipment (Protective Devices Register)
- Process Flow Diagrams (PFDs)
- Piping and Instrumentation Diagrams (P&IDs)
- Electrical Area Classification Drawings
- Plot Plans
- Electrical One Line Drawings
- Shutdown and Interlock Drawings
- Cause and Effect Drawings (Alarm and Shutdown Drawings)
- Relief Valve Basis and calculations
- Process Equipment Data Sheets
- Other Data Sheets (Utilities, MSDSs, etc.)

Start-up, Operating & Maintenance, and Emergency Procedures

Practices and procedures must be documented to ensure operations are carried out under specified conditions and in a consistent manner. These instructions should be up to date, clear, concise and unambiguous.

The Commissioning Team will provide instructions for start-up, normal operation, planned and emergency shutdown and preparation for maintenance, as well as any other OSHA Process Safety Management (PSM) required operating procedures. The format and content will be consistent with Savage's PSM requirements and Vancouver operating and maintenance procedures.

Appendix 1: Emergency Contact List

Emergencies	**xxxx or xxx-xxxx**
Battalion Chief	**xxxx or Radio Channel xx**
Shift Super	**xxxx or Radio Channel xx**
Security	**xxxx or Radio Channel xx**

_____ Construction Team

_____	Construction Coordinator	xxx-xxx-xxxx
	Project Engineer	
_____	HSSE Field Coordinator	xxx-xxx-xxxx

_____ Construction Team

_____	Construction Coordinator	xxx-xxx-xxxx
	Project Engineer	
_____	HSSE Manager	xxx-xxx-xxxx

Project Leadership Team

Dave Corpron	Projects & Const Manager	801-944-6600
Boyd Draper	Sr. Project Manager	801-944-6600
Coby Long, CSP	Project HSSE Manager	801-944-6600
_____	Commissioning Manger	
_____	Tech Services Manager	
_____	QA/QC Lead	

List of contractors Below

_____		
	Sr. Project Manager	360-
	Asst. Project Manager	360
	Const Superintendent	360-
	Safety Manager	360-
_____		
	Project Manager	360-
	General Superintendent	360-
	Safety	360-
_____		
	Project Manager	360-
	General Superintendent	360-

	Safety Lead	360-
	Project Manager	360-
	Site Manager	360-
	Safety Manager	360-

Appendix 2: Project Site Map

Appendix 3: Brownfield Sign-In Expectations

The purpose of the sign-in / sign-out requirement is to provide the Project with documentation of who has permission to be onsite within the Tesoro Savage Petroleum Terminal Project Brownfield and to describe the requirements for controlling and recording access to the area.

These expectations apply to any person entering the Permit Trailer located _____.

NOTE: Project specific orientation is required for all individuals prior to entering the Brownfield area unescorted. Visitors without Project Specific Orientation must be escorted for the duration of their visit by an individual that has received the project specific orientation.

1. Sign in is required immediately upon arrival to the site. Once onsite, travel must be directly to the Project Permit Trailer to sign in prior to any work or site walks being performed.

2. Sign out is required at the end of the shift or when leaving the site for an extended period of time.

3. When the Project Permit Trailer is not staffed, individuals visiting the site that are not assigned to the project full-time must contact the HSSE Manager via radio to inform them that you will be entering their area. The HSSE Manager will provide an update of site conditions and/or restrictions.

4. Once signed in, short trips outside the Brownfield, including breaks and lunch, will not require sign out.

5. Work groups that are entering the area may be signed in by their Foreman or the Foreman's designee. Sign in will include foreman or designee's name and crew size. Example: Matrix, John Smith + 4.

6. There are no exceptions as to personnel required to sign in or out of the area.

Appendix 4: Incident Reporting Form

To be determined in conjunction with Tesoro Savage Petroleum Terminal LLC

Appendix 5: Safety Team Terms of Reference

I. Vision
A self-directed cross-functional safety team that is actively engaged in reducing the risks associated with field construction activities.

II. Objective
The objective of the Project Safety Team is to promote a proactive approach to safety and health on the Project and to improve the effectiveness of the Project's overall safety program.

To advise and consult Project leadership on safety and health issues related to the Project.

III. Scope
The team's scope includes health & safety concerns associated with field construction activities related to the Project that are performed onsite at the Vancouver. This includes both OSBL and ISBL work as defined in the Project HSSE Execution plan.

IV. Deliverables
a. Field Audit Reports will be used to document audit activities.
b. Minutes will be kept at each team meeting.
- Previous meeting minutes and audits will be reviewed at the team meeting to determine if any issues remain outstanding
- All reports, audits, evaluations and recommendations of the team will be made part of the minutes of the safety team meeting

c. An action item register will be maintained to ensure closure of issues identified
- A reasonable time will be established for Project management to respond in writing to all safety team recommendations

V. Safety Team Formation and Membership
a. The Team will be comprised of both craft and management representatives.
b. Team members will be volunteers Sub contractors with contract duration of ninety (90) days or longer will be represented on the Team.
c. Employee representatives must serve a continuous term of at least four (4) weeks on the team. At the end of the fourth week the employee representative must bring his/her replacement to the meeting to assume his/her duties.
d. Reasonable efforts must be made to ensure that team members are representative of the major subcontractors and/or major work activities in progress.

VI. Stakeholders
a. Project Workforce

Project employees will be given the opportunity to actively participate in safety team activities by:

- Volunteering to serve as a team member
- Participating in field auditing activities conducted by the team
- Completing Observation forms and turning them it in to any safety team member.
- Suggesting improvements to the safety program to their respective team representative for consideration.

b. Project Leadership Team

The PLT recognizes the value of these teams and the empowerment they provide the contractors. The PLT will support the efforts of the team and provide guidance when necessary to ensure the team is successful at meeting its objective.

VII. Safety Team Duties and Functions

a. The team will elect a Chairperson from within their ranks at their first meeting.
b. The team will develop a written agenda for conducting safety team meetings. The agenda will prescribe the order in which team business will be addressed during the meeting.
c. The team will hold regular meetings and perform job audits on a bi-weekly basis. The team will document site audits and transmit them to Project HSSE Lead with recommendations for changes.
d. The team will review all accidents and near misses and recommend corrective actions to prevent a reoccurrence.
e. The team will follow up on their recommendations to ensure corrective actions have been implemented.

VIII. Hazard Assessment and Control

Safety Team will:

a. Establish procedures for auditing field construction activities to locate and identify safety and health hazards.
b. Conduct field audits on a weekly basis.
c. Establish procedures for reviewing the Project HSSE Incident Log and informal reports of hazards from Project employees.
d. Make recommendations for improvement to Project Management, based on those reviews.

IX. Accident investigation

The safety Team will establish procedures for reviewing all safety related incidents including injury accidents or illnesses. At least one member of the Safety Team must participate in the investigation of near misses and/or incidents associated with field construction activities.

X. Safety and Health Training and Instruction

The following items must be discussed with all new safety team members:

a. Safety team purpose and operation
b. Methods of conducting safety team meetings
c. Safety team members must receive training in:
- Hazard identification in the workplace
- Principles regarding effective accident and incident investigation

XI. Delegation of Authority

The safety team has no fiscal or policy authority. For activities or initiatives requiring financial support, a request for funding will be submitted in writing to the Project HSSE Lead.

Recommendations for policy or procedure changes must be submitted in writing to the Project HSSE Lead for consideration.

Appendix 6: Gas Detection Overview

General Requirements
As outlined in the Hot Work Policy, within the Project Brownfield is exempt from the requirement for continuous LEL monitoring. In addition, the area is exempt from the use of personal H2S monitors. The Brownfield area maintains an electrical classification of General Purpose and there are no process hazards present within the Brownfield.

The most likely source of flammable or toxic gas within the Brownfield is an uncontrolled release from an existing operating unit. The potential for a release to reach dangerous levels within the Brownfield was assessed and determined to be very low, but plausible.

Controls in place to manage this risk include the formal communication plan in place between the Project and the Operations Shift Supervisor, existing LEL & H2S gas detection within the existing units & the area-wide alarm system.

The Project has no requirements or agreements to maintain general area or perimeter gas detection. Continuous gas monitoring remains required for all confined space work. There are no variances in place for confined space entry work within the Brownfield. Continuous monitoring is required for all confined space entries.

City of Vancouver • P.O. Box 1995 • Vancouver, WA 98668-1995
www.cityofvancouver.us

August 20, 2013

Sam Adams, P.E.
BergerABAM
1111 Main Street, Suite 300
Vancouver, WA 98669-2958

Subject: Tesoro Savage Petroleum Terminal Water Availability

Mr. Adams,

The City of Vancouver Water Department acknowledges the request to serve the Tesoro Savage Petroleum Terminal project with water. The estimated average daily water use of 60,900 gallons per day (42.3 gpm) and the estimated maximum daily water use of 87,200 gallons per day (60.6 gpm) are available for the project from the city water system. In addition, it is estimated that at least 3500 gpm of water for fire flow purposes is currently available from hydrants in the proposed project area.

The city currently has sufficient water rights, storage and distribution capacity to serve the various sites with the requested flow, contingent on the extension of water utilities to the site as spelled out in the pre-application comments.

For additional information regarding the project, please contact me at (360) 487-7169.

Sincerely,

Tyler Clary
Water Engineering Program Manager
City of Vancouver

cc: Tracy Tuntland
Debi Davis
Jon Wagner

Appendix F

Tesoro Savage Vancouver Energy Distribution Terminal
Vancouver, Washington

Preliminary Stormwater Report

29 August 2013

Prepared by:

BergerABAM
1111 Main Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.00

TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL
PRELIMINARY STORMWATER REPORT

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1.0 PROJECT OVERVIEW

The Tesoro Savage Vancouver Energy Distribution Terminal Project (Facility) is located within the Port of Vancouver (Port), Washington. Development activities include five individual sites located near the northwest end of the port. One site is located adjacent to State Route (SR) 501 and just east of Farwest Steel and north of the Port's Terminal 4 pond. Three of the sites are located within or adjacent to the Port's Terminal 5, west of the Clark Public Utilities (CPU) power plant off NW Gateway Avenue. The fifth site is the reuse of an existing shipping berth. The total area of all five sites equals 41.5 acres. The general project location is shown on the vicinity map in Attachment A.

The development consists of a rail offloading area and administrative and support buildings with associated parking; a crude oil product storage area within a containment berm and the support buildings, access, and parking associated with it, and the west boiler building with associated parking; and an existing marine terminal. Sites were limited to contiguous acreage because of existing development and facilities within the port.

1.1 REGULATORY APPLICABILITY

The facility will be permitted through the Washington State Energy Facility Site Evaluation Council (EFSEC). EFSEC will render the final determination of regulatory applicability and confirm that the project design meets or exceeds the necessary stormwater and runoff requirements. The project design is based upon achieving compliance with the following standards and regulations.

- Washington State Department of Ecology *Stormwater Management Manual for Western Washington* (dated August 2012) (the stormwater manual)
- City of Vancouver Municipal Code (VMC) 14.24, 14.25 and 14.26
- City of Vancouver Surface Water General Requirements (revised September 2009)
- Port of Vancouver Industrial General Stormwater Permit
- Port of Vancouver Municipal Phase II General Stormwater Permit
- 40 CFR 112

The project requires compliance with all nine of the minimum requirements set forth in the stormwater manual.

1.2 SITE DESCRIPTIONS/PROPOSED IMPROVEMENTS

Area 200 – Rail Unloading and Office Area

The rail unloading and office area consists of two separate drainage basin areas. These areas are separated from one another by the existing rail loop located on Terminal 5 that

was constructed as part of the Port's West Vancouver Freight Access project. The area north of the rail loop is designated as the administrative and support building area, and the area south of the rail loop is designated as the rail offloading area. The sections that follow discuss these areas in more detail.

The administrative and support building area consists of three modular office and change room facilities. Associated parking for staff and visitors is provided at this site. A designated covered area is provided for two dumpsters. A series of proposed containment tanks is located on this site. The site encompasses 1.6 acres and is located parallel and adjacent to NW Old Lower River Road between the CPU power plant and the intersection of NW Old Lower River Road and Hickey Marine. Runoff from the parking area and landscape located above the Vanexco cap will be directed to on-site sump catch basins), and flow to a combination oil-water separator and cartridge media filter vault located south of the rail unloading building. A detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designation is provided in Table 1 below.

Table 1. Administrative and Support Building Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Untreated Impervious	C, Lawn, Flat	0.37
Office/Change Room Buildings	Untreated Impervious	Roof Top/Flat	0.23
Sidewalk	Untreated Impervious	Sidewalks/Flat	0.07
Parking	Untreated Impervious	Parking/Flat	0.93

The northern portion of the decommissioned Alcoa property will be redeveloped to serve as the rail offloading area. The facility encompasses 7.05 acres and is located on the northern portion of the Terminal 5 rail loop and bounded by NW Old Lower River Road to the north, NW Gateway Avenue to the east, the Columbia River to the south, and Hickey Marine to the west. Stormwater runoff from the roof area of the rail offloading building will be collected through a gutter system and discharged directly to the stormwater conveyance system just downstream of the proposed water quality vault. A combination oil-water separator and cartridge media filter vault will be installed to treat runoff collected from the yard and rail improvement area east of the rail offloading area. A small berm will be constructed to isolate the rail track that is currently proposed to serve as a unit train loop designated for a future tenant on Terminal 5.

The areas identified as "port general use" in Table 2 are yard and rail areas that are topographically unable to sheet flow to the proposed on-site stormwater system installed by the project. These areas although located within the applicant's lease boundary are part of a general use area designated by the Port and drainage from these areas will continue to be collected and treated by the Port's stormwater systems. Drainage from them will be directed to existing on-site stormwater inlets and conveyances that discharge to the downstream water quality ponds for treatment. A

portion of the existing industrial yard outside of the proposed site area will be directed to the on-site drainage system. Table 2 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 2. Rail Unloading Area

Surface Description	Existing Condition	WWHM Type	Area (acres)
Rail Unloading Area	Untreated Impervious	Roof Top/Flat	3.98
Treated Yard Area	Untreated Impervious	Parking/Flat	1.28
Treated Walkways	Untreated Impervious	Sidewalks/Flat	0.02
Port General Use Area	Untreated Impervious	Parking/Flat	1.77
Port General Use Area - Walkways	Untreated Impervious	Sidewalks/Flat	0.06

Areas 300 – Storage Area and Boiler Building

The storage area consists of two separate drainage basins totaling 21.02 acres located east of Farwest Steel and adjacent to SR 501 and approximately 0.4 mile east of the intersection of SR 501 and NW Gateway Avenue. The first basin consists of everything within the limits of the containment berm. The second basin includes the support buildings, parking area, access roads, and landscaping areas around the containment berm. A discussion of the basins follows.

The area inside the containment berm consists of 18.35 acres with 6.23 acres of roof area at buildout. Each tank will be constructed with a roof that floats on top of the crude oil to prevent vapors from escaping and a fixed roof on top of the tank to prevent stormwater from mixing with the stored product. Gutters will be installed on the tanks and roof runoff will be discharged directly to the storm drain downstream of the water quality vault. The gravel yard area used for occasional maintenance, monitoring, and sampling of crude oil in the product storage tanks will be sloped to 12 sumps within the site. Each tank will be separated from the other tanks with intermediate 4-foot-tall berms. Each tank area will have two sumps. Stormwater from the sumps will be pumped to hydrodynamic separator, oil/water separator, and a water quality vault on the site. Pumps will be positive displacement type to reduce the likelihood of re-emulsifying oil into solution with the stormwater. Stormwater from the gravel yard will be pumped out of the containment area only when the facility staff confirms visually that no oil sheen is visible in the sumps. Table 3 provides a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 3. Containment Berm Area

Surface Description	Existing Condition	WWHM Type	Area (acres)
Storage Tank Roofs	Treated Impervious	Roof Top/Flat	6.23
Treated Yard Area	Treated Impervious	Parking/Flat	12.12

The area outside the containment berm consists of 2.67 acres and is the location of support buildings, parking areas, landscape areas, and miscellaneous maintenances yard. Runoff from the support buildings and sidewalks will be directed onto the parking areas, and will be treated along with the parking runoff. Runoff from these pollution-generating surfaces will be treated with a combination oil-water separator and cartridge filter media vault. Table 4 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 4. Support Building & Parking Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Treated Impervious	C, Lawn, Flat	1.62
Boiler, Pump Pit, Fire Skid, Control Room Building	Treated Impervious	Roof Top/Flat	0.16
Sidewalk	Treated Impervious	Sidewalks/Flat	0.05
Parking	Untreated Impervious	Parking/Flat	0.28
Port General Use Area	Treated Impervious	Parking/Flat	0.39
Untreated Off site	Treated Impervious	Driveways/Flat	0.17

Area 400 – Marine Terminal and MVCU Area

The marine terminal consists of a single upland drainage basin. Currently, the 1.08-acre basin sheet flows upland into a series of water quality swales. Piping hydraulically connects the northern treatment swales to the southern infiltration swales. The basin consists of existing pavement and gravel surfacing. In a few spotted areas, sparse herbaceous grasses have begun to establish within the graveled areas. Because of the historical general industrial use of the area and the nature of fill soils placed in it over time, its soils function as impervious despite minimal grass establishment.

The marine vapor combustion unit (MVCU) is currently located in a portion of the northeastern swale. Mitigation for this reduction in treatment capacity is completed by restoring 0.07 acre of existing impervious to landscaping along the top of the riverbank and adding an additional filter strip designed to treat the equivalent loss of land treated by the portion of impacted swale. The remaining areas will be hard-surfaced with asphalt for employee parking and support buildings for vessel loading activities. Table 5 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 5. Marine Terminal Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Treated Impervious	C, Lawn, Flat	0.07
Support Buildings	Treated Impervious	Roof Top/Flat	0.03
Parking Lot & Drive Aisle	Treated Impervious	Parking/Flat	0.98

No stormwater improvements are proposed on the waterward portion of the dock facility. Modifications to the dock include limited overwater construction of mooring dolphins connected by grated open bottom walkways. Modifications to the primary berth will not result in additional impervious area. Additional impervious area created by the new mooring dolphins will be mitigated by removing the existing dolphins and portions of the downriver Berth 14. The open-air containment area located underneath the crane will catch all oil drips from the hoses, and this will be collected and pumped through the oil return line to the product storage tanks.

Area 500 – Transfer Pipeline Area

The transfer pipeline area is defined as a relatively narrow lease area in which the transfer pipelines are constructed in either above or below grade conveyances. Above-grade pipelines are fully welded steel located on pipeline trestles with supports spaced approximately every 30 feet. Underground sections of pipeline occur at key rail and roadway crossings. Where the pipeline is underground, the pipeline will be constructed inside of sealed casings with leak detection. The pipeline area is designated as part of the Port's General Use Area. Stormwater from the pipeline alignment will not be modified and will continue to discharge to existing inlets and conveyance systems for treatment and discharge to the Columbia River. Table 5 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 6. Transfer Pipeline Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Port General Use Area	Untreated Impervious	Parking/Flat	4.47

Area 600 - West Boiler Building

This site is necessary for full buildout of the facility and will not be constructed initially. The site is 0.5 acre, consists of a boiler building and associated parking, and is located to the north of the Terminal 5 rail loop at the intersection of NW Old Lower River Road and Hickey Marine. Stormwater from the facility will be discharged to a combination oil-water separator and cartridge media filter vault located on the south side of the rail unloading building. Details of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations are provided in Table 7 below.

Table 7. West Boiler Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Untreated Impervious	C, Lawn, Flat	0.15
Boiler Building	Untreated Impervious	Roof Top/Flat	0.15
Sidewalk	Untreated Impervious	Sidewalks/Flat	0.01

Surface Description	Existing Condition	WWHM Type	Area (acres)
Parking	Untreated Impervious	Parking/Flat	0.15
Off-site Pavement	Untreated Impervious	Parking/Flat	0.04

1.3 EXISTING CONDITIONS

Existing conditions are generally impervious, and consist of existing facilities within the port. The rail offloading area and administrative and support buildings (Area 200) is the former Alcoa site; it contains existing rail tracks and gravel laydown areas. The storage area (Area 300) and adjacent access and parking are currently used as staging and storage areas for other port construction. Existing gravel and excavated soil piles are located on this site. The west boiler building (Area 600) located at the southeast corner of the intersection of NW Old Lower River Road and Hickey Marine is currently unimproved area that was a miscellaneous industrial area used as borrow for fill activities on site.

An existing stormwater system on the site was installed in preparation for future development of Terminal 5. A hydrologic and hydraulic analysis report, dated May 3, 2012 was prepared by HDR Engineering Inc. and submitted to the City and is included as Attachment H. On-site conveyance and water quality treatment systems were designed for the area of the proposed development and assumed the site would be fully impervious. In accordance with the Port's National Pollutant Discharge Elimination System (NPDES) permit for Terminal 5, basic treatment is performed on site for the on-site tenant areas (Area 200 and Area 600) and the Port's downstream water quality ponds provide final polishing prior to discharge to the Columbia River through manmade conveyance systems and outfall.

The surrounding topography is flat and existing surface structures and improvements prohibit off-site stormwater from entering the project area. Outside the Terminal 5 rail loop, a new loop road, currently under construction, will be owned by the Port; this new loop road has its own separate stormwater system that further isolates the project area from off-site stormwater impacts.

The storage area located on Terminal 4 will discharge stormwater to an existing conveyance system designed when Farwest Steel completed its improvements. The stormwater system was sized and designed for tenant stormwater; the system keeps tenant stormwater separate from the Port's general stormwater basins and combines the two downstream of the Port's Terminal 4 water quality pond. Stormwater from the storage area will be treated to enhanced levels of treatment in accordance with the Port's NPDES General Stormwater Permit.

Farwest Steel's improvements were designed to manage stormwater on the site; to the east, the wetland depression collects water from SR 501 and the surrounding areas.

SR 501 restricts stormwater from the north from entering the tank farm area, while the rail loops and constructed stormwater systems to the south prohibit stormwater from entering the project site.

2.0 MINIMUM REQUIREMENTS

The facility's new development and redevelopment will comply with VMC Section 14.25 and will be regulated by the City's January 17, 2007 NPDES Western Washington Phase II Municipal Stormwater Permit and the mandatory provisions it incorporates from the 2012 edition of the stormwater manual.

The project is located entirely on previously disturbed soils that are generally considered impervious gravel. In some instances, the existing soil is heavily compacted fill material used for decades as an industrial area. While some sparse, short grasses have established themselves, years of industrial activity, fill, compaction, and environmental caps have resulted in the soils on the site being considered impervious.

The following table summarizes changes to land coverage resulting from this project.

Table 8. Drainage Basin Areas

	On-site Drainage Areas				Off-site Drainage Areas	
	Existing Impervious Surface	Replaced or Maintained Impervious Surface	Separated Impervious Roof Runoff	Impervious Surface Converted to Landscaping	Impervious Surface Contributing to Project Drainage System	Replaced Impervious Surface
Area 200 Unloading and Office	8.65 ac	4.07 ac	4.21 ac	0.37 ac	0.06 ac	-
Area 300 Storage	20.85 ac	12.84 ac	6.39 ac	1.62 ac	-	0.17 ac
Area 400 Marine Terinal	1.00 ac	0.90 ac	0.03 ac	0.07 ac	0.08	-
Area 500 Transfer Pipelines	4.47 ac	4.47 ac	-	-	-	-
Area 600 West Boiler	0.46 ac	0.16 ac	0.15 ac	0.15 ac	0.04 ac	-
Rail Infrastructure	4.63 ac	4.63 ac				
Total	**2.21 ac**	**27.07 ac**	**10.78 ac**	**2.21 ac**	**0.18 ac**	**0.17 ac**

The land-disturbing activity that will be carried out by the project will trigger water quality improvements required by the City's NPDES Phase II permit. Therefore, minimum requirements 1 through 9 of the stormwater manual apply to the project. The minimum requirements are listed below.

2.1 Minimum Requirement No. 1: Preparation of Stormwater Site Plans

Stormwater site plans have been prepared and are attached as Attachment I. Stormwater site plans are required by Section 2.5.1 of the stormwater manual and must be prepared according to Chapter 3 of the manual and VMC 14.24, 14.25, and 14.26.

2.2 Minimum Requirement No. 2: Construction Stormwater Pollution Prevention

The facility will result in more than 2,000 square feet of replaced hard surface and will disturb more than 7,000 square feet of land; stormwater pollution prevention therefore must be considered. To comply with this minimum requirement, a preliminary stormwater pollution prevention plan (SWPPP) has been prepared; it is attached to the EFSEC Application for Site Certification as Appendix C.

The SWPPP includes narratives and drawings that clearly refer to each of the best management practices (BMPs) that will be used to prevent erosion and control sediment. The SWPPP addresses the 13 elements that are briefly described in the following paragraphs. Seasonal limits are listed and erosion and sediment controls are designed to prevent silt-laden water from leaving the site during the wet and rainy season.

- **Element 1: Preserve Vegetation/Mark Clearing Limits –** Existing vegetation on site is very minimal and consists of herbaceous groundcover not exceeding 6 inches in height. Clearing limits are defined in the stormwater site plans and will be marked in the field by construction of either silt fencing or high visibility fencing. Existing landscape buffers and nearby wetland will be protected from construction activities. The contractor will restore any accidental disturbance.

- **Element 2: Establish Construction Access –** Construction access will be limited to stabilized construction entrances and construction routes assigned for the project. Rock-stabilized construction accesses will be installed at the storage area, rail unloading and office area, and the west boiler. Access to the transfer pipeline and marine terminal is from existing impervious areas, and land-disturbing activities at these sites will be isolated from general truck traffic.

  Wheel wash units are not anticipated to be necessary. If sediment is transported onto nearby roadways, the tracked sediment will be cleaned during dry weather by shoveling, sweeping, or other pickup means. Street washing will be used only after the previously mentioned methods of sediment removal have been completed. If these currently proposed BMPs are not sufficient to control sediment transport, wheel washes will be implemented.

- **Element 3: Control Flow Rates –** Turbid waters will be controlled from downstream properties through installed erosion and sediment control BMPs. All of the sites consist of existing impervious coverage, and runoff rates therefore will not be increased to downstream properties or conveyances. Sediment ponds will be installed to detain stormwater runoff from the rail offloading area and the storage area. Erosion and sediment control BMPs, including sediment ponds and conveyances, will be sized for the Type 1A 10-year 24-hour storm event.

  Construction BMPS will manage stormwater until the site has been stabilized and permanent operational BMPs have been installed; the supplier will perform start-up.

- **Element 4: Install Sediment Controls –** Elimination of soil erosion is the primary goal of the SWPPP as prepared. Sediment controls are added as an extra layer of security against off-site sediment transport if erosion occurs. Sediment controls such as sediment ponds, filters, and cutoff ditches will be installed before land-disturbing activities take place. Stormwater will be directed to installed sediment removal BMPs.

  Construction of erosion or sediment controls will be located above the ordinary high water line and therefore no interference is anticipated with juvenile salmonids. Additionally, the project will construct no new outfalls.

- **Element 5: Stabilize Soils –** Soil stabilizing will be performed on site for all soils exposed more than 7 days during the dry season (May 1–September 30) and for all soils exposed more than 2 days during the wet season (October 1–April 30). Soils will be stabilized by applying BMPs that prevent erosion; as appropriate, these BMPS include temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, and early application of gravel base on areas to be paved.

  Depending upon the weather forecast, soils will be stabilized at the end of the workday prior to a holiday or weekend. Stockpiles will be protected by plastic covering and silt fencing. To the extent possible, soil disturbance will be limited to areas being worked on, without carrying out clearing and grubbing activities ahead of construction activities.

- **Element 6: Protect Slopes –** The site is generally flat without any slopes requiring protection. Silt fencing will be installed along the edge of the riverbank to protect the river from runoff during construction. Stormwater discharges at the marine terminal will be maintained and directed to existing swale areas just north of the marine terminal. Slope construction necessary during construction of the storage area containment berm will be protected using applicable BMPs. The site will be surrounded by silt fencing and, once constructed, the soils will be tracked and seeded.

- **Element 7: Protect Drain Inlets –** All drain inlets, existing and proposed, will be protected with BMPs to maintain operation and prevent sediment transport. BMPs include insertable filter devices or above-grade filter media. Drain inlet BMPs will be inspected after each storm event to check capacity and the filter media will be cleaned or removed and replaced when sediment has filled one-third of the device's available storage capacity.

- **Element 8: Stabilize Channels and Outlets –** On-site conveyance channels (cutoff ditches) are designed to convey the Type 1A, 10-year, 24-hour storm without causing

erosion under the 10-minute peak velocity. No modifications are proposed to existing outfalls or outlets.

- **Element 9: Control Pollutants –** All liquid pollutants, including chemicals, gasoline, paints, thinners, solvents, grease, etc., will be stored in covered areas to prevent pollution. Fueling will be conducted off site and, when necessary, at a designated location on site. Detailed spill prevention and control measures are described in the spill prevention control and countermeasures (SPCC) plan included in the EFSEC Application for Site Certification Appendix B.2. Secondary containment will be provided for all chemical, liquid, and petroleum tanks and mechanical piping.

  Wheel wash and tire baths are not anticipated to be required. If necessary, wastewater will be contained in a closed loop system or disposed of to the sanitary sewer system after receiving permission from the City for the discharge.

  BMPs will be used to prevent contaminating stormwater runoff by sources of differing pH. A designated location will be provided for washing concrete trucks, and curing water, or discharge water from concrete sawing etc. Construction stormwater from these processes will be checked for pH prior to its discharge and, when necessary, will be treated to adjust its pH. The pH adjustment will be completed using CO_2 or dry ice only.

- **Element 10: Control Dewatering –** Construction dewatering is anticipated in portions of the site during excavation for underground utilities and building footings. Dewatering discharges will be directed to the on-site cutoff ditches and to on-site sediment ponds.

  If dewatering water cannot be discharged cleanly, additional treatment methods, including off-site disposal and/or settling tanks and flocculating chemical injection, may be completed prior to discharge to on-site systems.

- **Element 11: Maintain BMPs –** All BMPs will be inspected after each storm event to ensure that sediment buildup is less than 30 percent of the storage volume and that all BMPs are operating as designed. BMPs will be removed within 30-days of site stabilization and startup of the permanent operational stormwater system and BMPs.

- **Element 12: Manage the Project –** Initially, construction of the project will be phased to install all the stormwater BMPs necessary to manage stormwater on site in accordance with the stormwater manual. A Certified Erosion and Sediment Control Lead (CESCL) must inspect the site; the CESCL will be identified in the final SWPPP. Inspection and monitoring will be completed in accordance with Special Condition S4 of the Construction Stormwater General Permit.

To the maximum extent possible, construction phasing will avoid exposing disturbed soils for long periods. Soil stabilization will be completed according to Element 8 as frequently as possible to prevent erosion. Permanent facilities and site stabilization will be timed to maximize the effectiveness of stormwater erosion and sediment control BMPs to maintain downstream water quality.

- **Element 13: Protect Low Impact Development BMPs –** Any adjacent low impact development (LID) BMPs will be protected using necessary construction BMPs to prevent damage, including compaction, sedimentation, and other disruptions. Due to the industrial nature of the proposed site, suitable BMPs are designed for construction and operations on site.

2.3 Minimum Requirement No. 3: Source Control of Pollution

Identified sources of pollution are addressed with designed source control BMPs in accordance with the stormwater manual. Possible sources are identified and, where possible, eliminated during design. Remaining sources are protected with BMPs as identified in the erosion control and sedimentation plans.

2.4 Minimum Requirement No. 4: Preservation of Natural Drainage Systems and Outfalls

The site is an existing industrial site with no natural drainage channels. Discharges from the site will be maintained and directed to existing conveyance systems using existing outfalls. Discharge rates will not be increased due to the condition of the existing site as fully impervious. The site will discharge to three existing outfall systems, one located downstream of the Terminal 4 pond, one located at Terminal 5, and an infiltration swale located immediately north of the marine terminal.

Stormwater control and treatment structures are not located within the 25-year water elevation of the Columbia River, the only salmonid-bearing water adjacent to the project location. Existing outfalls were sized and designed to account for the construction of the project area as fully impervious surfaces.

2.5 Minimum Requirement No. 5: On-site Stormwater Management

Stormwater will be managed on site in accordance with Section 2.5.5 of Volume I Minimum Technical Requirements and Site Planning of the stormwater manual. In addition, in accordance with Section 2.5.7 of Appendix I-E, the project is flow control-exempt and therefore is not required to achieve the LID performance standard, or to consider bioretention, rain gardens, permeable pavement, and full dispersion. Stormwater monitoring manholes will be installed upstream of the connection point to monitor and confirm that on-site stormwater management techniques meet all discharge requirements.

Site grading will be conducted and stormwater improvements installed to minimize the discharge of stormwater run-off from the site. Structural components of design,

including manmade conveyances, inlets, and berms, will be used to contain stormwater on site. The project design accounts for the safe conveyance of the 100-year storm event in accordance with the stormwater manual.

2.6 Minimum Requirement No. 6: Runoff Treatment

Because the total project adds more than 5,000 square feet of pollution-generating hard surface, the project is required to address runoff treatment. Treatment units are sized for the contributing area and expected water quality flow as determined by the Western Washington Hydrology Model. Treatment facilities were selected in accordance with the process identified in Chapter 4 of Volume I and Chapter 2 of Volume V of the stormwater manual. An operations and maintenance (O&M) manual will be developed adhering to the maintenance schedule required in Volume V.

Discharge water quality monitoring manholes will be provided at all connection points to the existing stormwater conveyances. Stormwater discharges from pollution-generating surfaces in the storage area and marine terminal will be discharged to existing stormwater systems located in Terminal 4. Stormwater will be treated on site to the discharge limits identified in the state General Industrial Stormwater Permit. Terminal 4 discharges are currently permitted through state General Industrial Stormwater Permit No. WAR000424.

Stormwater discharges from pollution-generating surfaces in the west boiler building area, rail unloading and office area, and rail infrastructure improvements will be discharged to existing systems located in Terminal 5. Stormwater will be treated on site to the discharge limits identified in the State Phase II Municipal Stormwater Permit. Terminal 5 stormwater is then routed to an existing water quality pond that was designed with sufficient capacity for the built-out project areas, assuming fully impervious coverage. Terminal 5 discharges are currently permitted through a State Phase II Municipal Stormwater Permit No. WAR045201.

2.7 Minimum Requirement No. 7: Flow Control

Flow control is not required for this project. This project discharges indirectly to the Columbia River, which is listed in Appendix I-E of the stormwater manual. The areas proposed for redevelopment are located within the existing drainage basins of developed storm drain systems that discharge through manmade conveyances directly to the Columbia River.

Additionally, the existing brownfield nature of the project site is such that the project stormwater does not result in the diversion of drainage from any perennial stream listed in the water typing system or from any category of wetland. Additionally, construction flow splitting devices or drainage BMPs that route stormwater to any wetlands are not required.

On-site stormwater will be collected from buildings roofs through gutter and rain drain systems that will bypass stormwater treatment, as these surfaces are classified as non-pollution generating. Stormwater from surface improvements will be collected through a series of inlets and storm drain systems, routed through on-site treatment, and discharged to existing on-site manmade pipelines. These pipelines continue through manmade conveyance pipes to manmade water quality facilities before discharging through piped outfalls to the Columbia River. From collection to discharge into the river, the stormwater is never conveyed through natural channels.

The design of the downstream conveyance and water quality ponds that are not part of this project assumed that the project sites would be developed as fully impervious. Copies of the design reports for the downstream conveyance systems are attached in Attachments H and J.

2.8 Minimum Requirement No. 8: Wetlands Protection

Wetland protection does not apply to this project. This project does not discharge stormwater directly or indirectly into a wetland.

2.9 Minimum Requirement No. 9: Operation and Maintenance

An O&M manual consistent with the provisions of Volume V of the stormwater manual will be developed for the facilities and BMPs that are included in the project. A copy of the O&M manual will be retained on the site and available for review. Updated logs and copies of all required monitoring will be retained and included in the O&M manual for reference.

3.0 PRELIMINARY SOILS EVALUATION

According to the Natural Resource Conservation Service (NRCS) and the Soil Survey of Clark County, there are four predominant soil types on the project site: Newberg silt loam, Pilchuck fine sand, Sauvie silt loam, and Sauvie silty clay loam. In the vicinity of the storage tank farm (Subbasin 1 and Subbasin 2), all four soil types are found as well as areas of fill. Around the rail unloading facility (Subbasin 3), the soil is classified as fill land. At the intersection of NW Old Lower River Road and Hickey Marine (Subbasin 4), and at the existing truck loading station and office building along NW Old Lower River Road (Subbasin 5), the soil is classified as Sauvie silty clay loam.

A comprehensive study on existing geological conditions, including soil study is being completed by Geotechnical Resources, Inc. (GRI). The development of design criteria and recommendations is proceeding concurrently with design. A description of on-site soils and descriptive narratives are included in Part 3 of the EFSEC Application.

The physical and engineering properties of the soils are summarized in Table 9.

Table 9. NRCS Site Soils

Soil	Hydrological Group	Slope	Erosion Potential
Newberg silt loam (NbA)	B	0 to 3%	Slight
Pilchuck fine sand (PhB)	A	0 to 8%	Slight
Sauvie silt loam (SmA, SmB)	C	0 to 8%	Slight to Moderate
Sauvie silty clay loam (SpB)	C	0 to 8%	Moderate
Fill Land*	NA	NA	NA

* For the purpose of hydrologic capacity of soils to infiltrate, fill land was considered to be hydrological group C.

A soil survey map is provided in Attachment C.

4.0 FLOODPLAINS

According to Panel 0363D and Panel 0364D of the Flood Insurance Rate Map (FIRM) for Clark County, the storage area; the office area located at the southeast corner of the intersection of NW Old Lower River Road and Hickey Marine ; and the existing truck loading station and office building along NW Old Lower River Road are within Zone AE. See Attachment D for Panel 0363D and Panel 0364D.

5.0 SOURCE CONTROL

Pollution source control is the primary method used on site for preserving the quality of drainage leaving the site. All construction and operational activities on the site were evaluated for potential sources of stormwater pollution. To the maximum extent possible, industrial activities on the site are designed to occur within covered facilities isolated from the effects of stormwater. Descriptions of the construction and operational source control measures that will be used on the site follow.

5.1 Construction Source Control BMPs

Construction source control BMPs are designed and included to exceed the requirements prescribed in Chapter 4, Volume III, of the stormwater manual. Construction source control BMPs are identified in detail in the construction SWPPP that is attached in the EFSEC Application for Site Certification as Appendix C. Table 10 lists construction-related source control BMPs.

Table 10. Construction Source Control BMPs

Sub-basin No.	BMP: #C103 High Visibility Fence	BMP: #C105 Stabilized Construction Entrance	BMP: #C107 Construction Road/Parking Area Stabilization	BMP: #C120 Temporary & Permanent Seeding	BMP: #C121 Mulching	BMP: #C123 Plastic Covering	BMP: #C130 Surface Roughening	BMP: # C140 Dust Control	BMP: #C151 Concrete Handling	BMP: #C153 Material Delivery, Storage and Containment	BMP: #C154 Concrete Washout Area	BMP: #C160 Certified Erosion and Sediment Control Lead	BMP: #C162 Scheduling	BMP: #C200 Interceptor Dike and Swale	BMP: #C201 Grass-Lined Channels	BMP: #C220 Storm Drain Inlet Protection	BMP #C233 Silt Fence	BMP: #C235 Wattles	BMP: #C241 Temporary Sediment Pond
Area 200 Administrative & Support Buildings	X	X		X		X		X	X	X	X	X				X	X		
Area 200 Rail Offloading Area	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X		X
Area 300 Containment Berm		X		X		X	X	X	X	X	X	X	X			X	X		
Area 300 Support Buildings & Parking	X	X		X		X		X	X	X	X	X	X	X	X	X	X		X
Area 400 Marine Terminal	X			X		X		X	X	X	X	X	X			X	X	X	
Area 500 Transfer Pipeline	X				X	X		X	X	X	X	X	X			X	X	X	
Area 600 West Boiler	X	X		X		X		X	X	X	X	X	X			X	X		
Rail Improvements	X		X		X			X		X		X	X			X	X		

5.2 Structural Source Control BMPs

Operational and structural source control BMPs are designed to exceed the requirements of Chapter 2, Volume IV of the stormwater manual. On-site operations, including unloading, pumping, transfer, and storage of crude oil and miscellaneous materials, are conducted in covered facilities designed to keep stormwater from entering the structures and mixing with industrial activities. Transfer of crude oil at the dock facility is completed with a closed piping system where oil transfer will not be exposed to stormwater. To the maximum extent possible, all industrial activities are protected from stormwater.

Secondary structural containment measures are in place; they consist of containment pans along the rail offloading area, double bottom tanks with in situ monitoring for the storage area, and an impervious lined berm that surrounds the tank farm and is sized to exceed the storage requirements of 110 percent of the largest tank plus a 100-year rainfall event. Secondary containment system at the rail offloading area is collected and pumped to double-walled holding tanks located near the office building where the contents will be hauled off site. Secondary containment systems at the storage area include a series of manually controlled pumps that discharge to a hydrodynamic separator, oil-water separator, and a water quality filter vault to evacuate the stormwater contained within the storage containment berm. During storm events, the pumps are manual on, automatic off. Each time, the pumps must be turned on manually, with the manual on switch located where visual inspection for oil sheen is required.

Parking and access areas are designed with a combination of sumped catch basins and media cartridge filter vaults to treat stormwater runoff. Filter vaults are designed to include an oil-water separating baffle for added protection from miscellaneous oil drips.

Maintenance, including equipment and parts wash, will be conducted in a covered portion of the rail offloading area. All wastewater produced will be pumped to the holding tanks located at the administrative and support buildings.

Table 11. Applicable Structural Source Control & Operational BMPs

Subbasin No.	S411 Landscaping and Lawn/Vegetation Management	S412 – Loading & Unloading Areas	S415 – Maintenance of Public & Private Utility Corridors & Facilities	S417 – Maintenance of Stormwater Drainage & Treatment Systems	S421 – Parking & Storage of Vehicles and Equipment	S422 – Railroad Yards	S425 – Soil Erosion & Sediment Control at Industrial Sites	S426 – Spills of Oil & Hazardous Substances	S427 Storage of Liquids in Permanent Aboveground Tanks	S431 Washing & Steam Cleaning of Vehicles/Equipment/Building Structures
Area 200 Administrative and Support Buildings	X	X	X	X	X			X	X	
Area 200 Rail Offloading Area		X	X	X		X	X	X		X
Area 300 Containment Berm	X			X			X	X	X	
Area 300 & 700 Support Buildings & Parking	X	X	X	X	X		X	X		
Area 400 Marine Terminal	X	X	X	X	X		X	X		
Area 500 Transfer Pipeline				X				X		
Area 600 West Boiler	X	X		X	X		X			
Rail Improvements				X		X	X	X		

5.3 Operational Source Control BMPs

In addition, containment drip pans and other containment measures will supplement the structural source control BMPs. A comprehensive site-specific spill prevention control and countermeasures (SPCC) plan will be developed in accordance with 40 CFR 112; a preliminary outline of the SPCC plan is attached in the EFSEC Application for Site Certification as Appendix B2.

6.0 WATER QUALITY TREATMENT ANALYSIS AND DESIGN

In accordance with the City's General Requirements, the Western Washington Hydrology Model (WWHM) with a continuous storm event was used to size the stormwater treatment system. Per the General Requirements, the water quality storm is the 6-month, 24-hour event, as estimated using the WWHM. A simplified model for each subbasin was developed in the WWHM 3.0 software. Water quality model results are included in Attachment E and summarized in Table 12. This estimated peak flow was used to size the stormwater treatment system.

Table 12. Summary of Water Quality Model Results

Subbasin No.	Total Area (acres)	Pollution-Generating Surfaces (acres)	Water Quality Flow Rate (cfs)[1]	Rated Treatment Capacity (cfs)
Area 200 Administrative and Support Buildings	1.60	1.23	0.1511 0.0849[2]	>0.2456[2]
Area 200 Rail Offloading Area	6.02	1.20	0.1496 0.0842	>0.0842
Area 300 Containment Berm	18.35	12.12	1.5108[3] 0.8507	-
Area 300 Support Buildings & Parking	2.50	0.49	0.0671[3] 0.0374	>1.5779[3]
Area 400 Marine Terminal	1.18	1.05	0.1299 0.0731	>0.1299
Area 500 Transfer Pipeline	2.29	N/A	N/A	N/A
Area 600 West Boiler	0.46	0.35	0.2854 0.1607[2]	-
Rail Infrastructure		N/A	N/A	N/A

Note: Water quality volume and flow rates calculated with WWHM3.

1. Values listed are on-line water quality flow rate and an off-line water quality flow rate calculated with WWHM3. Both rates provided as each site uses different treatment methods.
2. Offline flow rate for Area 200 Office/Change Room and Area 600 West Boiler Building combined into a single treatment facility located south of the rail unloading building.
3. Online flow rate for Area 300 Containment Berm and Area 300 & 700 Buildings and Parking combined into a single treatment facility located south of the tank farm pump pit.

Water quality treatment for each site will be provided by passing runoff flows at or below to the water quality design flow through a proprietary filtration facilities.

Stormwater for the combined contribution of the Area 200 Administrative and Support Buildings and Area 600 West Boiler will flow to a proprietary filtration facility that includes an oil-water separation baffle and cartridge media filter units. The required water quality flow rate is 0.2456 cfs. The facility will be sized to hold a maximum of 11 cartridges capable of treating 0.275 cfs. A diversion structure will be designed upstream of the filtration treatment facility to direct the water quality storm to the vault and bypass the treatment vault during high flow events.

Stormwater for Area 200 Rail Offloading Area will flow to a proprietary filtration facility that includes an oil-water separation baffle and cartridge media filter units. The required water quality flow rate is 0.0842 cfs. The facility will be sized to hold a maximum of 11 cartridges capable of treating 0.275 cfs. A diversion structure will be designed upstream of the filtration treatment facility to direct the water quality storm to the vault and bypass the treatment vault during high flow events.

Stormwater from Area 300 Storage Area will flow to a treatment train of proprietary units. Stormwater from within the containment berm will be pumped to a

hydrodynamic separator capable of treating 2 cfs. Stormwater will then flow directly into an oil-water separator capable of treating 1.95 cfs. Stormwater from the parking and yard areas will enter the stormwater system through inlets and be combined with containment area stormwater for treatment in a proprietary filtration facility that includes an oil-water separation baffle and cartridge media filter units. The required water quality flow rate is 1.5779 cfs. The facility will be sized to hold a minimum of 63 cartridges capable of treating 1.579 cfs. This facility is designed as an on-line facility with no diversion structures required.

Stormwater from Area 400 Marine Terminal will sheet flow through an engineering filter strip approximately 16 feet in length prior to entering a bio-filtration and infiltration swale. Filter strip is designed according to Volume V, Section 9.4, BMP T9.40 of the stormwater manual.

Roof drains for buildings and storage tanks will bypass the water quality treatment conveyance and connect directly into the existing conveyance system. Selection of media filter type and final filtration vault sizing will be completed during final design.

7.0 FLOW CONTROL ANALYSIS AND DESIGN

The project discharges to existing Columbia River outfalls through existing manmade conveyance pipelines. This project is categorically exempt from the flow control provisions of the stormwater manual. According to Appendix I-E of the manual, the Columbia River is listed as a flow control-exempt water body.

Conveyance pipelines and structures were sized for the 100-year storm to ensure safe conveyance. The pipeline running along the south side of the rail offloading area was additionally analyzed to convey 2,000 gpm of fire flow water with 1,000 gpm entering the system at the extreme west and east ends of the building. Conveyance pipelines were designed using Manning's equation assuming that the pipelines are flowing at 75 percent of capacity. Grade of the proposed pipelines was determined assuming 2.5 feet per second using the 2-year storm event.

Table 13. Summary of 100-Year Storm Event Model Results

Subbasin No.	Total Area (acres)	100- Year Contributing Area (acres)	100-Year Storm Flow Rate (cfs)	Conveyance System Capacity (cfs)
Area 200 Administrative and Support Buildings	1.60	1.60	0.9323	>0.9323
Area 200 Rail Offloading Area	6.02	5.10	0.8506 2.7646[1]	>3.6152
Area 300 Containment Berm	18.35	18.35	8.5914 4.4162[2]	>13.0076
Area 300 Support Buildings and Parking	2.50	2.11	0.7101	>0.7101

Subbasin No.	Total Area (acres)	100- Year Contributing Area (acres)	100-Year Storm Flow Rate (cfs)	Conveyance System Capacity (cfs)
Area 400 Marine Terminal	1.18	1.18	0.7651	>0.7651
Area 500 Transfer Pipeline	2.29	N/A	N/A	N/A
Area 600 West Boiler	0.46	0.50	0.2730	>0.2730
Rail Infrastructure		N/A	N/A	N/A

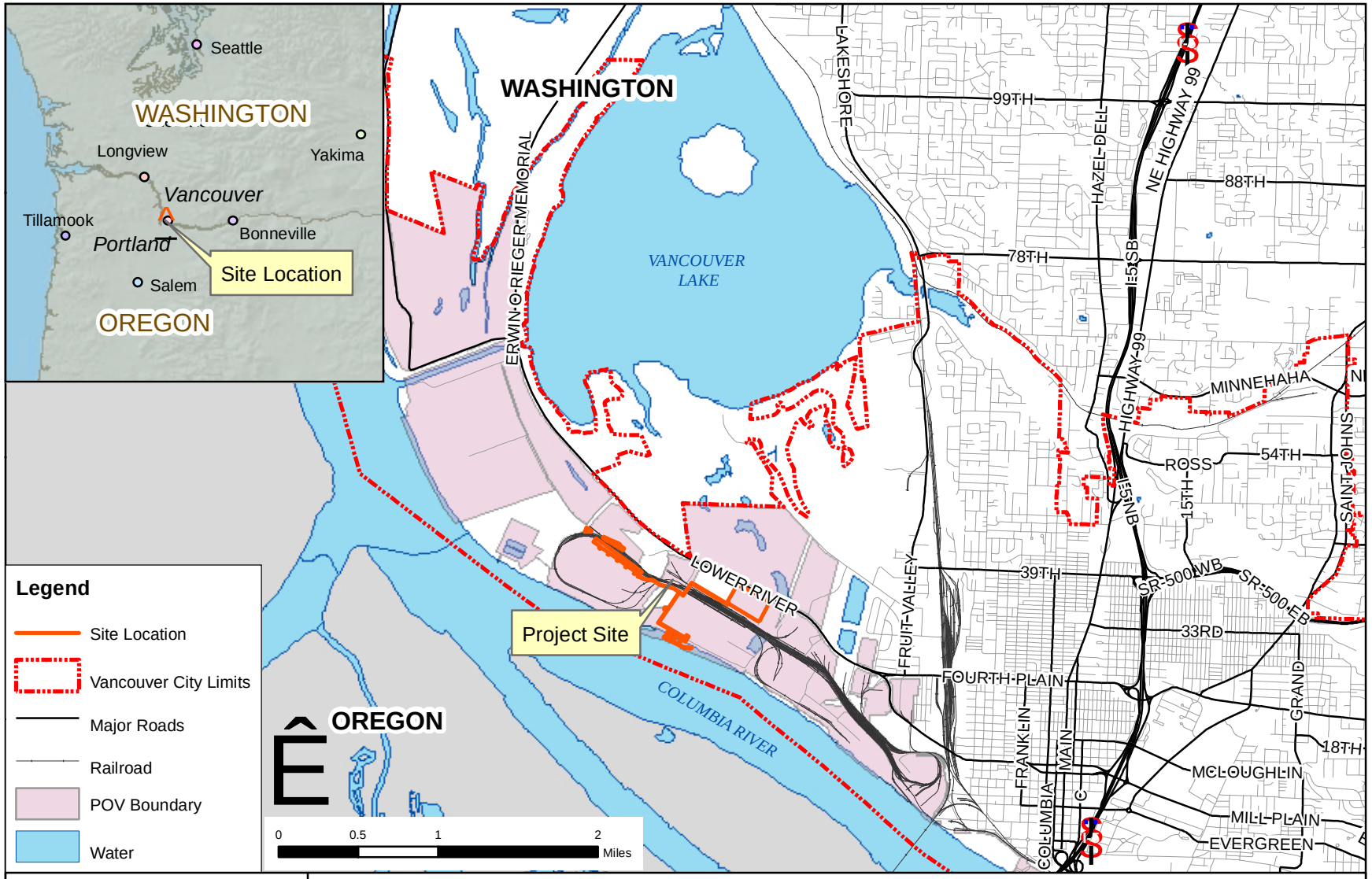
Note: 100-Year Storm flow rates calculated with WWHM3.

1. Value for 100-year runoff rate from rail facility's separated roof.
2. Value for 100-year runoff rate from aboveground storage tanks' separated roof.

8.0 WETLANDS PROTECTION

The storage area borders an existing wetland area. Site construction and disturbance will be limited to areas within the existing gravel access perimeter road. High visibility silt fencing installed along the property boundary will flag the sensitive area. On-site activities within the storage area will be contained within an imperviously lined containment berm with sufficient capacity for 110 percent of the volume of a single tank and the 100-year storm event. Runoff to the wetland will not be altered by the project and no modifications are proposed to the existing inlet or outlet of the wetland.

Attachment A
Vicinity Map



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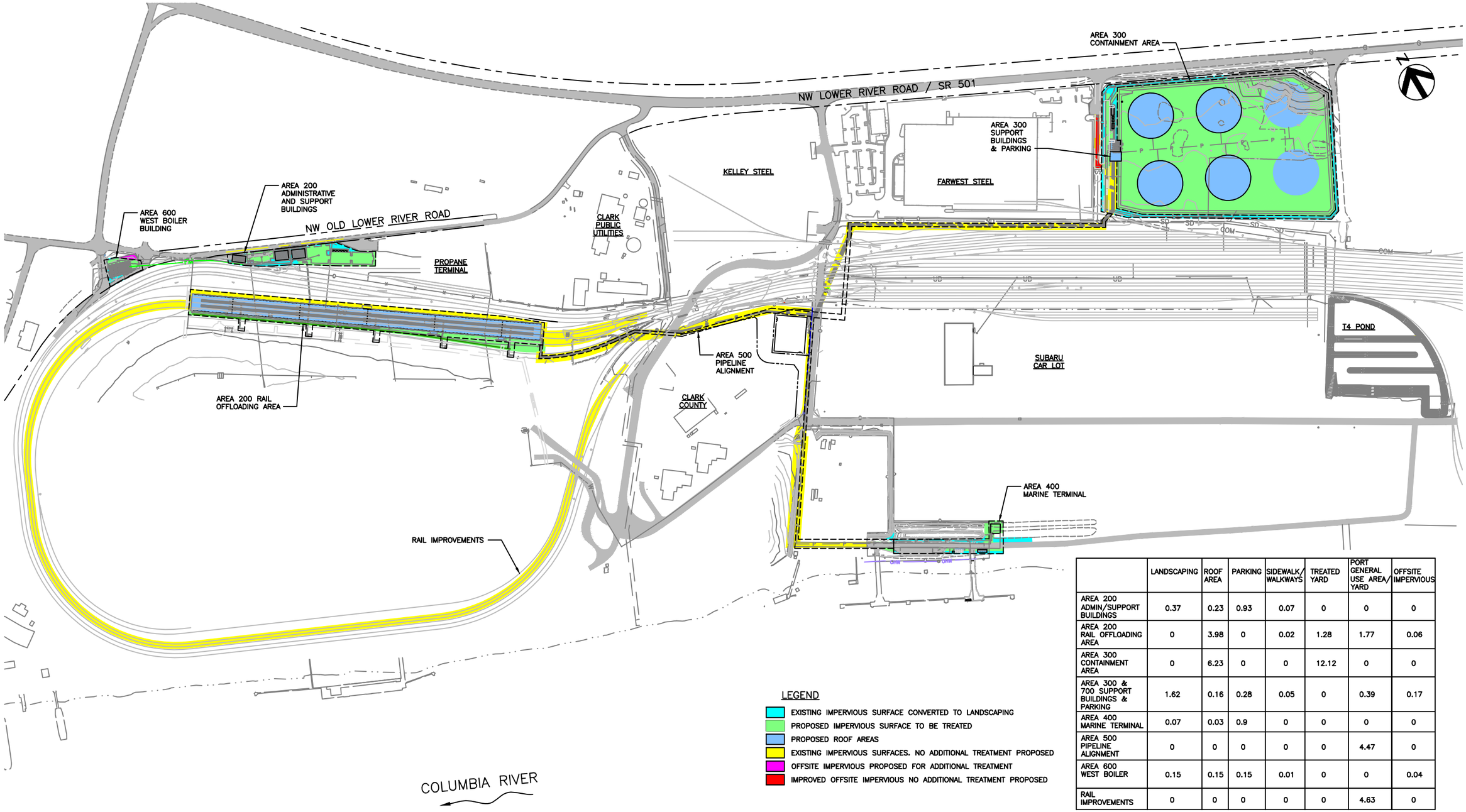
General Vicinity Map

Attachment B
Water Quality Basins Map



	LANDSCAPING	ROOF AREA	PARKING	SIDEWALK/ WALKWAYS	TREATED YARD	PORT GENERAL USE AREA/ YARD	OFFSITE IMPERVIOUS
AREA 200 ADMIN./SUPPORT BUILDINGS	0.37	0.23	0.93	0.07	0	0	0
AREA 200 RAIL OFFLOADING AREA	0	3.98	0	0.02	1.28	1.77	0.06
AREA 300 CONTAINMENT AREA	0	6.23	0	0	12.12	0	0
AREA 300 & 700 SUPPORT BUILDINGS & PARKING	1.62	0.16	0.28	0.05	0	0.39	0.17
AREA 400 MARINE TERMINAL	0.07	0.03	0.9	0	0	0	0
AREA 500 PIPELINE ALIGNMENT	0	0	0	0	0	4.47	0
AREA 600 WEST BOILER	0.15	0.15	0.15	0.01	0	0	0.04
RAIL IMPROVEMENTS	0	0	0	0	0	4.63	0

LEGEND

- EXISTING IMPERVIOUS SURFACE CONVERTED TO LANDSCAPING
- PROPOSED IMPERVIOUS SURFACE TO BE TREATED
- PROPOSED ROOF AREAS
- EXISTING IMPERVIOUS SURFACES. NO ADDITIONAL TREATMENT PROPOSED
- OFFSITE IMPERVIOUS PROPOSED FOR ADDITIONAL TREATMENT
- IMPROVED OFFSITE IMPERVIOUS NO ADDITIONAL TREATMENT PROPOSED

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM TERMINAL LLC

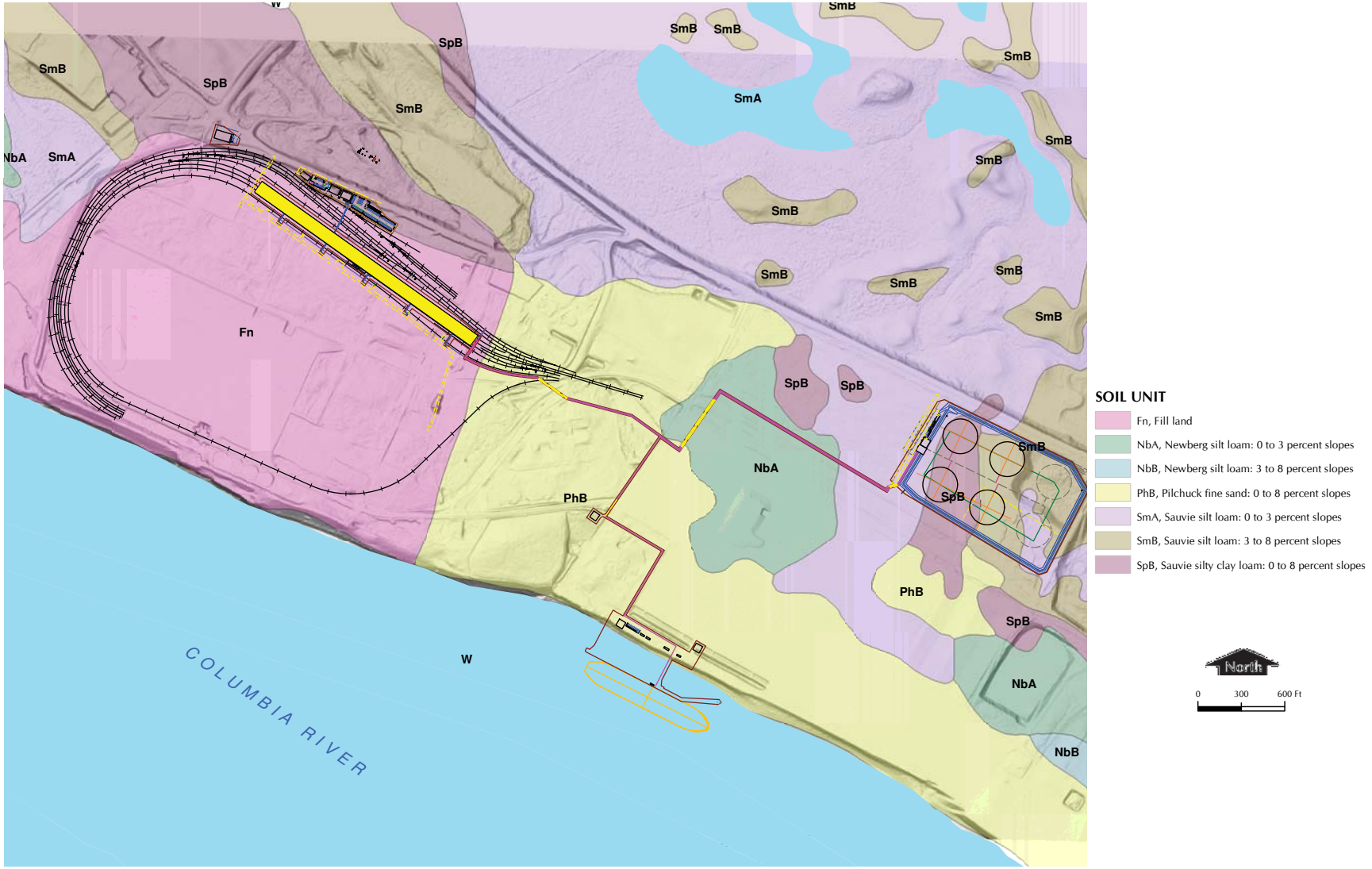
PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: WATER QUALITY BASIN MAP

DESIGN:	DES	START DATE:	6/26/2013	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	8/22/2013	PROJECT MANAGER:	PM
CHECKED:		APPROVED:	APPR	SIZE:	24X36

DRAWING NUMBER: 0X00-BASINS-001 | SHEET: 1/1 | REV.:

Attachment C
Soils Map



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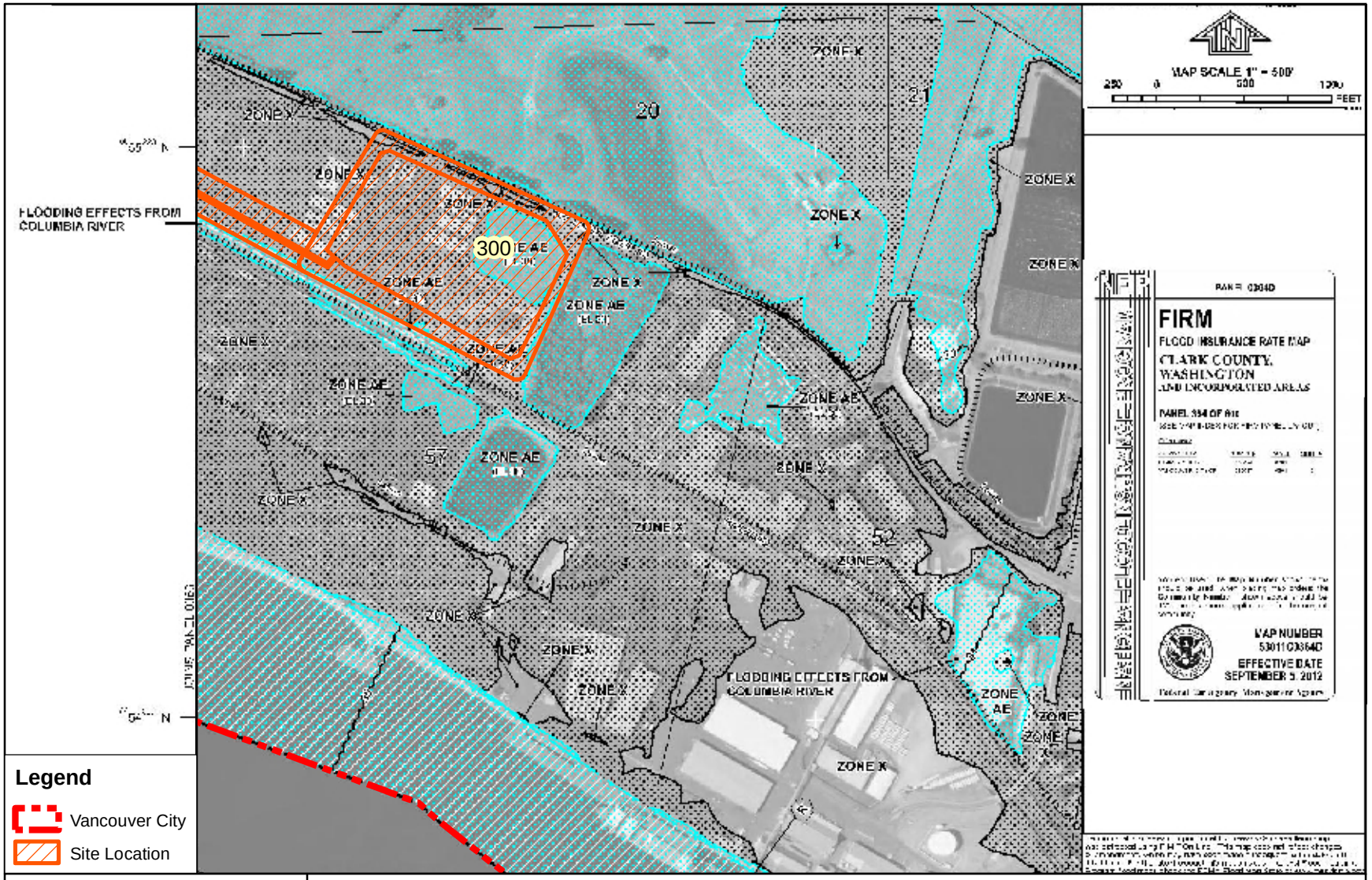
Soils Map

Attachment D
Flood Insurance Rate Maps



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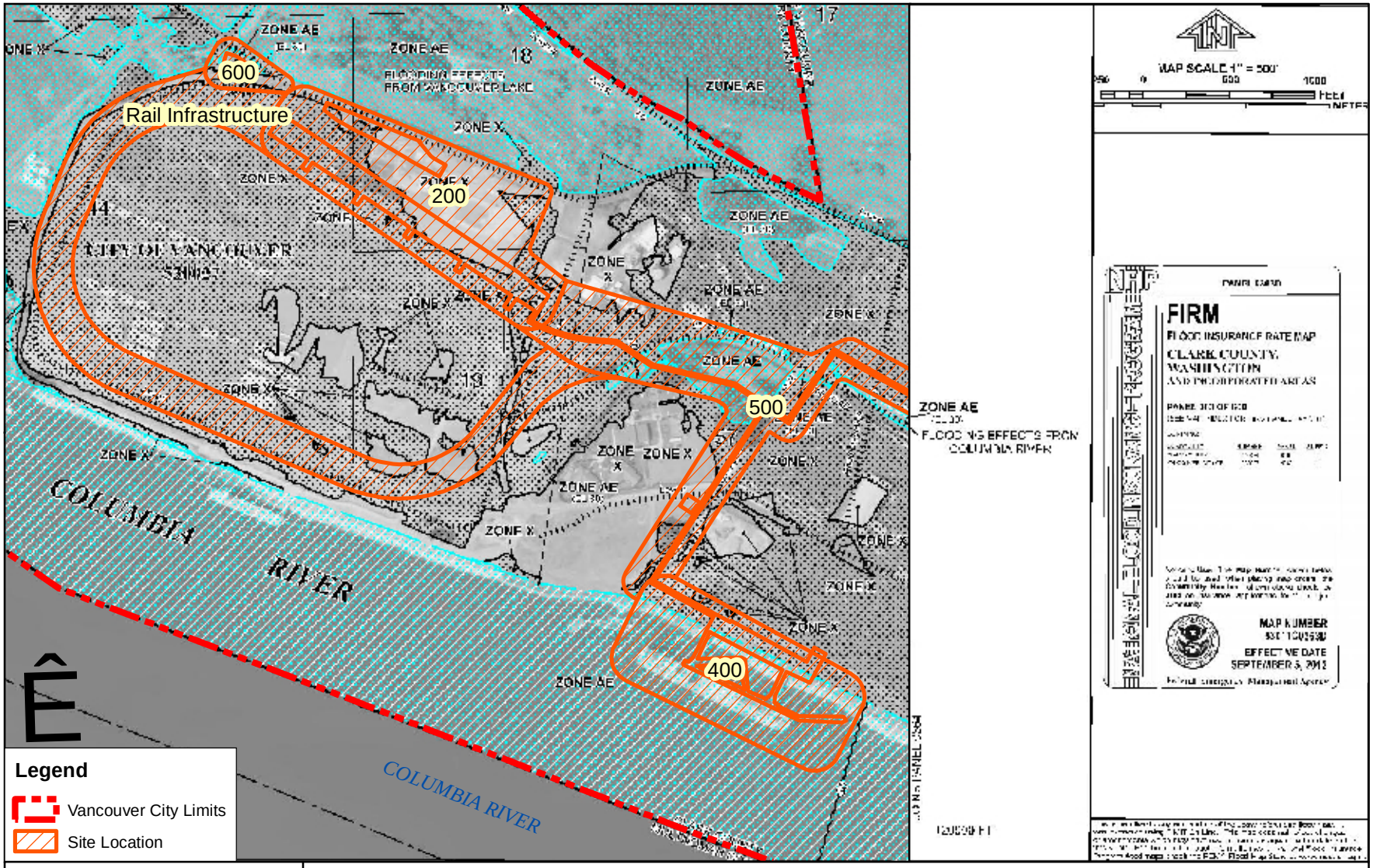
Mapped Floodplains East



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Mapped Floodplains West

Attachment E
WWHM Model Results

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Savage
Site Name:	Tesoro Savage Petroleum Terminal
Site Address:	5501 Old Lower River Road
City:	Vancouver
Report Date:	8/7/2013
Gage:	Portland
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.80
Version:	2013/05/17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year
Low Flow Threshold for POC4:	50 Percent of the 2 Year
High Flow Threshold for POC4:	50 Year
Low Flow Threshold for POC5:	50 Percent of the 2 Year
High Flow Threshold for POC5:	50 Year
Low Flow Threshold for POC6:	50 Percent of the 2 Year
High Flow Threshold for POC6:	50 Year
Low Flow Threshold for POC7:	50 Percent of the 2 Year
High Flow Threshold for POC7:	50 Year
Low Flow Threshold for POC8:	50 Percent of the 2 Year
High Flow Threshold for POC8:	50 Year
Low Flow Threshold for POC9:	50 Percent of the 2 Year
High Flow Threshold for POC9:	50 Year

Landuse Basin Data

Predeveloped Land Use

Area 200 - Office Change Room

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	1.6
Impervious Total	1.6
Basin Total	1.6

Element Flows To:

Surface	Interflow	Groundwater

Area 200 Rail Unloading

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	6.02
Impervious Total	6.02
Basin Total	6.02

Element Flows To:

Surface	Interflow	Groundwater

Area 300 Containment Berm

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	18.35
Impervious Total	18.35
Basin Total	18.35

Element Flows To:

Surface	Interflow	Groundwater

Area 300 & 700 Buidlings & Parking

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	2.5
Impervious Total	2.5
Basin Total	2.5

Element Flows To:

Surface	Interflow	Groundwater

Area 400 Dock

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	1.18
Impervious Total	1.18
Basin Total	1.18

Element Flows To:

Surface	Interflow	Groundwater

Area 500 Pipeline Alignment

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	2.29
Impervious Total	2.29
Basin Total	2.29

Element Flows To:

Surface	Interflow	Groundwater

Area 600 - West Boiler Building

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	0.46
Impervious Total	0.46
Basin Total	0.46

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Area 20O - Office Change Room

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	0.37
Pervious Total	0.37

Impervious Land Use	Acres
ROOF TOPS FLAT	0.23
SIDEWALKS FLAT	0.07
PARKING FLAT	0.93
Impervious Total	1.23
Basin Total	1.6

Element Flows To:

Surface	Interflow	Groundwater

Area 200 Rail Unloading

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
SIDEWALKS FLAT	0.02
PARKING FLAT	1.18
Impervious Total	1.2
Basin Total	1.2

Element Flows To:

Surface	Interflow	Groundwater

Area 300 Containment Berm

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	12.12
Impervious Total	12.12
Basin Total	12.12

Element Flows To:

Surface	Interflow	Groundwater

Area 300 & 700 Buidlings & Parking

Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Lawn, Flat	1.62
Pervious Total	1.62

Impervious Land Use	Acres
ROOF TOPS FLAT	0.16
SIDEWALKS FLAT	0.05
PARKING FLAT	0.28
Impervious Total	0.49
Basin Total	2.11

Element Flows To:

Surface	Interflow	Groundwater

Area 400 Dock

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	0.13
Pervious Total	0.13

Impervious Land Use	Acres
PARKING FLAT	1.05
Impervious Total	1.05
Basin Total	1.18

Element Flows To:

Surface	Interflow	Groundwater

Area 500 Pipeline Alignment

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	2.29
Impervious Total	2.29
Basin Total	2.29

Element Flows To:

Surface	Interflow	Groundwater

Area 600 - West Boiler Building

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	0.15
Pervious Total	0.15

Impervious Land Use	Acres
ROOF TOPS FLAT	0.15
SIDEWALKS FLAT	0.01
PARKING FLAT	0.19
Impervious Total	0.35
Basin Total	0.5

Element Flows To:

Surface	Interflow	Groundwater

Area 300 - Tank Roofs

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
ROOF TOPS FLAT	6.23
Impervious Total	6.23
Basin Total	6.23

Element Flows To:

Surface	Interflow	Groundwater

Area 200 - Rail Roof

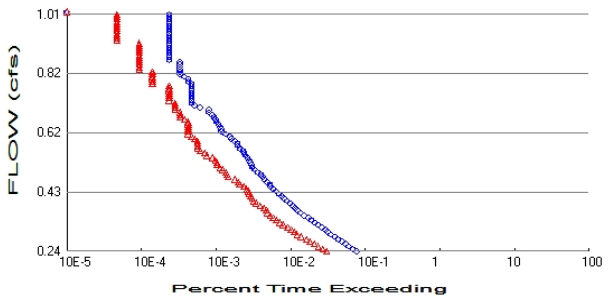
Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
ROOF TOPS FLAT	3.9
Impervious Total	3.9
Basin Total	3.9

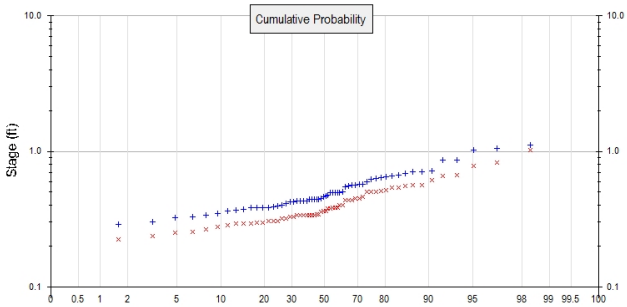
Element Flows To:

Surface	Interflow	Groundwater

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 1.6

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.37
Total Impervious Area: 1.23

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.479642
5 year	0.632761
10 year	0.742566
25 year	0.891239
50 year	1.00943
100 year	1.134182

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.378635
5 year	0.506049
10 year	0.598343
25 year	0.72432
50 year	0.825185
100 year	0.932254

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.672	0.517
1950	0.383	0.294
1951	0.430	0.343
1952	0.478	0.377
1953	0.399	0.307
1954	0.501	0.385
1955	0.323	0.252
1956	0.660	0.563
1957	0.448	0.356
1958	0.703	0.566

1959	0.382	0.294
1960	0.443	0.343
1961	0.621	0.511
1962	0.338	0.266
1963	0.426	0.337
1964	0.376	0.296
1965	0.546	0.452
1966	0.422	0.336
1967	0.492	0.386
1968	0.705	0.542
1969	0.858	0.661
1970	1.117	1.018
1971	0.441	0.339
1972	0.442	0.340
1973	0.430	0.330
1974	0.493	0.400
1975	0.300	0.236
1976	0.394	0.318
1977	0.280	0.216
1978	0.494	0.403
1979	0.684	0.553
1980	0.382	0.296
1981	0.564	0.464
1982	0.572	0.447
1983	0.599	0.505
1984	0.366	0.286
1985	0.413	0.319
1986	0.497	0.383
1987	0.465	0.365
1988	0.567	0.436
1989	0.427	0.329
1990	0.441	0.339
1991	0.433	0.340
1992	0.386	0.307
1993	0.555	0.438
1994	0.363	0.291
1995	0.653	0.502
1996	0.857	0.672
1997	0.713	0.612
1998	0.626	0.506
1999	0.347	0.275
2000	0.330	0.254
2001	0.291	0.225
2002	0.640	0.540
2003	0.387	0.308
2004	0.494	0.380
2005	0.440	0.339
2006	0.564	0.434
2007	0.461	0.362
2008	1.050	0.825
2009	1.016	0.782

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	1.1170	1.0179
2	1.0505	0.8253
3	1.0163	0.7815

4	0.8584	0.6716
5	0.8566	0.6607
6	0.7134	0.6121
7	0.7046	0.5662
8	0.7029	0.5627
9	0.6844	0.5532
10	0.6718	0.5424
11	0.6602	0.5401
12	0.6528	0.5168
13	0.6404	0.5115
14	0.6264	0.5057
15	0.6211	0.5046
16	0.5994	0.5022
17	0.5724	0.4643
18	0.5674	0.4516
19	0.5644	0.4467
20	0.5643	0.4376
21	0.5547	0.4363
22	0.5459	0.4340
23	0.5008	0.4030
24	0.4969	0.3995
25	0.4944	0.3855
26	0.4938	0.3853
27	0.4931	0.3827
28	0.4923	0.3798
29	0.4779	0.3773
30	0.4653	0.3646
31	0.4605	0.3619
32	0.4478	0.3556
33	0.4433	0.3430
34	0.4419	0.3426
35	0.4407	0.3403
36	0.4406	0.3400
37	0.4402	0.3390
38	0.4331	0.3389
39	0.4297	0.3387
40	0.4296	0.3373
41	0.4271	0.3362
42	0.4260	0.3304
43	0.4219	0.3292
44	0.4129	0.3189
45	0.3988	0.3180
46	0.3944	0.3082
47	0.3867	0.3069
48	0.3864	0.3069
49	0.3830	0.2959
50	0.3823	0.2956
51	0.3823	0.2945
52	0.3756	0.2943
53	0.3664	0.2915
54	0.3627	0.2863
55	0.3472	0.2753
56	0.3381	0.2658
57	0.3298	0.2536
58	0.3234	0.2519
59	0.3000	0.2355
60	0.2908	0.2253
61	0.2804	0.2162

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2398	1620	647	39	Pass
0.2476	1441	574	39	Pass
0.2554	1283	503	39	Pass
0.2631	1144	444	38	Pass
0.2709	1042	386	37	Pass
0.2787	924	346	37	Pass
0.2865	829	295	35	Pass
0.2942	733	260	35	Pass
0.3020	665	236	35	Pass
0.3098	614	217	35	Pass
0.3176	557	195	35	Pass
0.3253	497	169	34	Pass
0.3331	446	154	34	Pass
0.3409	401	136	33	Pass
0.3487	366	125	34	Pass
0.3564	323	113	34	Pass
0.3642	287	105	36	Pass
0.3720	262	101	38	Pass
0.3797	244	93	38	Pass
0.3875	227	83	36	Pass
0.3953	209	73	34	Pass
0.4031	190	68	35	Pass
0.4108	172	65	37	Pass
0.4186	161	62	38	Pass
0.4264	148	59	39	Pass
0.4342	137	58	42	Pass
0.4419	124	55	44	Pass
0.4497	115	50	43	Pass
0.4575	112	44	39	Pass
0.4653	104	42	40	Pass
0.4730	94	38	40	Pass
0.4808	89	31	34	Pass
0.4886	85	30	35	Pass
0.4964	77	29	37	Pass
0.5041	71	26	36	Pass
0.5119	66	24	36	Pass
0.5197	63	22	34	Pass
0.5275	62	22	35	Pass
0.5352	59	21	35	Pass
0.5430	56	19	33	Pass
0.5508	54	16	29	Pass
0.5585	51	15	29	Pass
0.5663	49	13	26	Pass
0.5741	44	12	27	Pass
0.5819	42	12	28	Pass
0.5896	41	12	29	Pass
0.5974	38	12	31	Pass
0.6052	34	11	32	Pass
0.6130	33	10	30	Pass
0.6207	29	9	31	Pass
0.6285	25	9	36	Pass
0.6363	25	9	36	Pass
0.6441	24	9	37	Pass

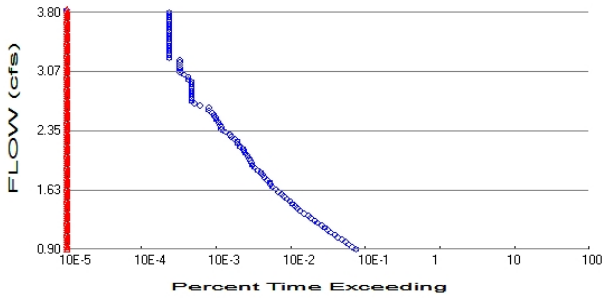
0.6518	23	9	39	Pass
0.6596	22	9	40	Pass
0.6674	21	8	38	Pass
0.6752	20	7	35	Pass
0.6829	19	7	36	Pass
0.6907	17	7	41	Pass
0.6985	17	6	35	Pass
0.7063	13	6	46	Pass
0.7140	11	6	54	Pass
0.7218	10	6	60	Pass
0.7296	10	5	50	Pass
0.7373	10	5	50	Pass
0.7451	10	5	50	Pass
0.7529	10	5	50	Pass
0.7607	10	5	50	Pass
0.7684	10	5	50	Pass
0.7762	10	5	50	Pass
0.7840	10	3	30	Pass
0.7918	9	3	33	Pass
0.7995	9	3	33	Pass
0.8073	8	3	37	Pass
0.8151	7	3	42	Pass
0.8229	7	3	42	Pass
0.8306	7	2	28	Pass
0.8384	7	2	28	Pass
0.8462	7	2	28	Pass
0.8540	7	2	28	Pass
0.8617	5	2	40	Pass
0.8695	5	2	40	Pass
0.8773	5	2	40	Pass
0.8850	5	2	40	Pass
0.8928	5	2	40	Pass
0.9006	5	2	40	Pass
0.9084	5	2	40	Pass
0.9161	5	2	40	Pass
0.9239	5	1	20	Pass
0.9317	5	1	20	Pass
0.9395	5	1	20	Pass
0.9472	5	1	20	Pass
0.9550	5	1	20	Pass
0.9628	5	1	20	Pass
0.9706	5	1	20	Pass
0.9783	5	1	20	Pass
0.9861	5	1	20	Pass
0.9939	5	1	20	Pass
1.0017	5	1	20	Pass
1.0094	5	1	20	Pass

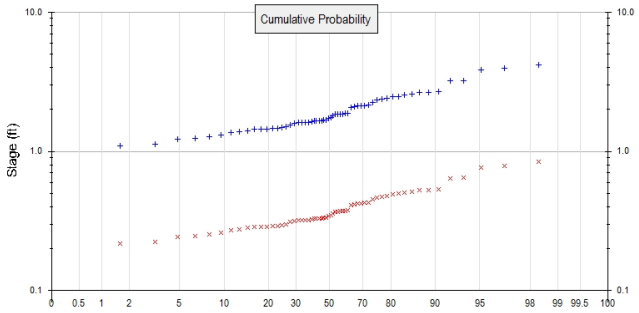
Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.1175 acre-feet
On-line facility target flow:	0.1511 cfs.
Adjusted for 15 min:	0.1511 cfs.
Off-line facility target flow:	0.0849 cfs.
Adjusted for 15 min:	0.0849 cfs.

POC 2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0
Total Impervious Area: 6.02

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0
Total Impervious Area: 1.2

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	1.804655
5 year	2.380765
10 year	2.793906
25 year	3.353291
50 year	3.797982
100 year	4.267365

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.359732
5 year	0.474571
10 year	0.556925
25 year	0.66843
50 year	0.757073
100 year	0.850638

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	2.528	0.504
1950	1.441	0.287
1951	1.616	0.322
1952	1.798	0.358
1953	1.501	0.299
1954	1.884	0.376
1955	1.217	0.243
1956	2.484	0.495
1957	1.685	0.336
1958	2.645	0.527
1959	1.438	0.287

1960	1.668	0.332
1961	2.337	0.466
1962	1.272	0.254
1963	1.603	0.320
1964	1.413	0.282
1965	2.054	0.409
1966	1.587	0.316
1967	1.852	0.369
1968	2.651	0.528
1969	3.230	0.644
1970	4.203	0.838
1971	1.658	0.331
1972	1.663	0.331
1973	1.617	0.322
1974	1.855	0.370
1975	1.129	0.225
1976	1.484	0.296
1977	1.055	0.210
1978	1.860	0.371
1979	2.575	0.513
1980	1.439	0.287
1981	2.124	0.423
1982	2.154	0.429
1983	2.255	0.450
1984	1.379	0.275
1985	1.554	0.310
1986	1.870	0.373
1987	1.751	0.349
1988	2.135	0.426
1989	1.607	0.320
1990	1.658	0.330
1991	1.630	0.325
1992	1.454	0.290
1993	2.087	0.416
1994	1.365	0.272
1995	2.456	0.490
1996	3.223	0.642
1997	2.684	0.535
1998	2.357	0.470
1999	1.306	0.260
2000	1.241	0.247
2001	1.094	0.218
2002	2.409	0.480
2003	1.455	0.290
2004	1.858	0.370
2005	1.656	0.330
2006	2.123	0.423
2007	1.733	0.345
2008	3.952	0.788
2009	3.824	0.762

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	4.2028	0.8378
2	3.9523	0.7878
3	3.8237	0.7622
4	3.2298	0.6438

5	3.2231	0.6425
6	2.6842	0.5351
7	2.6510	0.5284
8	2.6447	0.5272
9	2.5752	0.5133
10	2.5275	0.5038
11	2.4840	0.4951
12	2.4561	0.4896
13	2.4094	0.4803
14	2.3569	0.4698
15	2.3371	0.4659
16	2.2553	0.4496
17	2.1535	0.4293
18	2.1347	0.4255
19	2.1235	0.4233
20	2.1232	0.4232
21	2.0871	0.4160
22	2.0539	0.4094
23	1.8841	0.3756
24	1.8695	0.3727
25	1.8602	0.3708
26	1.8579	0.3703
27	1.8553	0.3698
28	1.8522	0.3692
29	1.7982	0.3584
30	1.7506	0.3490
31	1.7328	0.3454
32	1.6850	0.3359
33	1.6680	0.3325
34	1.6627	0.3314
35	1.6580	0.3305
36	1.6579	0.3305
37	1.6561	0.3301
38	1.6297	0.3249
39	1.6169	0.3223
40	1.6164	0.3222
41	1.6068	0.3203
42	1.6029	0.3195
43	1.5875	0.3164
44	1.5537	0.3097
45	1.5007	0.2991
46	1.4840	0.2958
47	1.4550	0.2900
48	1.4539	0.2898
49	1.4410	0.2872
50	1.4386	0.2868
51	1.4384	0.2867
52	1.4131	0.2817
53	1.3788	0.2748
54	1.3646	0.2720
55	1.3063	0.2604
56	1.2722	0.2536
57	1.2408	0.2473
58	1.2168	0.2425
59	1.1289	0.2250
60	1.0943	0.2181
61	1.0549	0.2103

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.9023	1608	0	0	Pass
0.9316	1432	0	0	Pass
0.9608	1281	0	0	Pass
0.9901	1143	0	0	Pass
1.0193	1031	0	0	Pass
1.0486	915	0	0	Pass
1.0778	828	0	0	Pass
1.1071	729	0	0	Pass
1.1363	666	0	0	Pass
1.1656	611	0	0	Pass
1.1948	556	0	0	Pass
1.2241	492	0	0	Pass
1.2533	446	0	0	Pass
1.2826	399	0	0	Pass
1.3118	366	0	0	Pass
1.3411	321	0	0	Pass
1.3703	286	0	0	Pass
1.3996	260	0	0	Pass
1.4288	244	0	0	Pass
1.4581	225	0	0	Pass
1.4873	209	0	0	Pass
1.5166	190	0	0	Pass
1.5458	171	0	0	Pass
1.5751	161	0	0	Pass
1.6043	147	0	0	Pass
1.6336	137	0	0	Pass
1.6628	123	0	0	Pass
1.6921	115	0	0	Pass
1.7213	112	0	0	Pass
1.7505	103	0	0	Pass
1.7798	94	0	0	Pass
1.8090	89	0	0	Pass
1.8383	85	0	0	Pass
1.8675	77	0	0	Pass
1.8968	71	0	0	Pass
1.9260	65	0	0	Pass
1.9553	63	0	0	Pass
1.9845	62	0	0	Pass
2.0138	59	0	0	Pass
2.0430	56	0	0	Pass
2.0723	53	0	0	Pass
2.1015	51	0	0	Pass
2.1308	49	0	0	Pass
2.1600	44	0	0	Pass
2.1893	42	0	0	Pass
2.2185	41	0	0	Pass
2.2478	38	0	0	Pass
2.2770	34	0	0	Pass
2.3063	33	0	0	Pass
2.3355	29	0	0	Pass
2.3648	25	0	0	Pass
2.3940	25	0	0	Pass
2.4233	24	0	0	Pass

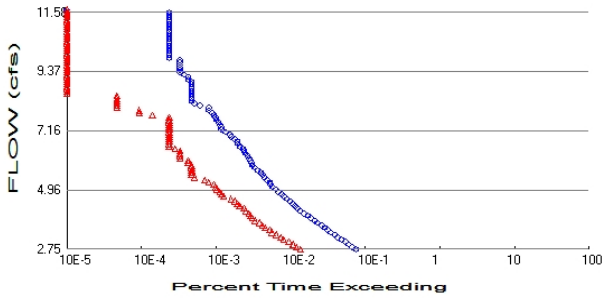
2.4525	23	0	0	Pass
2.4818	22	0	0	Pass
2.5110	21	0	0	Pass
2.5403	20	0	0	Pass
2.5695	19	0	0	Pass
2.5988	17	0	0	Pass
2.6280	17	0	0	Pass
2.6573	13	0	0	Pass
2.6865	11	0	0	Pass
2.7158	10	0	0	Pass
2.7450	10	0	0	Pass
2.7743	10	0	0	Pass
2.8035	10	0	0	Pass
2.8328	10	0	0	Pass
2.8620	10	0	0	Pass
2.8913	10	0	0	Pass
2.9205	10	0	0	Pass
2.9498	10	0	0	Pass
2.9790	9	0	0	Pass
3.0083	9	0	0	Pass
3.0375	8	0	0	Pass
3.0668	7	0	0	Pass
3.0960	7	0	0	Pass
3.1253	7	0	0	Pass
3.1545	7	0	0	Pass
3.1838	7	0	0	Pass
3.2130	7	0	0	Pass
3.2423	5	0	0	Pass
3.2715	5	0	0	Pass
3.3007	5	0	0	Pass
3.3300	5	0	0	Pass
3.3592	5	0	0	Pass
3.3885	5	0	0	Pass
3.4177	5	0	0	Pass
3.4470	5	0	0	Pass
3.4762	5	0	0	Pass
3.5055	5	0	0	Pass
3.5347	5	0	0	Pass
3.5640	5	0	0	Pass
3.5932	5	0	0	Pass
3.6225	5	0	0	Pass
3.6517	5	0	0	Pass
3.6810	5	0	0	Pass
3.7102	5	0	0	Pass
3.7395	5	0	0	Pass
3.7687	5	0	0	Pass
3.7980	5	0	0	Pass

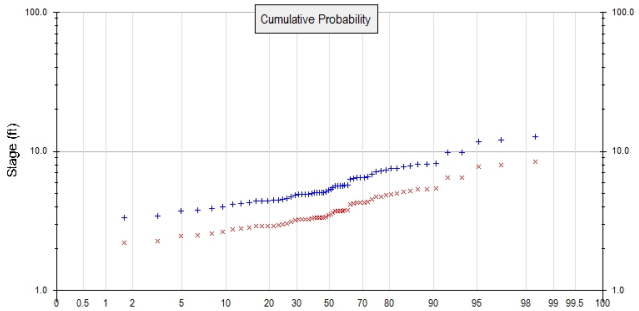
Water Quality

Water Quality BMP Flow and Volume for POC #2

On-line facility volume:	0.1067 acre-feet
On-line facility target flow:	0.1496 cfs.
Adjusted for 15 min:	0.1496 cfs.
Off-line facility target flow:	0.0842 cfs.
Adjusted for 15 min:	0.0842 cfs.

POC 3





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 0
Total Impervious Area: 18.35

Mitigated Landuse Totals for POC #3
Total Pervious Area: 0
Total Impervious Area: 12.12

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	5.500899
5 year	7.256983
10 year	8.516311
25 year	10.221418
50 year	11.576914
100 year	13.007677

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	3.63329
5 year	4.793165
10 year	5.624938
25 year	6.751142
50 year	7.646433
100 year	8.591436

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1949	7.704	5.089
1950	4.393	2.901
1951	4.927	3.254
1952	5.481	3.620
1953	4.574	3.021
1954	5.743	3.793
1955	3.709	2.450
1956	7.572	5.001
1957	5.136	3.392
1958	8.061	5.324
1959	4.384	2.896

1960	5.084	3.358
1961	7.124	4.705
1962	3.878	2.561
1963	4.886	3.227
1964	4.307	2.845
1965	6.261	4.135
1966	4.839	3.196
1967	5.646	3.729
1968	8.081	5.337
1969	9.845	6.502
1970	12.811	8.461
1971	5.054	3.338
1972	5.068	3.347
1973	4.928	3.255
1974	5.655	3.735
1975	3.441	2.273
1976	4.523	2.988
1977	3.216	2.124
1978	5.670	3.745
1979	7.850	5.185
1980	4.385	2.896
1981	6.473	4.275
1982	6.564	4.336
1983	6.874	4.540
1984	4.203	2.776
1985	4.736	3.128
1986	5.699	3.764
1987	5.336	3.524
1988	6.507	4.298
1989	4.898	3.235
1990	5.054	3.338
1991	4.968	3.281
1992	4.432	2.927
1993	6.362	4.202
1994	4.160	2.747
1995	7.487	4.945
1996	9.825	6.489
1997	8.182	5.404
1998	7.184	4.745
1999	3.982	2.630
2000	3.782	2.498
2001	3.336	2.203
2002	7.344	4.851
2003	4.435	2.929
2004	5.663	3.740
2005	5.048	3.334
2006	6.472	4.275
2007	5.282	3.489
2008	12.047	7.957
2009	11.655	7.698

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	12.8109	8.4615
2	12.0474	7.9572
3	11.6554	7.6983
4	9.8449	6.5025

5	9.8246	6.4890
6	8.1819	5.4040
7	8.0807	5.3372
8	8.0614	5.3245
9	7.8496	5.1846
10	7.7043	5.0886
11	7.5716	5.0010
12	7.4866	4.9448
13	7.3442	4.8507
14	7.1843	4.7452
15	7.1238	4.7052
16	6.8744	4.5405
17	6.5643	4.3356
18	6.5069	4.2977
19	6.4728	4.2752
20	6.4719	4.2746
21	6.3620	4.2020
22	6.2606	4.1351
23	5.7432	3.7933
24	5.6986	3.7639
25	5.6703	3.7452
26	5.6631	3.7404
27	5.6552	3.7352
28	5.6459	3.7291
29	5.4812	3.6203
30	5.3361	3.5244
31	5.2819	3.4886
32	5.1362	3.3924
33	5.0843	3.3581
34	5.0681	3.3475
35	5.0539	3.3381
36	5.0537	3.3379
37	5.0481	3.3342
38	4.9675	3.2810
39	4.9285	3.2552
40	4.9270	3.2542
41	4.8978	3.2350
42	4.8858	3.2270
43	4.8389	3.1961
44	4.7358	3.1280
45	4.5743	3.0213
46	4.5233	2.9876
47	4.4350	2.9293
48	4.4317	2.9271
49	4.3925	2.9012
50	4.3850	2.8962
51	4.3845	2.8959
52	4.3072	2.8449
53	4.2027	2.7758
54	4.1596	2.7474
55	3.9818	2.6299
56	3.8779	2.5613
57	3.7823	2.4982
58	3.7089	2.4497
59	3.4410	2.2727
60	3.3356	2.2031
61	3.2156	2.1239

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
2.7504	1608	289	17	Pass
2.8396	1430	253	17	Pass
2.9288	1281	228	17	Pass
3.0179	1144	201	17	Pass
3.1071	1029	172	16	Pass
3.1962	914	156	17	Pass
3.2854	828	137	16	Pass
3.3745	729	120	16	Pass
3.4637	666	112	16	Pass
3.5529	610	97	15	Pass
3.6420	555	89	16	Pass
3.7312	492	82	16	Pass
3.8203	446	71	15	Pass
3.9095	398	65	16	Pass
3.9986	364	62	17	Pass
4.0878	322	59	18	Pass
4.1769	286	53	18	Pass
4.2661	260	51	19	Pass
4.3553	243	44	18	Pass
4.4444	226	41	18	Pass
4.5336	208	38	18	Pass
4.6227	190	34	17	Pass
4.7119	171	27	15	Pass
4.8010	161	25	15	Pass
4.8902	147	24	16	Pass
4.9794	137	22	16	Pass
5.0685	123	21	17	Pass
5.1577	115	20	17	Pass
5.2468	112	17	15	Pass
5.3360	103	15	14	Pass
5.4251	94	11	11	Pass
5.5143	89	10	11	Pass
5.6034	85	10	11	Pass
5.6926	77	10	12	Pass
5.7818	71	10	14	Pass
5.8709	65	10	15	Pass
5.9601	63	9	14	Pass
6.0492	62	9	14	Pass
6.1384	59	7	11	Pass
6.2275	56	7	12	Pass
6.3167	53	7	13	Pass
6.4059	51	7	13	Pass
6.4950	49	6	12	Pass
6.5842	44	5	11	Pass
6.6733	42	5	11	Pass
6.7625	41	5	12	Pass
6.8516	38	5	13	Pass
6.9408	34	5	14	Pass
7.0299	33	5	15	Pass
7.1191	29	5	17	Pass
7.2083	25	5	20	Pass
7.2974	25	5	20	Pass
7.3866	24	5	20	Pass

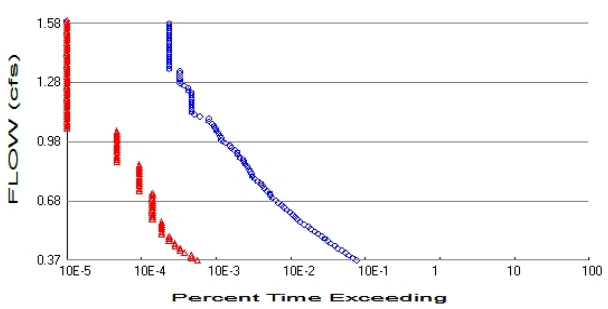
7.4757	23	5	21	Pass
7.5649	22	5	22	Pass
7.6540	21	5	23	Pass
7.7432	20	3	15	Pass
7.8324	19	2	10	Pass
7.9215	17	2	11	Pass
8.0107	17	1	5	Pass
8.0998	13	1	7	Pass
8.1890	11	1	9	Pass
8.2781	10	1	10	Pass
8.3673	10	1	10	Pass
8.4564	10	1	10	Pass
8.5456	10	0	0	Pass
8.6348	10	0	0	Pass
8.7239	10	0	0	Pass
8.8131	10	0	0	Pass
8.9022	10	0	0	Pass
8.9914	10	0	0	Pass
9.0805	9	0	0	Pass
9.1697	9	0	0	Pass
9.2589	8	0	0	Pass
9.3480	7	0	0	Pass
9.4372	7	0	0	Pass
9.5263	7	0	0	Pass
9.6155	7	0	0	Pass
9.7046	7	0	0	Pass
9.7938	7	0	0	Pass
9.8829	5	0	0	Pass
9.9721	5	0	0	Pass
10.0613	5	0	0	Pass
10.1504	5	0	0	Pass
10.2396	5	0	0	Pass
10.3287	5	0	0	Pass
10.4179	5	0	0	Pass
10.5070	5	0	0	Pass
10.5962	5	0	0	Pass
10.6854	5	0	0	Pass
10.7745	5	0	0	Pass
10.8637	5	0	0	Pass
10.9528	5	0	0	Pass
11.0420	5	0	0	Pass
11.1311	5	0	0	Pass
11.2203	5	0	0	Pass
11.3094	5	0	0	Pass
11.3986	5	0	0	Pass
11.4878	5	0	0	Pass
11.5769	5	0	0	Pass

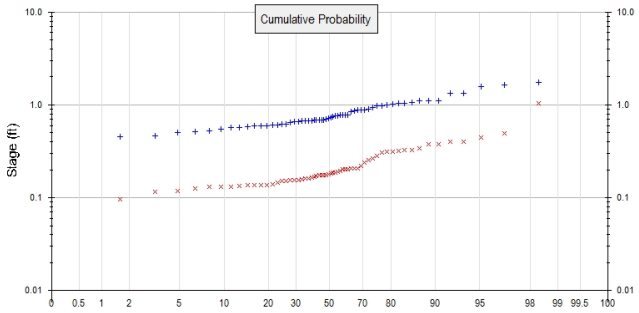
Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	1.0785 acre-feet
On-line facility target flow:	1.5108 cfs.
Adjusted for 15 min:	1.5108 cfs.
Off-line facility target flow:	0.8507 cfs.
Adjusted for 15 min:	0.8507 cfs.

POC 4





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #4
Total Pervious Area: 0
Total Impervious Area: 2.5

Mitigated Landuse Totals for POC #4
Total Pervious Area: 1.62
Total Impervious Area: 0.49

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	**Flow(cfs)**
2 year	0.749441
5 year	0.988689
10 year	1.16026
25 year	1.392563
50 year	1.577235
100 year	1.772161

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	**Flow(cfs)**
2 year	0.190564
5 year	0.285817
10 year	0.364424
25 year	0.483906
50 year	0.589246
100 year	0.710103

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #4

Year	**Predeveloped**	**Mitigated**
1949	1.050	0.207
1950	0.598	0.139
1951	0.671	0.207
1952	0.747	0.189
1953	0.623	0.150
1954	0.782	0.155
1955	0.505	0.130
1956	1.032	0.444
1957	0.700	0.187
1958	1.098	0.328
1959	0.597	0.119

1960	0.693	0.145
1961	0.971	0.339
1962	0.528	0.138
1963	0.666	0.174
1964	0.587	0.169
1965	0.853	0.307
1966	0.659	0.181
1967	0.769	0.204
1968	1.101	0.241
1969	1.341	0.267
1970	1.745	1.039
1971	0.689	0.137
1972	0.690	0.160
1973	0.671	0.170
1974	0.770	0.286
1975	0.469	0.125
1976	0.616	0.186
1977	0.438	0.089
1978	0.773	0.252
1979	1.069	0.328
1980	0.597	0.132
1981	0.882	0.311
1982	0.894	0.204
1983	0.937	0.375
1984	0.573	0.132
1985	0.645	0.159
1986	0.776	0.155
1987	0.727	0.178
1988	0.886	0.174
1989	0.667	0.135
1990	0.689	0.136
1991	0.677	0.165
1992	0.604	0.162
1993	0.867	0.219
1994	0.567	0.177
1995	1.020	0.206
1996	1.339	0.320
1997	1.115	0.497
1998	0.979	0.378
1999	0.542	0.154
2000	0.515	0.115
2001	0.454	0.096
2002	1.001	0.405
2003	0.604	0.195
2004	0.772	0.152
2005	0.688	0.136
2006	0.882	0.204
2007	0.720	0.175
2008	1.641	0.400
2009	1.588	0.313

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #4

Rank	Predeveloped	Mitigated
1	1.7454	1.0389
2	1.6413	0.4974
3	1.5879	0.4438
4	1.3413	0.4053

5	1.3385	0.3995
6	1.1147	0.3781
7	1.1009	0.3752
8	1.0983	0.3390
9	1.0694	0.3285
10	1.0496	0.3281
11	1.0316	0.3196
12	1.0200	0.3133
13	1.0006	0.3106
14	0.9788	0.3072
15	0.9705	0.2855
16	0.9366	0.2665
17	0.8943	0.2519
18	0.8865	0.2412
19	0.8819	0.2188
20	0.8817	0.2072
21	0.8668	0.2072
22	0.8529	0.2063
23	0.7825	0.2045
24	0.7764	0.2041
25	0.7725	0.2036
26	0.7715	0.1950
27	0.7705	0.1895
28	0.7692	0.1869
29	0.7468	0.1857
30	0.7270	0.1809
31	0.7196	0.1781
32	0.6998	0.1768
33	0.6927	0.1752
34	0.6905	0.1745
35	0.6885	0.1736
36	0.6885	0.1699
37	0.6877	0.1689
38	0.6768	0.1649
39	0.6715	0.1616
40	0.6713	0.1602
41	0.6673	0.1594
42	0.6656	0.1552
43	0.6593	0.1548
44	0.6452	0.1543
45	0.6232	0.1523
46	0.6163	0.1502
47	0.6042	0.1451
48	0.6038	0.1389
49	0.5984	0.1378
50	0.5974	0.1366
51	0.5973	0.1361
52	0.5868	0.1360
53	0.5726	0.1347
54	0.5667	0.1325
55	0.5425	0.1324
56	0.5283	0.1302
57	0.5153	0.1250
58	0.5053	0.1187
59	0.4688	0.1149
60	0.4544	0.0965
61	0.4381	0.0894

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3747	1617	12	0	Pass
0.3869	1441	10	0	Pass
0.3990	1280	10	0	Pass
0.4112	1144	8	0	Pass
0.4233	1031	7	0	Pass
0.4355	915	7	0	Pass
0.4476	829	6	0	Pass
0.4597	737	6	0	Pass
0.4719	669	5	0	Pass
0.4840	610	5	0	Pass
0.4962	555	5	0	Pass
0.5083	494	4	0	Pass
0.5205	448	4	0	Pass
0.5326	400	4	1	Pass
0.5448	366	4	1	Pass
0.5569	323	4	1	Pass
0.5691	286	4	1	Pass
0.5812	260	3	1	Pass
0.5934	244	3	1	Pass
0.6055	227	3	1	Pass
0.6177	209	3	1	Pass
0.6298	190	3	1	Pass
0.6419	172	3	1	Pass
0.6541	161	3	1	Pass
0.6662	147	3	2	Pass
0.6784	137	3	2	Pass
0.6905	123	3	2	Pass
0.7027	115	3	2	Pass
0.7148	112	3	2	Pass
0.7270	104	2	1	Pass
0.7391	94	2	2	Pass
0.7513	89	2	2	Pass
0.7634	85	2	2	Pass
0.7756	77	2	2	Pass
0.7877	71	2	2	Pass
0.7999	66	2	3	Pass
0.8120	63	2	3	Pass
0.8241	62	2	3	Pass
0.8363	59	2	3	Pass
0.8484	56	2	3	Pass
0.8606	54	2	3	Pass
0.8727	51	1	1	Pass
0.8849	49	1	2	Pass
0.8970	44	1	2	Pass
0.9092	42	1	2	Pass
0.9213	41	1	2	Pass
0.9335	38	1	2	Pass
0.9456	34	1	2	Pass
0.9578	33	1	3	Pass
0.9699	29	1	3	Pass
0.9821	25	1	4	Pass
0.9942	25	1	4	Pass
1.0063	24	1	4	Pass

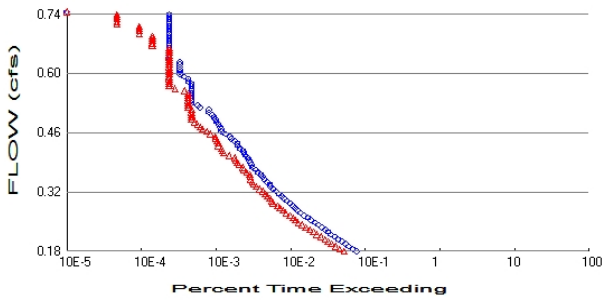
1.0185	23	1	4	Pass
1.0306	22	1	4	Pass
1.0428	21	0	0	Pass
1.0549	20	0	0	Pass
1.0671	19	0	0	Pass
1.0792	17	0	0	Pass
1.0914	17	0	0	Pass
1.1035	13	0	0	Pass
1.1157	11	0	0	Pass
1.1278	10	0	0	Pass
1.1400	10	0	0	Pass
1.1521	10	0	0	Pass
1.1643	10	0	0	Pass
1.1764	10	0	0	Pass
1.1885	10	0	0	Pass
1.2007	10	0	0	Pass
1.2128	10	0	0	Pass
1.2250	10	0	0	Pass
1.2371	9	0	0	Pass
1.2493	9	0	0	Pass
1.2614	8	0	0	Pass
1.2736	7	0	0	Pass
1.2857	7	0	0	Pass
1.2979	7	0	0	Pass
1.3100	7	0	0	Pass
1.3222	7	0	0	Pass
1.3343	7	0	0	Pass
1.3464	5	0	0	Pass
1.3586	5	0	0	Pass
1.3707	5	0	0	Pass
1.3829	5	0	0	Pass
1.3950	5	0	0	Pass
1.4072	5	0	0	Pass
1.4193	5	0	0	Pass
1.4315	5	0	0	Pass
1.4436	5	0	0	Pass
1.4558	5	0	0	Pass
1.4679	5	0	0	Pass
1.4801	5	0	0	Pass
1.4922	5	0	0	Pass
1.5044	5	0	0	Pass
1.5165	5	0	0	Pass
1.5286	5	0	0	Pass
1.5408	5	0	0	Pass
1.5529	5	0	0	Pass
1.5651	5	0	0	Pass
1.5772	5	0	0	Pass

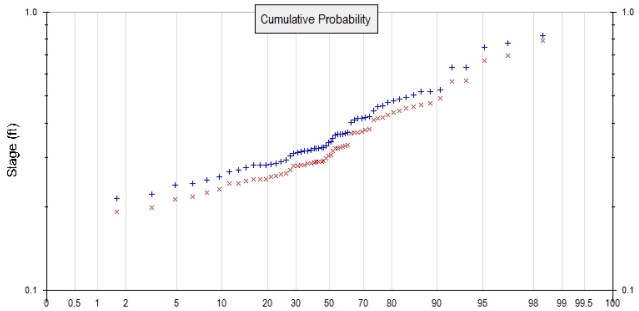
Water Quality

Water Quality BMP Flow and Volume for POC #4

On-line facility volume:	0.087 acre-feet
On-line facility target flow:	0.0671 cfs.
Adjusted for 15 min:	0.0671 cfs.
Off-line facility target flow:	0.0374 cfs.
Adjusted for 15 min:	0.0374 cfs.

POC 5





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #5
Total Pervious Area: 0
Total Impervious Area: 1.18

Mitigated Landuse Totals for POC #5
Total Pervious Area: 0.13
Total Impervious Area: 1.05

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #5

Return Period	**Flow(cfs)**
2 year	0.353736
5 year	0.466661
10 year	0.547642
25 year	0.657289
50 year	0.744455
100 year	0.83646

Flow Frequency Return Periods for Mitigated. POC #5

Return Period	**Flow(cfs)**
2 year	0.318141
5 year	0.421986
10 year	0.496768
25 year	0.598363
50 year	0.679368
100 year	0.765073

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #5

Year	**Predeveloped**	**Mitigated**
1949	0.495	0.441
1950	0.282	0.251
1951	0.317	0.286
1952	0.352	0.317
1953	0.294	0.262
1954	0.369	0.329
1955	0.239	0.212
1956	0.487	0.453
1957	0.330	0.298
1958	0.518	0.470
1959	0.282	0.251

1960	0.327	0.292
1961	0.458	0.420
1962	0.249	0.224
1963	0.314	0.283
1964	0.277	0.248
1965	0.403	0.369
1966	0.311	0.281
1967	0.363	0.325
1968	0.520	0.463
1969	0.633	0.564
1970	0.824	0.789
1971	0.325	0.289
1972	0.326	0.290
1973	0.317	0.282
1974	0.364	0.331
1975	0.221	0.198
1976	0.291	0.264
1977	0.207	0.184
1978	0.365	0.333
1979	0.505	0.459
1980	0.282	0.252
1981	0.416	0.381
1982	0.422	0.378
1983	0.442	0.409
1984	0.270	0.242
1985	0.305	0.271
1986	0.366	0.326
1987	0.343	0.308
1988	0.418	0.372
1989	0.315	0.281
1990	0.325	0.289
1991	0.319	0.287
1992	0.285	0.257
1993	0.409	0.368
1994	0.267	0.242
1995	0.481	0.429
1996	0.632	0.567
1997	0.526	0.491
1998	0.462	0.415
1999	0.256	0.231
2000	0.243	0.216
2001	0.214	0.191
2002	0.472	0.437
2003	0.285	0.258
2004	0.364	0.324
2005	0.325	0.289
2006	0.416	0.370
2007	0.340	0.305
2008	0.775	0.696
2009	0.749	0.667

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #5

Rank	Predeveloped	Mitigated
1	0.8238	0.7890
2	0.7747	0.6956
3	0.7495	0.6670
4	0.6331	0.5668

5	0.6318	0.5636
6	0.5261	0.4906
7	0.5196	0.4704
8	0.5184	0.4626
9	0.5048	0.4587
10	0.4954	0.4526
11	0.4869	0.4410
12	0.4814	0.4370
13	0.4723	0.4285
14	0.4620	0.4196
15	0.4581	0.4151
16	0.4421	0.4087
17	0.4221	0.3811
18	0.4184	0.3780
19	0.4162	0.3724
20	0.4162	0.3704
21	0.4091	0.3695
22	0.4026	0.3680
23	0.3693	0.3325
24	0.3664	0.3308
25	0.3646	0.3287
26	0.3642	0.3263
27	0.3637	0.3249
28	0.3631	0.3241
29	0.3525	0.3171
30	0.3431	0.3078
31	0.3397	0.3050
32	0.3303	0.2979
33	0.3269	0.2916
34	0.3259	0.2901
35	0.3250	0.2893
36	0.3250	0.2892
37	0.3246	0.2890
38	0.3194	0.2868
39	0.3169	0.2864
40	0.3168	0.2830
41	0.3150	0.2820
42	0.3142	0.2810
43	0.3112	0.2806
44	0.3045	0.2712
45	0.2941	0.2640
46	0.2909	0.2619
47	0.2852	0.2576
48	0.2850	0.2571
49	0.2825	0.2515
50	0.2820	0.2514
51	0.2819	0.2510
52	0.2770	0.2476
53	0.2703	0.2425
54	0.2675	0.2421
55	0.2561	0.2308
56	0.2494	0.2240
57	0.2432	0.2164
58	0.2385	0.2122
59	0.2213	0.1979
60	0.2145	0.1915
61	0.2068	0.1842

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1769	1625	1104	67	Pass
0.1826	1447	972	67	Pass
0.1883	1283	852	66	Pass
0.1941	1144	750	65	Pass
0.1998	1045	674	64	Pass
0.2055	924	615	66	Pass
0.2113	828	545	65	Pass
0.2170	729	478	65	Pass
0.2227	674	434	64	Pass
0.2285	614	384	62	Pass
0.2342	556	340	61	Pass
0.2399	503	305	60	Pass
0.2457	452	270	59	Pass
0.2514	400	246	61	Pass
0.2571	365	229	62	Pass
0.2629	324	208	64	Pass
0.2686	288	185	64	Pass
0.2743	260	167	64	Pass
0.2801	244	154	63	Pass
0.2858	228	143	62	Pass
0.2915	209	124	59	Pass
0.2973	190	118	62	Pass
0.3030	172	112	65	Pass
0.3087	162	104	64	Pass
0.3145	148	98	66	Pass
0.3202	137	90	65	Pass
0.3259	124	82	66	Pass
0.3317	115	73	63	Pass
0.3374	112	68	60	Pass
0.3431	104	65	62	Pass
0.3489	94	62	65	Pass
0.3546	89	61	68	Pass
0.3603	85	60	70	Pass
0.3661	77	55	71	Pass
0.3718	73	51	69	Pass
0.3775	66	49	74	Pass
0.3833	63	43	68	Pass
0.3890	62	41	66	Pass
0.3947	59	39	66	Pass
0.4005	57	38	66	Pass
0.4062	54	32	59	Pass
0.4119	51	27	52	Pass
0.4177	49	26	53	Pass
0.4234	44	25	56	Pass
0.4291	42	23	54	Pass
0.4349	41	23	56	Pass
0.4406	38	22	57	Pass
0.4463	34	21	61	Pass
0.4521	33	21	63	Pass
0.4578	29	18	62	Pass
0.4635	25	16	64	Pass
0.4693	25	14	56	Pass
0.4750	24	13	54	Pass

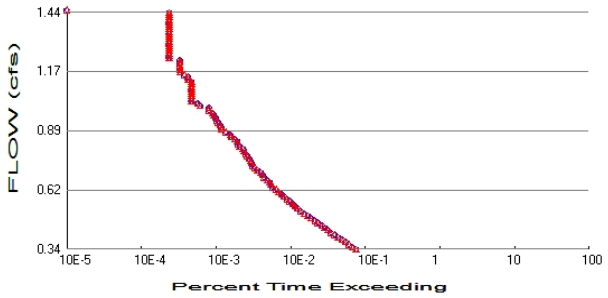
0.4807	23	12	52	Pass
0.4865	22	11	50	Pass
0.4922	21	10	47	Pass
0.4979	20	10	50	Pass
0.5037	19	10	52	Pass
0.5094	17	10	58	Pass
0.5151	17	10	58	Pass
0.5209	13	9	69	Pass
0.5266	12	9	75	Pass
0.5323	10	9	90	Pass
0.5381	10	9	90	Pass
0.5438	10	9	90	Pass
0.5495	10	9	90	Pass
0.5553	10	9	90	Pass
0.5610	10	8	80	Pass
0.5667	10	6	60	Pass
0.5725	10	5	50	Pass
0.5782	10	5	50	Pass
0.5839	9	5	55	Pass
0.5897	9	5	55	Pass
0.5954	8	5	62	Pass
0.6011	7	5	71	Pass
0.6069	7	5	71	Pass
0.6126	7	5	71	Pass
0.6183	7	5	71	Pass
0.6241	7	5	71	Pass
0.6298	7	5	71	Pass
0.6355	5	5	100	Pass
0.6413	5	5	100	Pass
0.6470	5	5	100	Pass
0.6527	5	5	100	Pass
0.6585	5	5	100	Pass
0.6642	5	5	100	Pass
0.6699	5	3	60	Pass
0.6757	5	3	60	Pass
0.6814	5	3	60	Pass
0.6871	5	3	60	Pass
0.6929	5	3	60	Pass
0.6986	5	2	40	Pass
0.7043	5	2	40	Pass
0.7101	5	2	40	Pass
0.7158	5	2	40	Pass
0.7215	5	1	20	Pass
0.7273	5	1	20	Pass
0.7330	5	1	20	Pass
0.7387	5	1	20	Pass
0.7445	5	1	20	Pass

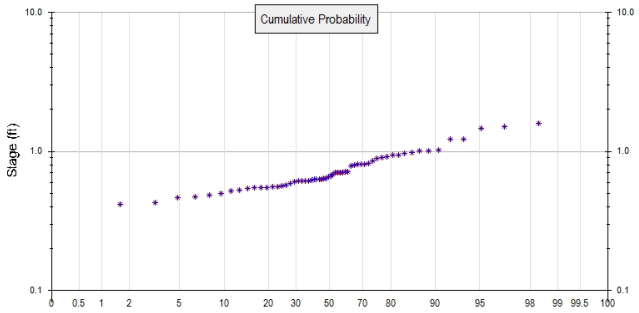
Water Quality

Water Quality BMP Flow and Volume for POC #5

On-line facility volume:	0.0959 acre-feet
On-line facility target flow:	0.1299 cfs.
Adjusted for 15 min:	0.1299 cfs.
Off-line facility target flow:	0.0731 cfs.
Adjusted for 15 min:	0.0731 cfs.

POC 6





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #6
Total Pervious Area: 0
Total Impervious Area: 2.29

Mitigated Landuse Totals for POC #6
Total Pervious Area: 0
Total Impervious Area: 2.29

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #6

Return Period	**Flow(cfs)**
2 year	0.686488
5 year	0.90564
10 year	1.062798
25 year	1.275588
50 year	1.444748
100 year	1.623301

Flow Frequency Return Periods for Mitigated. POC #6

Return Period	**Flow(cfs)**
2 year	0.686488
5 year	0.90564
10 year	1.062798
25 year	1.275588
50 year	1.444748
100 year	1.623301

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #6

Year	**Predeveloped**	**Mitigated**
1949	0.961	0.961
1950	0.548	0.548
1951	0.615	0.615
1952	0.684	0.684
1953	0.571	0.571
1954	0.717	0.717
1955	0.463	0.463
1956	0.945	0.945
1957	0.641	0.641
1958	1.006	1.006
1959	0.547	0.547

1960	0.634	0.634
1961	0.889	0.889
1962	0.484	0.484
1963	0.610	0.610
1964	0.538	0.538
1965	0.781	0.781
1966	0.604	0.604
1967	0.705	0.705
1968	1.008	1.008
1969	1.229	1.229
1970	1.599	1.599
1971	0.631	0.631
1972	0.632	0.632
1973	0.615	0.615
1974	0.706	0.706
1975	0.429	0.429
1976	0.564	0.564
1977	0.401	0.401
1978	0.708	0.708
1979	0.980	0.980
1980	0.547	0.547
1981	0.808	0.808
1982	0.819	0.819
1983	0.858	0.858
1984	0.524	0.524
1985	0.591	0.591
1986	0.711	0.711
1987	0.666	0.666
1988	0.812	0.812
1989	0.611	0.611
1990	0.631	0.631
1991	0.620	0.620
1992	0.553	0.553
1993	0.794	0.794
1994	0.519	0.519
1995	0.934	0.934
1996	1.226	1.226
1997	1.021	1.021
1998	0.897	0.897
1999	0.497	0.497
2000	0.472	0.472
2001	0.416	0.416
2002	0.917	0.917
2003	0.553	0.553
2004	0.707	0.707
2005	0.630	0.630
2006	0.808	0.808
2007	0.659	0.659
2008	1.503	1.503
2009	1.455	1.455

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #6

Rank	Predeveloped	Mitigated
1	1.5987	1.5987
2	1.5035	1.5035
3	1.4545	1.4545
4	1.2286	1.2286

5	1.2261	1.2261
6	1.0211	1.0211
7	1.0084	1.0084
8	1.0060	1.0060
9	0.9796	0.9796
10	0.9615	0.9615
11	0.9449	0.9449
12	0.9343	0.9343
13	0.9165	0.9165
14	0.8966	0.8966
15	0.8890	0.8890
16	0.8579	0.8579
17	0.8192	0.8192
18	0.8120	0.8120
19	0.8078	0.8078
20	0.8077	0.8077
21	0.7939	0.7939
22	0.7813	0.7813
23	0.7167	0.7167
24	0.7112	0.7112
25	0.7076	0.7076
26	0.7067	0.7067
27	0.7057	0.7057
28	0.7046	0.7046
29	0.6840	0.6840
30	0.6659	0.6659
31	0.6592	0.6592
32	0.6410	0.6410
33	0.6345	0.6345
34	0.6325	0.6325
35	0.6307	0.6307
36	0.6307	0.6307
37	0.6300	0.6300
38	0.6199	0.6199
39	0.6151	0.6151
40	0.6149	0.6149
41	0.6112	0.6112
42	0.6097	0.6097
43	0.6039	0.6039
44	0.5910	0.5910
45	0.5708	0.5708
46	0.5645	0.5645
47	0.5535	0.5535
48	0.5531	0.5531
49	0.5482	0.5482
50	0.5472	0.5472
51	0.5472	0.5472
52	0.5375	0.5375
53	0.5245	0.5245
54	0.5191	0.5191
55	0.4969	0.4969
56	0.4839	0.4839
57	0.4720	0.4720
58	0.4629	0.4629
59	0.4294	0.4294
60	0.4163	0.4163
61	0.4013	0.4013

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3432	1610	1610	100	Pass
0.3544	1435	1435	100	Pass
0.3655	1282	1282	100	Pass
0.3766	1149	1149	100	Pass
0.3877	1036	1036	100	Pass
0.3989	923	923	100	Pass
0.4100	828	828	100	Pass
0.4211	731	731	100	Pass
0.4323	666	666	100	Pass
0.4434	612	612	100	Pass
0.4545	557	557	100	Pass
0.4656	497	497	100	Pass
0.4768	450	450	100	Pass
0.4879	400	400	100	Pass
0.4990	364	364	100	Pass
0.5101	322	322	100	Pass
0.5213	287	287	100	Pass
0.5324	260	260	100	Pass
0.5435	244	244	100	Pass
0.5546	227	227	100	Pass
0.5658	209	209	100	Pass
0.5769	191	191	100	Pass
0.5880	171	171	100	Pass
0.5991	161	161	100	Pass
0.6103	147	147	100	Pass
0.6214	137	137	100	Pass
0.6325	123	123	100	Pass
0.6437	115	115	100	Pass
0.6548	112	112	100	Pass
0.6659	104	104	100	Pass
0.6770	94	94	100	Pass
0.6882	89	89	100	Pass
0.6993	85	85	100	Pass
0.7104	77	77	100	Pass
0.7215	71	71	100	Pass
0.7327	66	66	100	Pass
0.7438	63	63	100	Pass
0.7549	62	62	100	Pass
0.7660	59	59	100	Pass
0.7772	56	56	100	Pass
0.7883	54	54	100	Pass
0.7994	51	51	100	Pass
0.8105	49	49	100	Pass
0.8217	44	44	100	Pass
0.8328	42	42	100	Pass
0.8439	41	41	100	Pass
0.8551	38	38	100	Pass
0.8662	34	34	100	Pass
0.8773	33	33	100	Pass
0.8884	29	29	100	Pass
0.8996	25	25	100	Pass
0.9107	25	25	100	Pass
0.9218	24	24	100	Pass

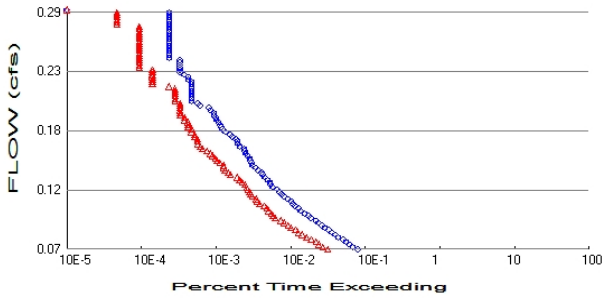
0.9329	23	23	100	Pass
0.9441	22	22	100	Pass
0.9552	21	21	100	Pass
0.9663	20	20	100	Pass
0.9774	19	19	100	Pass
0.9886	17	17	100	Pass
0.9997	17	17	100	Pass
1.0108	13	13	100	Pass
1.0219	12	12	100	Pass
1.0331	10	10	100	Pass
1.0442	10	10	100	Pass
1.0553	10	10	100	Pass
1.0665	10	10	100	Pass
1.0776	10	10	100	Pass
1.0887	10	10	100	Pass
1.0998	10	10	100	Pass
1.1110	10	10	100	Pass
1.1221	10	10	100	Pass
1.1332	9	9	100	Pass
1.1443	9	9	100	Pass
1.1555	8	8	100	Pass
1.1666	7	7	100	Pass
1.1777	7	7	100	Pass
1.1888	7	7	100	Pass
1.2000	7	7	100	Pass
1.2111	7	7	100	Pass
1.2222	7	7	100	Pass
1.2333	5	5	100	Pass
1.2445	5	5	100	Pass
1.2556	5	5	100	Pass
1.2667	5	5	100	Pass
1.2779	5	5	100	Pass
1.2890	5	5	100	Pass
1.3001	5	5	100	Pass
1.3112	5	5	100	Pass
1.3224	5	5	100	Pass
1.3335	5	5	100	Pass
1.3446	5	5	100	Pass
1.3557	5	5	100	Pass
1.3669	5	5	100	Pass
1.3780	5	5	100	Pass
1.3891	5	5	100	Pass
1.4002	5	5	100	Pass
1.4114	5	5	100	Pass
1.4225	5	5	100	Pass
1.4336	5	5	100	Pass
1.4447	5	5	100	Pass

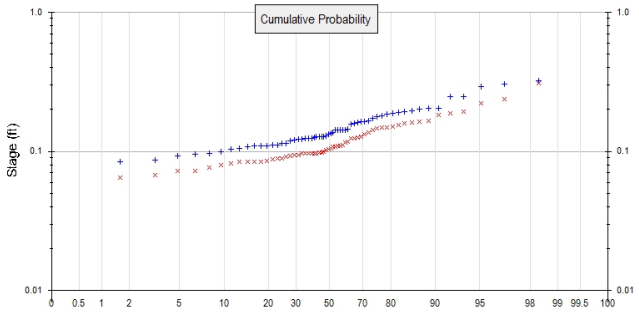
Water Quality

Water Quality BMP Flow and Volume for POC #6

On-line facility volume:	0.2037 acre-feet
On-line facility target flow:	0.2854 cfs.
Adjusted for 15 min:	0.2854 cfs.
Off-line facility target flow:	0.1607 cfs.
Adjusted for 15 min:	0.1607 cfs.

POC 7





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #7
Total Pervious Area: 0
Total Impervious Area: 0.46

Mitigated Landuse Totals for POC #7
Total Pervious Area: 0.15
Total Impervious Area: 0.35

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #7

Return Period	**Flow(cfs)**
2 year	0.137897
5 year	0.181919
10 year	0.213488
25 year	0.256232
50 year	0.290211
100 year	0.326078

Flow Frequency Return Periods for Mitigated. POC #7

Return Period	**Flow(cfs)**
2 year	0.108994
5 year	0.14647
10 year	0.173732
25 year	0.211068
50 year	0.241052
100 year	0.272956

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #7

Year	**Predeveloped**	**Mitigated**
1949	0.193	0.147
1950	0.110	0.084
1951	0.124	0.099
1952	0.137	0.109
1953	0.115	0.087
1954	0.144	0.110
1955	0.093	0.073
1956	0.190	0.167
1957	0.129	0.103
1958	0.202	0.164
1959	0.110	0.084

1960	0.127	0.098
1961	0.179	0.150
1962	0.097	0.076
1963	0.122	0.097
1964	0.108	0.086
1965	0.157	0.132
1966	0.121	0.097
1967	0.142	0.111
1968	0.203	0.154
1969	0.247	0.188
1970	0.321	0.309
1971	0.127	0.096
1972	0.127	0.097
1973	0.124	0.094
1974	0.142	0.116
1975	0.086	0.068
1976	0.113	0.092
1977	0.081	0.062
1978	0.142	0.117
1979	0.197	0.161
1980	0.110	0.084
1981	0.162	0.136
1982	0.165	0.128
1983	0.172	0.149
1984	0.105	0.082
1985	0.119	0.092
1986	0.143	0.109
1987	0.134	0.105
1988	0.163	0.124
1989	0.123	0.094
1990	0.127	0.096
1991	0.125	0.098
1992	0.111	0.089
1993	0.159	0.126
1994	0.104	0.084
1995	0.188	0.143
1996	0.246	0.193
1997	0.205	0.182
1998	0.180	0.149
1999	0.100	0.079
2000	0.095	0.072
2001	0.084	0.064
2002	0.184	0.159
2003	0.111	0.089
2004	0.142	0.108
2005	0.127	0.096
2006	0.162	0.124
2007	0.132	0.104
2008	0.302	0.237
2009	0.292	0.222

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #7

Rank	Predeveloped	Mitigated
1	0.3211	0.3089
2	0.3020	0.2370
3	0.2922	0.2224
4	0.2468	0.1927

5	0.2463	0.1881
6	0.2051	0.1819
7	0.2026	0.1668
8	0.2021	0.1642
9	0.1968	0.1607
10	0.1931	0.1594
11	0.1898	0.1544
12	0.1877	0.1497
13	0.1841	0.1493
14	0.1801	0.1489
15	0.1786	0.1471
16	0.1723	0.1429
17	0.1646	0.1358
18	0.1631	0.1324
19	0.1623	0.1279
20	0.1622	0.1259
21	0.1595	0.1242
22	0.1569	0.1235
23	0.1440	0.1175
24	0.1429	0.1162
25	0.1421	0.1112
26	0.1420	0.1097
27	0.1418	0.1090
28	0.1415	0.1085
29	0.1374	0.1081
30	0.1338	0.1046
31	0.1324	0.1039
32	0.1288	0.1026
33	0.1275	0.0992
34	0.1270	0.0977
35	0.1267	0.0977
36	0.1267	0.0972
37	0.1265	0.0971
38	0.1245	0.0968
39	0.1235	0.0965
40	0.1235	0.0965
41	0.1228	0.0964
42	0.1225	0.0940
43	0.1213	0.0938
44	0.1187	0.0923
45	0.1147	0.0917
46	0.1134	0.0890
47	0.1112	0.0885
48	0.1111	0.0874
49	0.1101	0.0857
50	0.1099	0.0845
51	0.1099	0.0843
52	0.1080	0.0838
53	0.1054	0.0838
54	0.1043	0.0820
55	0.0998	0.0794
56	0.0972	0.0763
57	0.0948	0.0726
58	0.0930	0.0722
59	0.0863	0.0679
60	0.0836	0.0643
61	0.0806	0.0616

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0689	1675	667	39	Pass
0.0712	1441	576	39	Pass
0.0734	1304	506	38	Pass
0.0757	1174	466	39	Pass
0.0779	1074	404	37	Pass
0.0801	918	347	37	Pass
0.0824	840	304	36	Pass
0.0846	760	269	35	Pass
0.0868	688	247	35	Pass
0.0891	612	213	34	Pass
0.0913	561	198	35	Pass
0.0935	505	173	34	Pass
0.0958	461	158	34	Pass
0.0980	398	132	33	Pass
0.1002	366	123	33	Pass
0.1025	327	117	35	Pass
0.1047	293	108	36	Pass
0.1069	269	102	37	Pass
0.1092	244	94	38	Pass
0.1114	230	81	35	Pass
0.1136	217	77	35	Pass
0.1159	196	73	37	Pass
0.1181	171	65	38	Pass
0.1204	163	62	38	Pass
0.1226	152	60	39	Pass
0.1248	140	57	40	Pass
0.1271	123	55	44	Pass
0.1293	115	52	45	Pass
0.1315	112	48	42	Pass
0.1338	105	44	41	Pass
0.1360	96	41	42	Pass
0.1382	89	33	37	Pass
0.1405	86	31	36	Pass
0.1427	79	28	35	Pass
0.1449	73	27	36	Pass
0.1472	66	27	40	Pass
0.1494	64	24	37	Pass
0.1516	62	22	35	Pass
0.1539	60	21	35	Pass
0.1561	56	19	33	Pass
0.1583	54	18	33	Pass
0.1606	52	16	30	Pass
0.1628	51	14	27	Pass
0.1651	44	13	29	Pass
0.1673	42	12	28	Pass
0.1695	41	12	29	Pass
0.1718	39	12	30	Pass
0.1740	35	11	31	Pass
0.1762	33	11	33	Pass
0.1785	29	10	34	Pass
0.1807	26	10	38	Pass
0.1829	25	9	36	Pass
0.1852	24	9	37	Pass

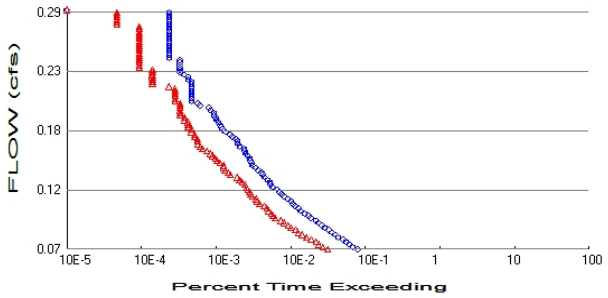
0.1874	23	9	39	Pass
0.1896	22	8	36	Pass
0.1919	21	8	38	Pass
0.1941	20	7	35	Pass
0.1963	20	7	35	Pass
0.1986	18	7	38	Pass
0.2008	17	7	41	Pass
0.2030	13	7	53	Pass
0.2053	12	7	58	Pass
0.2075	10	6	60	Pass
0.2098	10	6	60	Pass
0.2120	10	6	60	Pass
0.2142	10	6	60	Pass
0.2165	10	6	60	Pass
0.2187	10	6	60	Pass
0.2209	10	5	50	Pass
0.2232	10	3	30	Pass
0.2254	10	3	30	Pass
0.2276	9	3	33	Pass
0.2299	9	3	33	Pass
0.2321	8	3	37	Pass
0.2343	7	3	42	Pass
0.2366	7	3	42	Pass
0.2388	7	2	28	Pass
0.2410	7	2	28	Pass
0.2433	7	2	28	Pass
0.2455	7	2	28	Pass
0.2477	5	2	40	Pass
0.2500	5	2	40	Pass
0.2522	5	2	40	Pass
0.2545	5	2	40	Pass
0.2567	5	2	40	Pass
0.2589	5	2	40	Pass
0.2612	5	2	40	Pass
0.2634	5	2	40	Pass
0.2656	5	2	40	Pass
0.2679	5	2	40	Pass
0.2701	5	2	40	Pass
0.2723	5	2	40	Pass
0.2746	5	2	40	Pass
0.2768	5	2	40	Pass
0.2790	5	1	20	Pass
0.2813	5	1	20	Pass
0.2835	5	1	20	Pass
0.2857	5	1	20	Pass
0.2880	5	1	20	Pass
0.2902	5	1	20	Pass

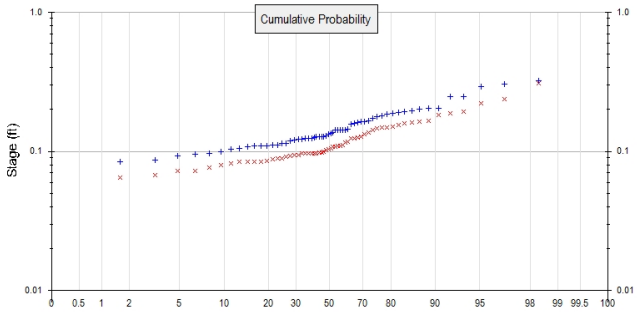
Water Quality

Water Quality BMP Flow and Volume for POC #7

On-line facility volume:	0.0346 acre-feet
On-line facility target flow:	0.0429 cfs.
Adjusted for 15 min:	0.0429 cfs.
Off-line facility target flow:	0.024 cfs.
Adjusted for 15 min:	0.024 cfs.

POC 8





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #8
Total Pervious Area: 0
Total Impervious Area: 0

Mitigated Landuse Totals for POC #8
Total Pervious Area: 0
Total Impervious Area: 6.23

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #8

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Flow Frequency Return Periods for Mitigated. POC #8

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #8

Year	**Predeveloped**	**Mitigated**

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #8

Rank	**Predeveloped**	**Mitigated**

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

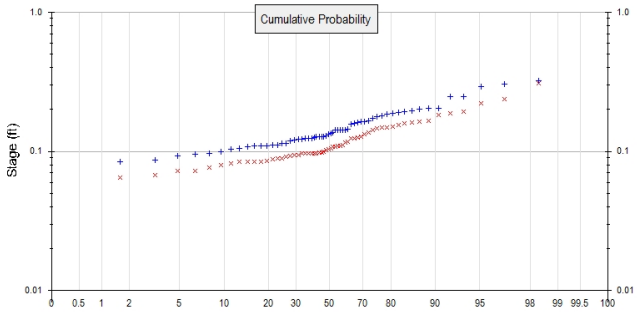
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #8

On-line facility volume:	0.5544 acre-feet
On-line facility target flow:	0.7766 cfs.
Adjusted for 15 min:	0.7766 cfs.
Off-line facility target flow:	0.4372 cfs.
Adjusted for 15 min:	0.4372 cfs.

POC 9



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #9
Total Pervious Area: 0
Total Impervious Area: 0

Mitigated Landuse Totals for POC #9
Total Pervious Area: 0
Total Impervious Area: 3.9

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #9

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Flow Frequency Return Periods for Mitigated. POC #9

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #9

Year	**Predeveloped**	**Mitigated**

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #9

Rank	**Predeveloped**	**Mitigated**

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
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0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #9

On-line facility volume:	0.347 acre-feet
On-line facility target flow:	0.4862 cfs.
Adjusted for 15 min:	0.4862 cfs.
Off-line facility target flow:	0.2737 cfs.
Adjusted for 15 min:	0.2737 cfs.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Savage.wdm
MESSU       25   PreSavage.MES
            27   PreSavage.L61
            28   PreSavage.L62
            30   POCSavage1.dat
            31   POCSavage2.dat
            32   POCSavage3.dat
            33   POCSavage4.dat
            34   POCSavage5.dat
            35   POCSavage6.dat
            36   POCSavage7.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND      11
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      COPY       505
      COPY       506
      COPY       507
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       5
      DISPLY       6
      DISPLY       7
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Area 200 - Office Change    MAX                   1    2   30    9
    2        Area 200 Rail Unloading     MAX                   1    2   31    9
    3        Area 300 Containment Berm   MAX                   1    2   32    9
    4        Area 300 & 700 Buidlings    MAX                   1    2   33    9
    5        Area 400 Dock               MAX                   1    2   34    9
    6        Area 500 Pipeline Alignme   MAX                   1    2   35    9
    7        Area 600 - West Boiler Bu   MAX                   1    2   36    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  505         1    1
  506         1    1
  507         1    1
  END TIMESERIES
```

```
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN     INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                      User  t-series Engl Metr ***
                                       in  out           ***
   11      PARKING/FLAT           1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
```

```
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
   11         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
   11               0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK    ***
<Name>   #                  <-factor->     <Name>   #   Tbl#    ***
Area 200 - Office Change Room***
IMPLND  11                       1.6      COPY   501     15
Area 200 Rail Unloading***
IMPLND  11                      6.02      COPY   502     15
Area 300 Containment Berm***
IMPLND  11                     18.35      COPY   503     15
Area 300 & 700 Buidlings & Parking***
IMPLND  11                       2.5      COPY   504     15
Area 400 Dock***
IMPLND  11                      1.18      COPY   505     15
Area 500 Pipeline Alignment***
IMPLND  11                      2.29      COPY   506     15
Area 600 - West Boiler Building***
IMPLND  11                      0.46      COPY   507     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     INPUT  TIMSER 1
COPY   506 OUTPUT MEAN   1 1   48.4        DISPLY   6     INPUT  TIMSER 1
COPY   507 OUTPUT MEAN   1 1   48.4        DISPLY   7     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
```

```
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG            ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4       WDM    501 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4       WDM    502 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4       WDM    503 FLOW     ENGL      REPL
COPY   504 OUTPUT MEAN   1 1     48.4       WDM    504 FLOW     ENGL      REPL
COPY   505 OUTPUT MEAN   1 1     48.4       WDM    505 FLOW     ENGL      REPL
COPY   506 OUTPUT MEAN   1 1     48.4       WDM    506 FLOW     ENGL      REPL
COPY   507 OUTPUT MEAN   1 1     48.4       WDM    507 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>           <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK      15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK  15
```

```
END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM         26   Savage.wdm
MESSU       25   MitSavage.MES
            27   MitSavage.L61
            28   MitSavage.L62
            30   POCSavage1.dat
            31   POCSavage2.dat
            32   POCSavage3.dat
            33   POCSavage4.dat
            34   POCSavage5.dat
            35   POCSavage6.dat
            36   POCSavage7.dat
            37   POCSavage8.dat
            38   POCSavage9.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      16
      IMPLND       4
      IMPLND       8
      IMPLND      11
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      COPY       505
      COPY       506
      COPY       507
      COPY       508
      COPY       509
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       5
      DISPLY       6
      DISPLY       7
      DISPLY       8
      DISPLY       9
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Area 20O - Office Change    MAX                  1    2   30    9
    2        Area 200 Rail Unloading     MAX                  1    2   31    9
    3        Area 300 Containment Berm   MAX                  1    2   32    9
    4        Area 300 & 700 Buidlings    MAX                  1    2   33    9
    5        Area 400 Dock               MAX                  1    2   34    9
    6        Area 500 Pipeline Alignme   MAX                  1    2   35    9
    7        Area 600 - West Boiler Bu   MAX                  1    2   36    9
    8        Area 300 - Tank Roofs       MAX                  1    2   37    9
    9        Area 200 - Rail Roof        MAX                  1    2   38    9
  END DISPLY-INFO1
END DISPLY
COPY
```

```
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  505         1    1
  506         1    1
  507         1    1
  508         1    1
  509         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                     in  out           ***
   16     C, Lawn, Flat           1     1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   16             0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16          0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS       AGWS      GWVS
```

```
   16              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out            ***
    4      ROOF TOPS/FLAT          1    1    1   27    0
    8      SIDEWALKS/FLAT          1    1    1   27    0
   11      PARKING/FLAT            1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
    8         0    0    1    0    0    0
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
   11         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
    8         0    0    0    0    0
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    8              0         0
   11              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    8              0         0
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
Area 200 - Office Change Room***
```

```
PERLND  16                        0.37     COPY   501     12
PERLND  16                        0.37     COPY   501     13
IMPLND   4                        0.23     COPY   501     15
IMPLND   8                        0.07     COPY   501     15
IMPLND  11                        0.93     COPY   501     15
Area 200 Rail Unloading***
IMPLND   8                        0.02     COPY   502     15
IMPLND  11                        1.18     COPY   502     15
Area 300 Containment Berm***
IMPLND  11                       12.12     COPY   503     15
Area 300 & 700 Buidlings & Parking***
PERLND  16                        1.62     COPY   504     12
PERLND  16                        1.62     COPY   504     13
IMPLND   4                        0.16     COPY   504     15
IMPLND   8                        0.05     COPY   504     15
IMPLND  11                        0.28     COPY   504     15
Area 400 Dock***
PERLND  16                        0.13     COPY   505     12
PERLND  16                        0.13     COPY   505     13
IMPLND  11                        1.05     COPY   505     15
Area 500 Pipeline Alignment***
IMPLND  11                        2.29     COPY   506     15
Area 600 - West Boiler Building***
PERLND  16                        0.15     COPY   507     12
PERLND  16                        0.15     COPY   507     13
IMPLND   4                        0.15     COPY   507     15
IMPLND   8                        0.01     COPY   507     15
IMPLND  11                        0.19     COPY   507     15
Area 300 - Tank Roofs***
IMPLND   4                        6.23     COPY   508     15
Area 200 - Rail Roof***
IMPLND   4                         3.9     COPY   509     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     INPUT  TIMSER 1
COPY   506 OUTPUT MEAN   1 1   48.4        DISPLY   6     INPUT  TIMSER 1
COPY   507 OUTPUT MEAN   1 1   48.4        DISPLY   7     INPUT  TIMSER 1
COPY   508 OUTPUT MEAN   1 1   48.4        DISPLY   8     INPUT  TIMSER 1
COPY   509 OUTPUT MEAN   1 1   48.4        DISPLY   9     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<-----------------><---> User T-series  Engl Metr LKFG            ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
```

```
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8             PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8             IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76            PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
COPY     2 OUTPUT MEAN   1 1     48.4      WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    802 FLOW     ENGL      REPL
COPY     3 OUTPUT MEAN   1 1     48.4      WDM    703 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    803 FLOW     ENGL      REPL
COPY     4 OUTPUT MEAN   1 1     48.4      WDM    704 FLOW     ENGL      REPL
COPY   504 OUTPUT MEAN   1 1     48.4      WDM    804 FLOW     ENGL      REPL
COPY     5 OUTPUT MEAN   1 1     48.4      WDM    705 FLOW     ENGL      REPL
COPY   505 OUTPUT MEAN   1 1     48.4      WDM    805 FLOW     ENGL      REPL
COPY     6 OUTPUT MEAN   1 1     48.4      WDM    706 FLOW     ENGL      REPL
COPY   506 OUTPUT MEAN   1 1     48.4      WDM    806 FLOW     ENGL      REPL
COPY     7 OUTPUT MEAN   1 1     48.4      WDM    707 FLOW     ENGL      REPL
COPY   507 OUTPUT MEAN   1 1     48.4      WDM    807 FLOW     ENGL      REPL
COPY     8 OUTPUT MEAN   1 1     48.4      WDM    708 FLOW     ENGL      REPL
COPY   508 OUTPUT MEAN   1 1     48.4      WDM    808 FLOW     ENGL      REPL
COPY     9 OUTPUT MEAN   1 1     48.4      WDM    709 FLOW     ENGL      REPL
COPY   509 OUTPUT MEAN   1 1     48.4      WDM    809 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>           <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13
```

```
  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Disclaimer

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WWHM2012

PROJECT REPORT

General Model Information

Project Name: Savage T5
Site Name:
Site Address:
City:
Report Date: 8/21/2013
Gage: Portland
Data Start: 1948/10/01
Data End: 2009/09/30
Timestep: 15 Minute
Precip Scale: 0.93
Version: 2013/05/17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year

Landuse Basin Data
Predeveloped Land Use

Terminal 5

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Pasture, Flat	13.84
Pervious Total	13.84

Impervious Land Use	Acres
Impervious Total	0
Basin Total	13.84

Element Flows To:

Surface	Interflow	Groundwater

Terminal 4

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Pasture, Flat	25.49
Pervious Total	25.49

Impervious Land Use	Acres
Impervious Total	0
Basin Total	25.49

Element Flows To:

Surface	Interflow	Groundwater

Marine Terminal

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Pasture, Flat	1.08
Pervious Total	1.08

Impervious Land Use	Acres
Impervious Total	0
Basin Total	1.08

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Terminal 5

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	0.52
Pervious Total	0.52

Impervious Land Use	Acres
ROOF TOPS FLAT	4.36
SIDEWALKS FLAT	0.1
PARKING FLAT	8.86
Impervious Total	13.32
Basin Total	13.84

Element Flows To:

Surface	Interflow	Groundwater

Terminal 4

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	1.62
Pervious Total	1.62

Impervious Land Use	Acres
ROOF TOPS FLAT	6.39
SIDEWALKS FLAT	0.05
PARKING FLAT	17.43
Impervious Total	23.87
Basin Total	25.49

Element Flows To:

Surface	Interflow	Groundwater

Marine Terminal

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	0.07
Pervious Total	0.07

Impervious Land Use	Acres
ROOF TOPS FLAT	0.03
PARKING FLAT	0.98
Impervious Total	1.01
Basin Total	1.08

Element Flows To:

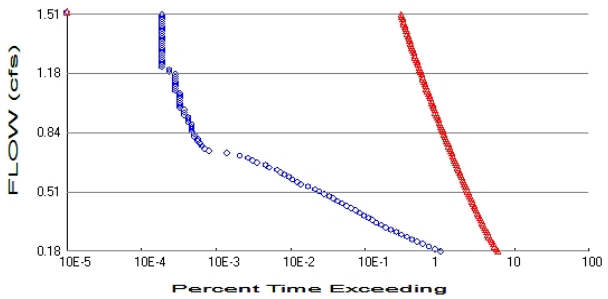
Surface	Interflow	Groundwater

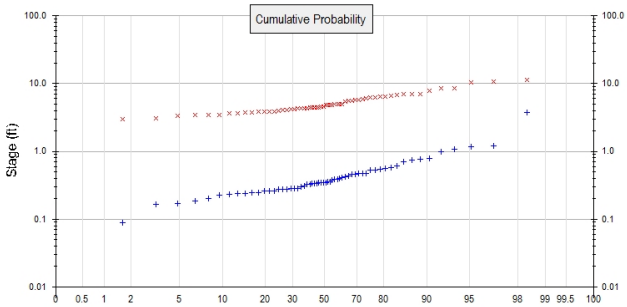
Routing Elements
Predeveloped Routing

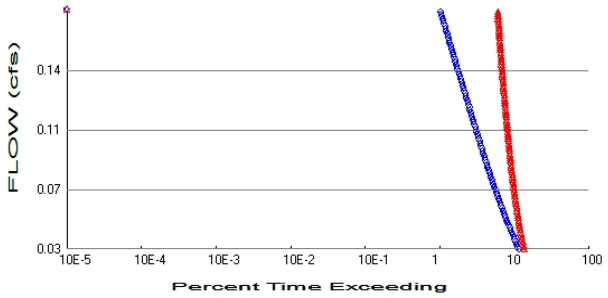
Mitigated Routing

Analysis Results

POC 1







+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 13.84
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.52
Total Impervious Area: 13.32

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.362901
5 year	0.629251
10 year	0.854431
25 year	1.200747
50 year	1.507667
100 year	1.860032

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	4.816932
5 year	6.355366
10 year	7.458706
25 year	8.952709
50 year	10.140458
100 year	11.394218

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.467	6.742
1950	0.418	3.927
1951	0.401	4.299
1952	0.335	4.790
1953	0.351	4.039
1954	0.356	5.005
1955	0.282	3.486
1956	1.071	6.563
1957	0.324	4.421
1958	0.264	6.977
1959	0.240	3.800
1960	0.233	4.383
1961	0.706	6.221
1962	0.277	3.426
1963	0.300	4.238
1964	0.380	3.741
1965	0.562	5.514
1966	0.347	4.221
1967	0.258	4.855
1968	0.476	6.921
1969	0.340	8.541
1970	3.783	11.208
1971	0.259	4.463
1972	0.382	4.364
1973	0.323	4.386
1974	0.786	4.907
1975	0.345	3.067
1976	0.391	3.901
1977	0.050	2.777
1978	0.549	4.907
1979	0.465	6.938
1980	0.404	3.793
1981	0.750	5.601
1982	0.607	5.678
1983	1.176	6.135
1984	0.283	3.611
1985	0.332	4.077
1986	0.226	4.864
1987	0.530	4.575
1988	0.246	5.763
1989	0.165	4.919
1990	0.244	4.430
1991	0.271	4.357
1992	0.240	3.889
1993	0.273	5.471
1994	0.473	3.664
1995	0.345	6.450
1996	0.762	8.457
1997	1.205	7.785
1998	0.528	6.284
1999	0.436	3.465
2000	0.171	3.309
2001	0.089	2.951
2002	0.974	6.415
2003	0.454	3.819
2004	0.186	4.825

2005	0.204	4.315
2006	0.345	5.819
2007	0.307	4.554
2008	0.285	10.615
2009	0.582	10.335

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	3.7827	11.2082
2	1.2047	10.6150
3	1.1759	10.3349
4	1.0707	8.5411
5	0.9743	8.4572
6	0.7857	7.7852
7	0.7618	6.9774
8	0.7502	6.9383
9	0.7062	6.9210
10	0.6071	6.7419
11	0.5819	6.5632
12	0.5618	6.4504
13	0.5486	6.4145
14	0.5295	6.2839
15	0.5277	6.2210
16	0.4761	6.1346
17	0.4728	5.8188
18	0.4667	5.7633
19	0.4645	5.6783
20	0.4536	5.6012
21	0.4364	5.5142
22	0.4185	5.4708
23	0.4040	5.0047
24	0.4012	4.9186
25	0.3908	4.9075
26	0.3824	4.9068
27	0.3800	4.8635
28	0.3555	4.8547
29	0.3511	4.8251
30	0.3474	4.7897
31	0.3452	4.5753
32	0.3451	4.5536
33	0.3451	4.4627
34	0.3397	4.4300
35	0.3354	4.4207
36	0.3322	4.3863
37	0.3241	4.3831
38	0.3230	4.3640
39	0.3073	4.3573
40	0.3003	4.3151
41	0.2851	4.2987
42	0.2830	4.2383
43	0.2819	4.2214
44	0.2770	4.0767
45	0.2735	4.0387
46	0.2713	3.9268
47	0.2635	3.9014
48	0.2593	3.8895
49	0.2582	3.8195

50	0.2464	3.8004
51	0.2438	3.7935
52	0.2404	3.7414
53	0.2404	3.6644
54	0.2329	3.6112
55	0.2262	3.4864
56	0.2041	3.4650
57	0.1865	3.4257
58	0.1706	3.3087
59	0.1653	3.0666
60	0.0894	2.9509
61	0.0505	2.7773

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0290	245971	288107	117	Fail
0.0306	237630	283188	119	Fail
0.0321	229716	278268	121	Fail
0.0337	222016	273991	123	Fail
0.0352	214744	269713	125	Fail
0.0367	208027	265649	127	Fail
0.0383	201525	261799	129	Fail
0.0398	195301	258163	132	Fail
0.0413	189334	254741	134	Fail
0.0429	183623	251318	136	Fail
0.0444	178276	247896	139	Fail
0.0460	173078	244902	141	Fail
0.0475	168030	241907	143	Fail
0.0490	163090	238913	146	Fail
0.0506	158363	236132	149	Fail
0.0521	153850	233566	151	Fail
0.0537	149572	230785	154	Fail
0.0552	145422	228218	156	Fail
0.0567	141551	225866	159	Fail
0.0583	137701	223513	162	Fail
0.0598	134044	220946	164	Fail
0.0614	130514	218594	167	Fail
0.0629	127114	216455	170	Fail
0.0644	123798	214530	173	Fail
0.0660	120633	212391	176	Fail
0.0675	117553	210359	178	Fail
0.0691	114537	208284	181	Fail
0.0706	111585	206316	184	Fail
0.0721	108741	204456	188	Fail
0.0737	106003	202659	191	Fail
0.0752	103287	200862	194	Fail
0.0768	100720	199066	197	Fail
0.0783	98217	197354	200	Fail
0.0798	95779	195579	204	Fail
0.0814	93448	193868	207	Fail
0.0829	91202	192307	210	Fail
0.0845	89106	190767	214	Fail
0.0860	86988	189227	217	Fail
0.0875	84956	187708	220	Fail
0.0891	82967	186211	224	Fail
0.0906	81021	184692	227	Fail
0.0922	79139	183195	231	Fail
0.0937	77299	181783	235	Fail
0.0952	75502	180436	238	Fail
0.0968	73749	179088	242	Fail
0.0983	72080	177762	246	Fail
0.0999	70455	176415	250	Fail
0.1014	68936	175174	254	Fail
0.1029	67332	173870	258	Fail
0.1045	65920	172608	261	Fail
0.1060	64402	171260	265	Fail
0.1076	62969	170105	270	Fail
0.1091	61600	168972	274	Fail
0.1106	60209	167795	278	Fail

0.1122	58905	166662	282	Fail
0.1137	57557	165507	287	Fail
0.1152	56402	164394	291	Fail
0.1168	55204	163261	295	Fail
0.1183	53943	162127	300	Fail
0.1199	52809	161036	304	Fail
0.1214	51654	159967	309	Fail
0.1229	50606	158919	314	Fail
0.1245	49515	157892	318	Fail
0.1260	48424	156801	323	Fail
0.1276	47440	155860	328	Fail
0.1291	46371	154812	333	Fail
0.1306	45366	153785	338	Fail
0.1322	44425	152909	344	Fail
0.1337	43419	151882	349	Fail
0.1353	42457	150941	355	Fail
0.1368	41451	149935	361	Fail
0.1383	40553	149037	367	Fail
0.1399	39655	148182	373	Fail
0.1414	38671	147262	380	Fail
0.1430	37815	146406	387	Fail
0.1445	36896	145465	394	Fail
0.1460	36083	144631	400	Fail
0.1476	35270	143733	407	Fail
0.1491	34479	142877	414	Fail
0.1507	33752	142022	420	Fail
0.1522	33067	141273	427	Fail
0.1537	32340	140460	434	Fail
0.1553	31677	139669	440	Fail
0.1568	30928	138835	448	Fail
0.1584	30265	138043	456	Fail
0.1599	29602	137295	463	Fail
0.1614	28939	136482	471	Fail
0.1630	28319	135733	479	Fail
0.1645	27698	134921	487	Fail
0.1661	27100	134151	495	Fail
0.1676	26522	133445	503	Fail
0.1691	25902	132696	512	Fail
0.1707	25389	131969	519	Fail
0.1722	24832	131178	528	Fail
0.1738	24319	130493	536	Fail
0.1753	23784	129766	545	Fail
0.1768	23228	128996	555	Fail
0.1784	22758	128333	563	Fail
0.1799	22266	127627	573	Fail
0.1815	21774	126964	583	Fail

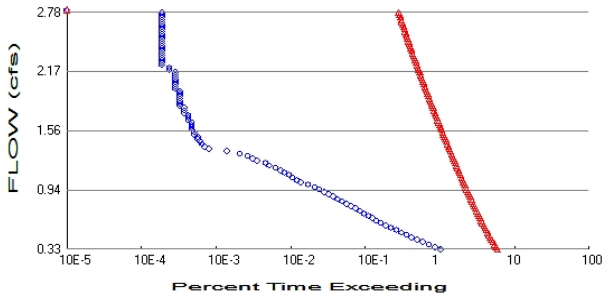
The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

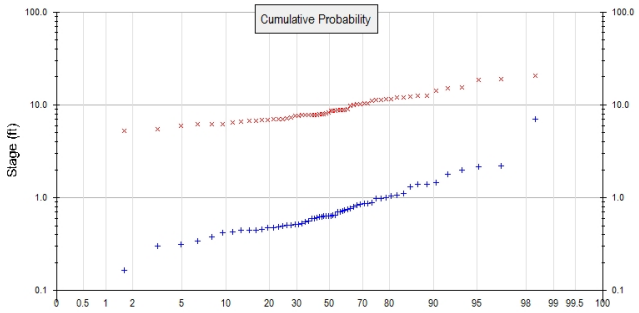
Water Quality

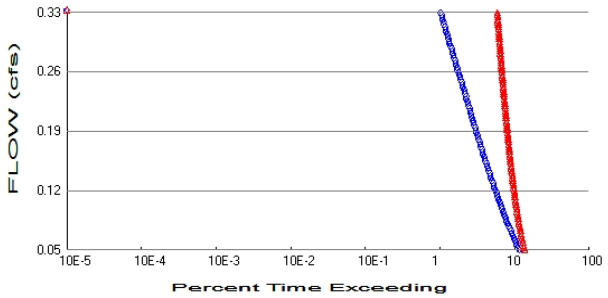
Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	1.3867 acre-feet
On-line facility target flow:	1.9475 cfs.
Adjusted for 15 min:	1.9475 cfs.
Off-line facility target flow:	1.0963 cfs.
Adjusted for 15 min:	1.0963 cfs.

POC 2







+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 25.49
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 1.62
Total Impervious Area: 23.87

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.668377
5 year	1.158931
10 year	1.573658
25 year	2.21149
50 year	2.776763
100 year	3.425736

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	8.664614
5 year	11.450471
10 year	13.45095
25 year	16.162471
50 year	18.320079
100 year	20.599204

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**

1949	0.859	12.082
1950	0.771	7.037
1951	0.739	7.751
1952	0.618	8.614
1953	0.647	7.245
1954	0.655	8.971
1955	0.519	6.248
1956	1.972	11.916
1957	0.597	7.961
1958	0.485	12.608
1959	0.443	6.815
1960	0.429	7.865
1961	1.301	11.273
1962	0.510	6.163
1963	0.553	7.626
1964	0.700	6.716
1965	1.035	9.979
1966	0.640	7.602
1967	0.476	8.745
1968	0.877	12.414
1969	0.626	15.316
1970	6.967	20.473
1971	0.478	7.997
1972	0.704	7.821
1973	0.595	7.861
1974	1.447	8.857
1975	0.636	5.505
1976	0.720	7.039
1977	0.093	4.982
1978	1.010	8.869
1979	0.856	12.522
1980	0.744	6.805
1981	1.382	10.131
1982	1.118	10.215
1983	2.166	11.120
1984	0.521	6.485
1985	0.612	7.312
1986	0.417	8.722
1987	0.975	8.223
1988	0.454	10.331
1989	0.304	8.815
1990	0.449	7.942
1991	0.500	7.835
1992	0.443	7.000
1993	0.504	9.841
1994	0.871	6.605
1995	0.636	11.560
1996	1.403	15.217
1997	2.219	14.149
1998	0.972	11.307
1999	0.804	6.233
2000	0.314	5.930
2001	0.165	5.296
2002	1.795	11.640
2003	0.835	6.883
2004	0.343	8.647
2005	0.376	7.735
2006	0.636	10.430

2007	0.566	8.188
2008	0.525	19.125
2009	1.072	18.524

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	6.9668	20.4729
2	2.2187	19.1245
3	2.1657	18.5238
4	1.9720	15.3164
5	1.7945	15.2171
6	1.4470	14.1486
7	1.4031	12.6076
8	1.3818	12.5223
9	1.3006	12.4142
10	1.1181	12.0819
11	1.0716	11.9158
12	1.0346	11.6396
13	1.0104	11.5595
14	0.9753	11.3066
15	0.9720	11.2728
16	0.8768	11.1203
17	0.8708	10.4298
18	0.8595	10.3305
19	0.8555	10.2152
20	0.8353	10.1310
21	0.8038	9.9793
22	0.7708	9.8413
23	0.7441	8.9713
24	0.7390	8.8687
25	0.7197	8.8566
26	0.7043	8.8145
27	0.7000	8.7452
28	0.6548	8.7223
29	0.6467	8.6473
30	0.6399	8.6145
31	0.6358	8.2231
32	0.6356	8.1877
33	0.6356	7.9975
34	0.6256	7.9607
35	0.6177	7.9418
36	0.6118	7.8654
37	0.5970	7.8605
38	0.5949	7.8354
39	0.5659	7.8208
40	0.5530	7.7507
41	0.5252	7.7351
42	0.5211	7.6264
43	0.5192	7.6017
44	0.5102	7.3122
45	0.5037	7.2447
46	0.4997	7.0387
47	0.4853	7.0371
48	0.4777	7.0002
49	0.4756	6.8835
50	0.4538	6.8154
51	0.4491	6.8054

52	0.4427	6.7157
53	0.4427	6.6048
54	0.4289	6.4848
55	0.4165	6.2479
56	0.3759	6.2330
57	0.3435	6.1632
58	0.3143	5.9298
59	0.3044	5.5046
60	0.1646	5.2956
61	0.0930	4.9821

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0535	247468	292385	118	Fail
0.0563	238485	286610	120	Fail
0.0591	229930	281477	122	Fail
0.0620	224582	278054	123	Fail
0.0648	216882	273349	126	Fail
0.0676	209482	268643	128	Fail
0.0705	202595	264366	130	Fail
0.0733	195964	260302	132	Fail
0.0762	189590	256238	135	Fail
0.0790	185526	253885	136	Fail
0.0818	179773	250249	139	Fail
0.0847	174255	246827	141	Fail
0.0875	168886	243405	144	Fail
0.0903	163646	240196	146	Fail
0.0932	158598	237202	149	Fail
0.0960	153850	234207	152	Fail
0.0988	150834	232068	153	Fail
0.1017	146385	229288	156	Fail
0.1045	142193	226507	159	Fail
0.1073	138150	223941	162	Fail
0.1102	134257	221374	164	Fail
0.1130	130536	219021	167	Fail
0.1159	128098	217310	169	Fail
0.1187	124611	214957	172	Fail
0.1215	121210	212776	175	Fail
0.1244	117916	210487	178	Fail
0.1272	114751	208306	181	Fail
0.1300	111628	206188	184	Fail
0.1329	109596	204776	186	Fail
0.1357	106645	202809	190	Fail
0.1385	103778	200926	193	Fail
0.1414	101019	198937	196	Fail
0.1442	98410	197034	200	Fail
0.1470	95800	195109	203	Fail
0.1499	94132	193911	205	Fail
0.1527	91758	192221	209	Fail
0.1555	89491	190510	212	Fail
0.1584	87288	188927	216	Fail
0.1612	85127	187259	219	Fail
0.1641	82989	185548	223	Fail
0.1669	81641	184436	225	Fail
0.1697	79588	182896	229	Fail
0.1726	77641	181356	233	Fail
0.1754	75738	179923	237	Fail
0.1782	73877	178447	241	Fail
0.1811	72102	177014	245	Fail
0.1839	70947	176094	248	Fail
0.1867	69257	174618	252	Fail
0.1896	67610	173207	256	Fail
0.1924	66091	171880	260	Fail
0.1952	64530	170533	264	Fail
0.1981	62969	169250	268	Fail
0.2009	61985	168394	271	Fail
0.2038	60552	167218	276	Fail

0.2066	59119	165977	280	Fail
0.2094	57750	164694	285	Fail
0.2123	56466	163475	289	Fail
0.2151	55183	162255	294	Fail
0.2179	54328	161485	297	Fail
0.2208	53087	160309	301	Fail
0.2236	51911	159111	306	Fail
0.2264	50713	157978	311	Fail
0.2293	49579	156844	316	Fail
0.2321	48446	155817	321	Fail
0.2349	47740	155090	324	Fail
0.2378	46649	154021	330	Fail
0.2406	45580	152951	335	Fail
0.2435	44510	151860	341	Fail
0.2463	43483	150812	346	Fail
0.2491	42457	149807	352	Fail
0.2520	41772	149144	357	Fail
0.2548	40810	148203	363	Fail
0.2576	39783	147219	370	Fail
0.2605	38821	146257	376	Fail
0.2633	37858	145273	383	Fail
0.2661	36938	144267	390	Fail
0.2690	36361	143669	395	Fail
0.2718	35463	142727	402	Fail
0.2746	34650	141851	409	Fail
0.2775	33858	140995	416	Fail
0.2803	33088	140118	423	Fail
0.2831	32361	139241	430	Fail
0.2860	31891	138642	434	Fail
0.2888	31121	137787	442	Fail
0.2917	30415	136952	450	Fail
0.2945	29688	136097	458	Fail
0.2973	28982	135263	466	Fail
0.3002	28319	134429	474	Fail
0.3030	27891	133894	480	Fail
0.3058	27249	133060	488	Fail
0.3087	26629	132290	496	Fail
0.3115	26009	131498	505	Fail
0.3143	25431	130728	514	Fail
0.3172	24854	129894	522	Fail
0.3200	24298	129103	531	Fail
0.3228	23913	128568	537	Fail
0.3257	23357	127841	547	Fail
0.3285	22822	127114	556	Fail
0.3314	22309	126386	566	Fail
0.3342	21795	125638	576	Fail

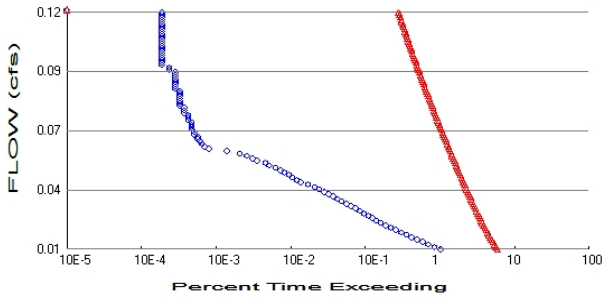
The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

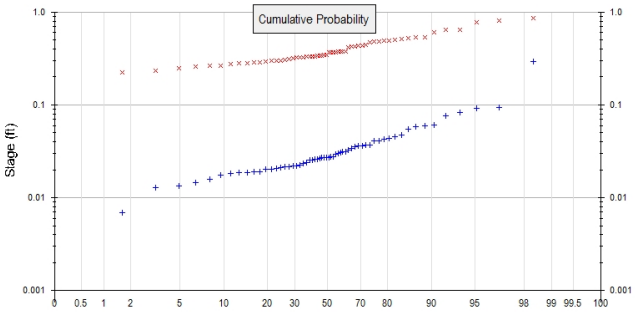
Water Quality

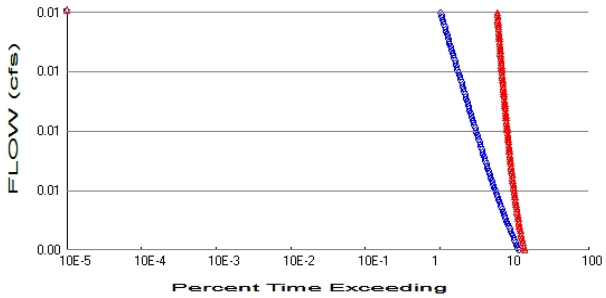
Water Quality BMP Flow and Volume for POC #2

On-line facility volume:	2.4992 acre-feet
On-line facility target flow:	3.4808 cfs.
Adjusted for 15 min:	3.4808 cfs.
Off-line facility target flow:	1.9602 cfs.
Adjusted for 15 min:	1.9602 cfs.

POC 3







+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 1.08
Total Impervious Area: 0

Mitigated Landuse Totals for POC #3
Total Pervious Area: 0.07
Total Impervious Area: 1.01

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	0.028319
5 year	0.049103
10 year	0.066675
25 year	0.0937
50 year	0.11765
100 year	0.145147

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	0.36669
5 year	0.484628
10 year	0.569323
25 year	0.684127
50 year	0.775483
100 year	0.871987

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**

1949	0.036	0.511
1950	0.033	0.298
1951	0.031	0.328
1952	0.026	0.365
1953	0.027	0.307
1954	0.028	0.380
1955	0.022	0.264
1956	0.084	0.505
1957	0.025	0.337
1958	0.021	0.534
1959	0.019	0.288
1960	0.018	0.333
1961	0.055	0.477
1962	0.022	0.261
1963	0.023	0.323
1964	0.030	0.284
1965	0.044	0.422
1966	0.027	0.322
1967	0.020	0.370
1968	0.037	0.525
1969	0.027	0.648
1970	0.295	0.867
1971	0.020	0.338
1972	0.030	0.331
1973	0.025	0.333
1974	0.061	0.375
1975	0.027	0.233
1976	0.030	0.298
1977	0.004	0.211
1978	0.043	0.375
1979	0.036	0.530
1980	0.032	0.288
1981	0.059	0.429
1982	0.047	0.432
1983	0.092	0.471
1984	0.022	0.274
1985	0.026	0.309
1986	0.018	0.369
1987	0.041	0.348
1988	0.019	0.437
1989	0.013	0.373
1990	0.019	0.336
1991	0.021	0.332
1992	0.019	0.296
1993	0.021	0.416
1994	0.037	0.280
1995	0.027	0.489
1996	0.059	0.644
1997	0.094	0.599
1998	0.041	0.479
1999	0.034	0.264
2000	0.013	0.251
2001	0.007	0.224
2002	0.076	0.493
2003	0.035	0.291
2004	0.015	0.366
2005	0.016	0.327
2006	0.027	0.441

2007	0.024	0.346
2008	0.022	0.809
2009	0.045	0.784

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	0.2952	0.8671
2	0.0940	0.8094
3	0.0918	0.7838
4	0.0836	0.6481
5	0.0760	0.6440
6	0.0613	0.5991
7	0.0594	0.5337
8	0.0585	0.5300
9	0.0551	0.5253
10	0.0474	0.5112
11	0.0454	0.5045
12	0.0438	0.4928
13	0.0428	0.4891
14	0.0413	0.4785
15	0.0412	0.4772
16	0.0372	0.4708
17	0.0369	0.4413
18	0.0364	0.4371
19	0.0362	0.4323
20	0.0354	0.4289
21	0.0341	0.4225
22	0.0327	0.4165
23	0.0315	0.3796
24	0.0313	0.3754
25	0.0305	0.3749
26	0.0298	0.3730
27	0.0297	0.3701
28	0.0277	0.3691
29	0.0274	0.3659
30	0.0271	0.3646
31	0.0269	0.3480
32	0.0269	0.3465
33	0.0269	0.3384
34	0.0265	0.3369
35	0.0262	0.3360
36	0.0259	0.3328
37	0.0253	0.3326
38	0.0252	0.3316
39	0.0240	0.3309
40	0.0234	0.3281
41	0.0223	0.3273
42	0.0221	0.3228
43	0.0220	0.3217
44	0.0216	0.3094
45	0.0213	0.3066
46	0.0212	0.2979
47	0.0206	0.2978
48	0.0202	0.2963
49	0.0202	0.2913
50	0.0192	0.2884
51	0.0190	0.2880

52	0.0188	0.2842
53	0.0188	0.2795
54	0.0182	0.2744
55	0.0176	0.2644
56	0.0159	0.2638
57	0.0146	0.2608
58	0.0133	0.2509
59	0.0129	0.2329
60	0.0070	0.2241
61	0.0039	0.2108

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0023	245971	291743	118	Fail
0.0024	237630	286396	120	Fail
0.0025	229716	281477	122	Fail
0.0026	222016	276557	124	Fail
0.0027	214744	272066	126	Fail
0.0029	207985	267788	128	Fail
0.0030	201504	263724	130	Fail
0.0031	195301	259874	133	Fail
0.0032	189312	256238	135	Fail
0.0033	183623	252602	137	Fail
0.0035	178297	249180	139	Fail
0.0036	173057	245971	142	Fail
0.0037	168009	242763	144	Fail
0.0038	163090	239768	147	Fail
0.0039	158363	236988	149	Fail
0.0041	153850	234207	152	Fail
0.0042	149572	231427	154	Fail
0.0043	145444	228860	157	Fail
0.0044	141530	226080	159	Fail
0.0045	137701	223727	162	Fail
0.0047	134044	221160	164	Fail
0.0048	130536	219021	167	Fail
0.0049	127114	216669	170	Fail
0.0050	123820	214530	173	Fail
0.0051	120654	212391	176	Fail
0.0053	117553	210231	178	Fail
0.0054	114537	208134	181	Fail
0.0055	111585	206145	184	Fail
0.0056	108762	204220	187	Fail
0.0057	105982	202381	190	Fail
0.0059	103287	200563	194	Fail
0.0060	100720	198681	197	Fail
0.0061	98196	196863	200	Fail
0.0062	95758	195066	203	Fail
0.0064	93426	193419	207	Fail
0.0065	91202	191836	210	Fail
0.0066	89106	190211	213	Fail
0.0067	87010	188713	216	Fail
0.0068	84978	187109	220	Fail
0.0070	82967	185484	223	Fail
0.0071	81021	183944	227	Fail
0.0072	79139	182489	230	Fail
0.0073	77299	181056	234	Fail
0.0074	75502	179687	237	Fail
0.0076	73749	178318	241	Fail
0.0077	72080	176950	245	Fail
0.0078	70455	175602	249	Fail
0.0079	68829	174255	253	Fail
0.0080	67311	172886	256	Fail
0.0082	65856	171624	260	Fail
0.0083	64402	170362	264	Fail
0.0084	62926	169185	268	Fail
0.0085	61536	168009	273	Fail
0.0086	60188	166833	277	Fail

0.0088	58841	165656	281	Fail
0.0089	57557	164480	285	Fail
0.0090	56359	163325	289	Fail
0.0091	55162	162170	293	Fail
0.0092	53943	161079	298	Fail
0.0094	52766	159988	303	Fail
0.0095	51675	158833	307	Fail
0.0096	50563	157742	311	Fail
0.0097	49472	156737	316	Fail
0.0098	48403	155710	321	Fail
0.0100	47398	154662	326	Fail
0.0101	46414	153743	331	Fail
0.0102	45387	152716	336	Fail
0.0103	44403	151689	341	Fail
0.0104	43441	150705	346	Fail
0.0106	42457	149743	352	Fail
0.0107	41494	148845	358	Fail
0.0108	40575	147904	364	Fail
0.0109	39633	147005	370	Fail
0.0110	38714	146086	377	Fail
0.0112	37815	145123	383	Fail
0.0113	36938	144225	390	Fail
0.0114	36104	143326	396	Fail
0.0115	35270	142471	403	Fail
0.0116	34522	141658	410	Fail
0.0118	33773	140867	417	Fail
0.0119	33067	140032	423	Fail
0.0120	32361	139177	430	Fail
0.0121	31677	138364	436	Fail
0.0122	30971	137551	444	Fail
0.0124	30287	136760	451	Fail
0.0125	29602	135947	459	Fail
0.0126	28960	135156	466	Fail
0.0127	28319	134364	474	Fail
0.0128	27720	133616	482	Fail
0.0130	27121	132846	489	Fail
0.0131	26522	132119	498	Fail
0.0132	25945	131370	506	Fail
0.0133	25410	130621	514	Fail
0.0134	24854	129830	522	Fail
0.0136	24340	129081	530	Fail
0.0137	23806	128333	539	Fail
0.0138	23250	127670	549	Fail
0.0139	22758	127007	558	Fail
0.0140	22287	126279	566	Fail
0.0142	21795	125574	576	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	0.1057 acre-feet
On-line facility target flow:	0.1472 cfs.
Adjusted for 15 min:	0.1472 cfs.
Off-line facility target flow:	0.0829 cfs.
Adjusted for 15 min:	0.0829 cfs.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Savage T5.wdm
MESSU       25   PreSavage T5.MES
            27   PreSavage T5.L61
            28   PreSavage T5.L62
            30   POCSavage T51.dat
            31   POCSavage T52.dat
            32   POCSavage T53.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      13
      COPY       501
      COPY       502
      COPY       503
      DISPLY       1
      DISPLY       2
      DISPLY       3
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Terminal 5                MAX                    1    2   30    9
    2        Terminal 4                MAX                    1    2   31    9
    3        Marine Terminal           MAX                    1    2   32    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   13     C, Pasture, Flat        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   13         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   13         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   13         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   13              0       4.5      0.06       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   13              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   13           0.15       0.4       0.3         6       0.5       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   13              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Terminal 5***
PERLND  13                       13.84     COPY   501     12
PERLND  13                       13.84     COPY   501     13
Terminal 4***
PERLND  13                       25.49     COPY   502     12
PERLND  13                       25.49     COPY   502     13
Marine Terminal***
PERLND  13                        1.08     COPY   503     12
PERLND  13                        1.08     COPY   503     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
```

```
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                    ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.933          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.933          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    502 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    503 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Savage T5.wdm
MESSU       25   MitSavage T5.MES
            27   MitSavage T5.L61
            28   MitSavage T5.L62
            30   POCSavage T51.dat
            31   POCSavage T52.dat
            32   POCSavage T53.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      16
      IMPLND       4
      IMPLND       8
      IMPLND      11
      COPY       501
      COPY       502
      COPY       503
      DISPLY       1
      DISPLY       2
      DISPLY       3
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Terminal 5                 MAX                   1    2   30    9
    2        Terminal 4                 MAX                   1    2   31    9
    3        Marine Terminal            MAX                   1    2   32    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***
```

```
  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2          ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR      KVARY      AGWRC
   16              0       4.5      0.03       400      0.05        0.5      0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS       AGWS      GWVS
   16              0         0         0         0       2.5          1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
    8      SIDEWALKS/FLAT         1    1    1   27    0
   11      PARKING/FLAT           1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
    8         0    0    1    0    0    0
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
   11         0    0    4    0    0    0    1    9
```

```
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
    8         0    0    0    0    0
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    8              0         0
   11              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    8              0         0
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                <--Area-->     <-Target->   MBLK   ***
<Name>   #                <-factor->     <Name>   #   Tbl#   ***
Terminal 5***
PERLND  16                      0.52     COPY   501     12
PERLND  16                      0.52     COPY   501     13
IMPLND   4                      4.36     COPY   501     15
IMPLND   8                       0.1     COPY   501     15
IMPLND  11                      8.86     COPY   501     15
Terminal 4***
PERLND  16                      1.62     COPY   502     12
PERLND  16                      1.62     COPY   502     13
IMPLND   4                      6.39     COPY   502     15
IMPLND   8                      0.05     COPY   502     15
IMPLND  11                     17.43     COPY   502     15
Marine Terminal***
PERLND  16                      0.07     COPY   503     12
PERLND  16                      0.07     COPY   503     13
IMPLND   4                      0.03     COPY   503     15
IMPLND  11                      0.98     COPY   503     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
```

```
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                     in  out                                ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><---------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->   <--><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
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END MASS-LINK

END RUN
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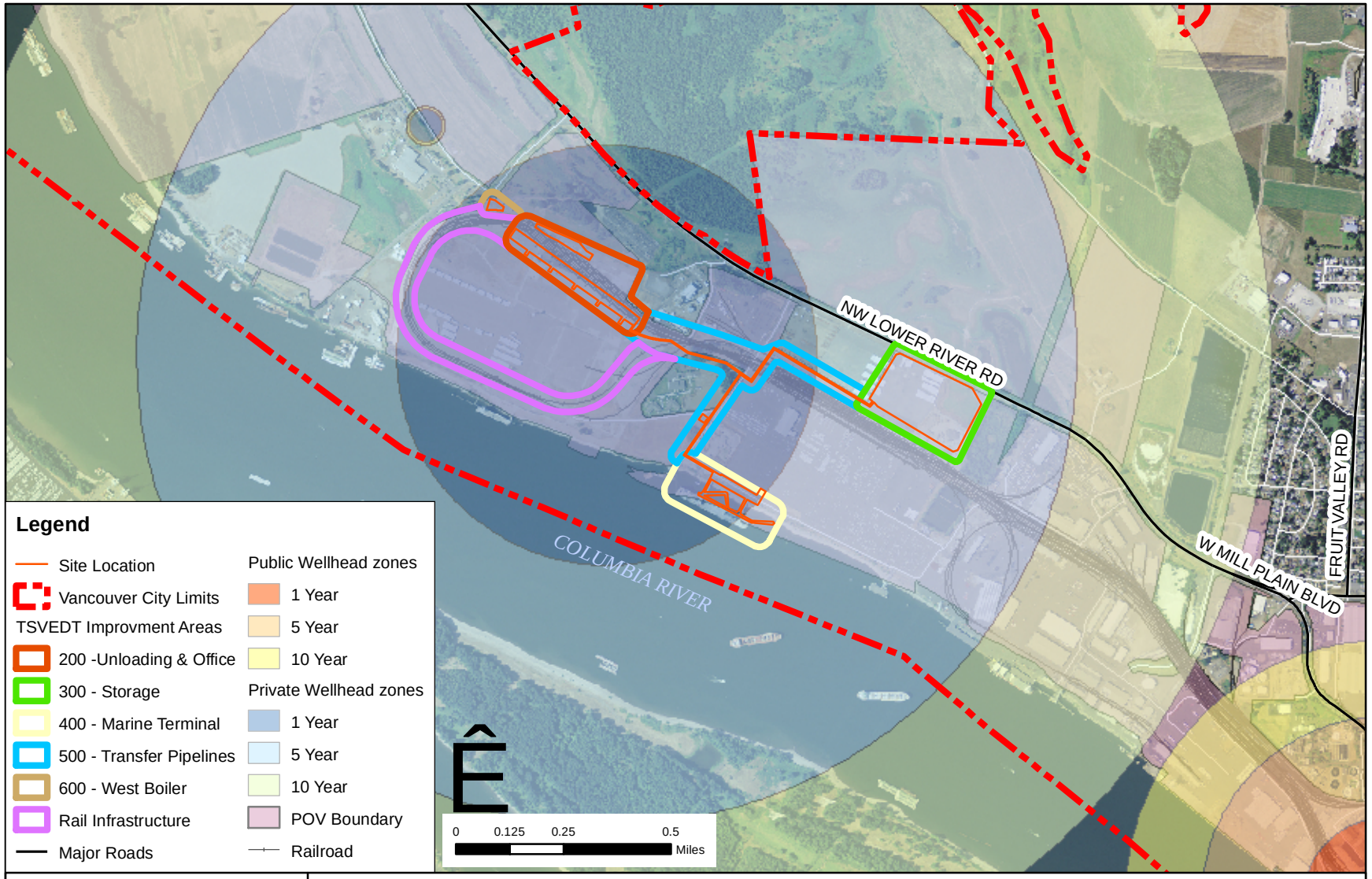
Attachment F
Wellhead Protection



BergerABAM

Wellhead Protection Map

Attachment G
Shoreline Management Area

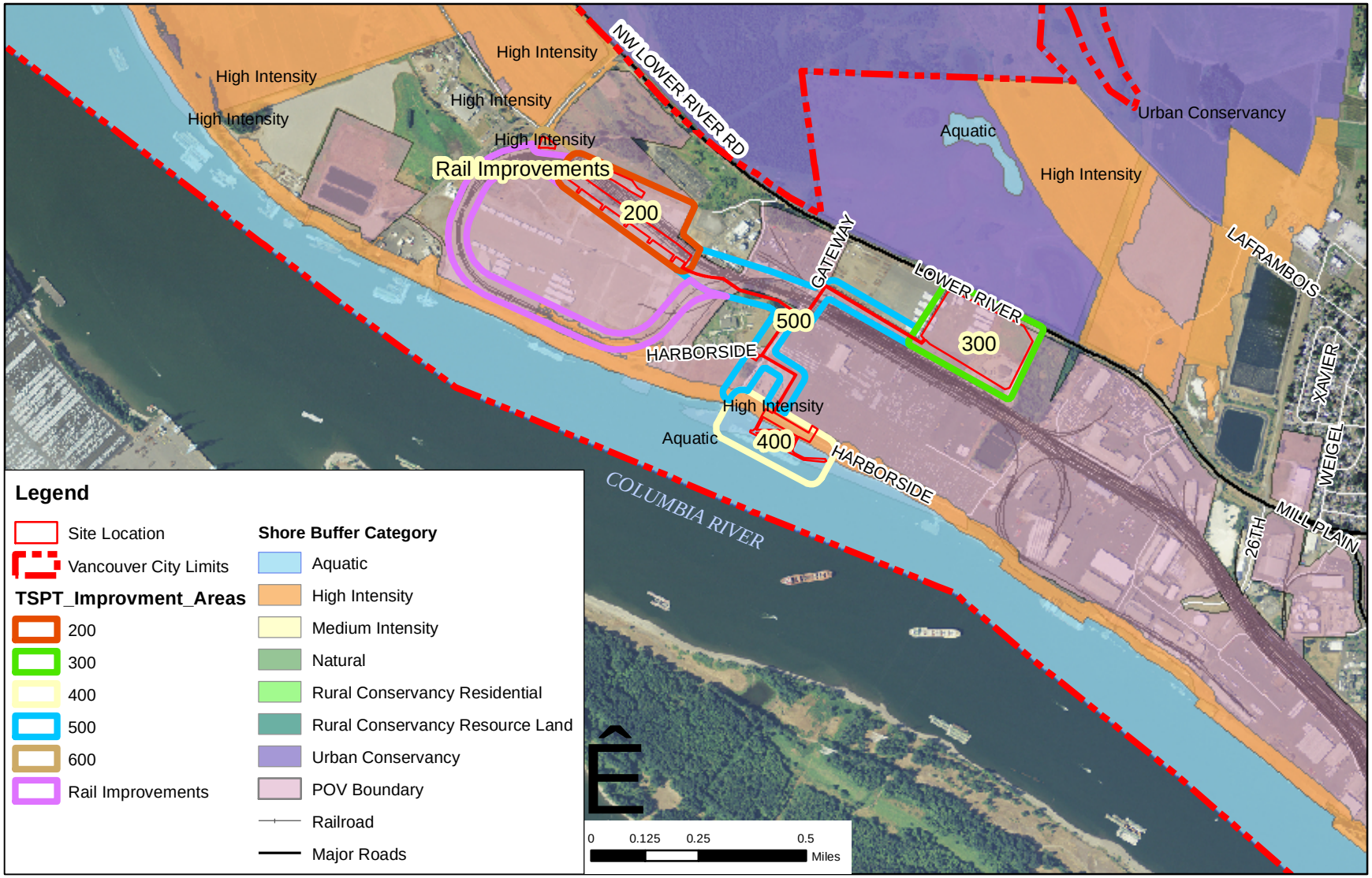


Figure x.x-: Shoreline Management Area

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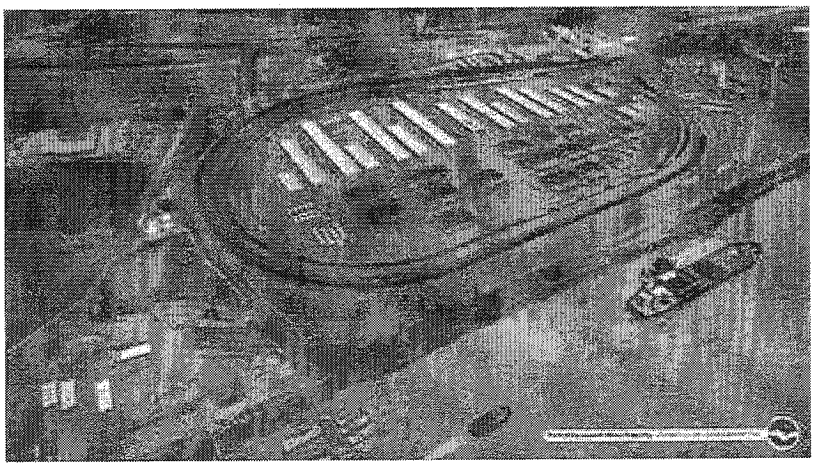
Attachment H
Terminal 5 Expansion Hydrologic and Hydraulic Analysis Report

West Vancouver Freight Access

Terminal 5 Expansion (4000A and SPL)

Final Hydrologic and Hydraulic Analysis Report

Case Number ENG2012-00016
Project PRJ2012-00414



Revision 1: May 3rd, 2012

PORT OF VANCOUVER U.S.A.

Prepared by:
HDR Engineering, Inc.
1001 SW Fifth Ave, Suite 1800, Portland, Oregon 97204

HDR

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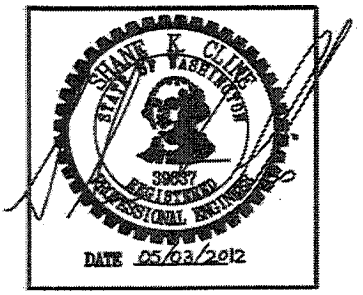

EXECUTIVE SUMMARY

This report provides the stormwater system design and hydrologic and hydraulic analysis information for the Terminal 5 (T5) Expansion, part of the West Vancouver Freight Access (WVFA) Project (Project) located at the Port of Vancouver (Port), Washington.

The Project will expand the capacity of the rail system in order to reduce track congestion. Currently, stormwater runoff either infiltrates directly into the ground or is collected by an existing stormwater system and treated at the T5 lagoons. Quantity treatment or detention of stormwater will not be required on the Project because all stormwater at the Port is discharged to the Columbia River, which is an exempt water body with respect to quantity treatment.

The T5 Expansion will relocate existing tracks and construct a new perimeter access road around the outside of the track loop. Several crossings will be constructed to allow vehicular access to the inside of the track loop. New lighting and electrical conduit will be installed and multiple casings will be placed under the shifted tracks. A new tenant, Broken Hill Proprietary Billiton (BHPB), will be performing extensive site improvements at T5 beginning in the summer of 2012. These site improvements will include construction of a potash storage and transfer facility, rail dumper pit, and a ship loading facility. The stormwater design for T5 is intended to prepare the terminal for the construction associated with these site improvements.

The T5 Expansion will be constructed in phases to facilitate coordination with other projects on the site and reduce the impact of construction issues associated with groundwater. The 4000A project is the first phase of the T5 Expansion during which a portion of the complete stormwater system will be completed. The remainder of the stormwater system will be constructed during the next phase called the SPL Project. The second phase includes addition of a pump station and wet well, which will pump the water quality flow rate to the T5 lagoons. The stormwater system will not be operational during the end of the 4000A project (when the existing system is decommissioned) and during the beginning of the SPL Project (when the new stormwater system is completed).

HDR's stormwater design for the Project includes re-routing of the existing stormwater system so that the pipes do not cross the new tenant's lease area, additional stormwater infrastructure associated with roadway improvements, and a connection from BHPB's lease area to discharge treated stormwater to the existing outfall. The existing outfall will be used to discharge overflows from other portions of T5, as well as the BHPB's treated runoff, to the Columbia River. The SPL Project includes a rehabilitation of this existing outfall using a cured-in-place pipe lining method.

1.0 PROJECT OVERVIEW

1.1 Site Description

The Port's WVFA project will construct approximately 3.2 miles of new rail line to expand its rail capacity within the existing facility and relieve track congestion. Overall, the goals of the WVFA project are:

- Expand the Port rail capacity and operations within the existing Port facility;
- Relieve congestion and ensure continued safe operations as rail traffic expands in the Port and along the existing north-south and west-east main lines; and
- Minimize disruption to existing Port tenants and businesses while enhancing the rail system for future growth.

The Project site starts approximately 1,200 feet east of the Columbia River Rail Bridge, extends approximately 3.2 miles west, and ends just before the intersection of N.W. Old Lower River Road. Figures 1 and 2 provide the project location. The Port has filled the floodplain with dredge spoils which are the top layer of soils for much of the project area.

This report evaluates impacts to stormwater drainage resulting from the 4000A and SPL Projects of the T5 Expansion, associated with the full build-out of T5.

1.2 Existing Conditions

T5 currently consists of a track loop which was recently cleared to provide a graded surface for windmill turbine parts storage. The graded area is mostly compacted gravel with minimal paved roadways, several environmental caps, and a stormwater catchment and conveyance system composed of both recently constructed and older components. A trunkline collecting all of the flow conveys runoff to an existing pump station which operates as a temporary solution at this time. No power is currently routed to the existing pumps, so a generator is parked adjacent to the pump station. This generator must be manually activated to power the pumps so that water can be routed to the T5 lagoons west of the track loop.

Overflows are routed to a diversion box that spills into the outfall to the Columbia River. This system as a whole, including the T5 lagoons, was designed to drain and treat the terminal in its past condition, which included significantly more impervious pavement and roofing. Since most of the Terminal is now surfaced with gravel, the pumps are rarely activated. Figure 6 shows the layout of the existing system.

The T5 Lagoons were designed to treat industrial process water and stormwater for Terminal 5. The total area draining to the lagoons was over 130 acres when the site was used for aluminum industry related purposes.

1.3 Proposed Design

The Project includes relocation of existing tracks, construction of a new perimeter access road around the outside of the track loop and several crossings for vehicular access to the inside of the track loop, and installation of several utilities. The Port's new tenant, BHPB, will be performing extensive site improvements including construction of a

potash storage and transfer facility, rail dumper pit, and a ship loading facility. The stormwater design for T5 is intended to provide drainage for the future build-out of T5.

The proposed stormwater system needs to satisfy the City of Vancouver's stormwater management requirements, which are based on the Department of Ecology's 2005 Stormwater Management Manual for Western Washington (SMMWW) for design of water quality treatment facilities. These requirements include the need to treat runoff from new pollutant generating impervious surfaces (PGIS) to a "basic treatment" level. Detention is generally also a consideration, but due to the Project's proximity to the Columbia River, detention is not required. Since detention is not necessary, the Soil Conservation Service Unit Hydrograph Method was used for hydrology calculations. Standards, codes, and guidelines for conveyance are as per The City of Vancouver Engineering Services General Requirements and Details 2009 (GRD) and the American Railway Engineer and Maintenance-of-Way Association Manual for Railway Engineering 2007 (AREMA).

1.3.1 Full Build-Out

The proposed fully built-out system replaces any stormwater infrastructure that lies within the future BHPB lease and routes the trunkline around this property. Additional stormwater inlets are placed along a new perimeter access road that encircles much of the track loop. The trunkline structures are mostly WSDOT Manhole Type III with a few WDSOT Catch Basin Type II structures. WSDOT Catch Basin Type I structures are used for the lateral inlets. The pipe network consists of mostly corrugated polyethylene stormwater sewer pipes (CPSSP) with ductile iron sewer pipes and reinforced concrete pipes at a few locations. The stormwater system drains to a new wet well and pump station location outside of the track loop at the southwest portion of the Terminal. A 30-inch force main will connect the proposed pump station to the T5 lagoons.

1.3.2 Phases of the T5 Expansion: 4000A and SPL

The construction of the stormwater system needs to be completed in phases due to constructability constraints. Stone columns will be installed as part of another project at T5. This stone column work is expected to cause settlement which could damage any infrastructure nearby. Hence, these stone columns must be in place before subsurface infrastructure can be placed in their vicinity. In addition, high groundwater and the degree of contamination of the groundwater will increase the cost and duration of any construction that requires excavation. In consideration of these constraints, the stormwater conveyance system for the Project will be constructed in two phases: the 4000A Project and the SPL Project.

The proposed stormwater system has been divided into seven alignments (Alignments A through G). The 4000A Project will include construction of Alignments A, B, C, and D (See Figure 7). Alignment A drains the T5 perimeter access driveway from the intersection with Old Lower River Road to the proposed pump station. Alignment B drains a portion of the T5 perimeter access driveway to the east and a portion of T5 inside the track loop. Alignment D provides the connection to the BHPB stormwater system (which has its own, separate, water quality treatment facility) and allows it to drain directly to the existing outfall. Alignment C is a single pipe connecting the inside of the track loop to Alignment A. The components constructed in the 4000A project are discontinuous and will not be operational until the remainder of the stormwater system is completed in the next phase. The existing stormwater system will remain operational as long as is reasonably possible considering construction logistics. In addition, the Port is

prepared to pump and treat water from the non-operational system as needed while there is no connection to the T5 lagoons or the existing outfall.

The SPL Project is the second phase which will include construction of the remaining portions of the stormwater conveyance system including Alignments E, F, and G and the proposed wet well and pump station connecting the system to the T5 lagoons (see Figure 7). Alignments E and F drain portions of the T5 perimeter access driveway. Alignment G, which forms a connection between Alignments B and C, drains a portion of T5 inside the track loop. The SPL contractor will be responsible for pumping and treating water in the non-operational system as soon as they are mobilized. This contractor will also be required to complete construction of the operational stormwater system by September 30th, 2012.

The existing outfall will remain in service with the new upstream connection as part of the 4000A and SPL Projects. The outfall will be rehabilitated as part of the SPL Project. This work will include removal of a portion of the outfall pipe that extends into the Columbia River, and a new liner in the outfall pipe that will improve structural integrity while maintaining adequate conveyance capacity.

1.4 Conveyance System Analysis and Design

The Port's new tenant, BHPB, will treat their own stormwater and discharge the flows to the existing outfall through a connection to the proposed stormwater system. This accounts for approximately 40 acres of drainage area. While some additional area on the perimeter of T5 will drain to the T5 lagoons through the proposed pump station, the total contributing drainage area from T5 to the lagoons will be reduced from over 130 acres in the existing scenario to approximately 91 acres. BHPB has estimated the peak flow rate for their property to be 24 cubic feet per second (cfs) for the 25-year storm event and 30 cfs for the 100-year storm event; the downstream stormwater system has been designed with consideration of this input.

This pump station is designed to pump the water quality flow rate to the T5 lagoons. The water quality flow rate has been calculated to be 9 cfs based on the drainage area of 91 acres using MGS Flood and assumes fully impervious, fully built-out conditions (see Appendix B). The complete T5 Expansion proposed stormwater system is shown in Figure 6.

Due to the long runs of pipe and the desire to keep portions of the system elevated as high as possible (such as the pump station wet well), the system has been designed *without* the usual 0.2-foot drop per structure. Backflow prevention valves are proposed in structures just downstream of the overflow structure and where the connection is made to the BHPB storm line. These valves will be elastomer duckbill-type valves that will help reduce flooding inside the track loop during extremely high flows in the Columbia River. Due to the possibility of high groundwater and a relatively empty stormwater system because of the backflow prevention valves, all manholes and catch basin type II structures have been designed with counter buoyancy bases.

All the alignments except Alignment D (connection between the BHPB drainage system and the existing outfall) will drain to the proposed pump station which is designed to pump out the water quality flow. The pipes between the existing outfall pipe and the proposed pump station are designed to flow full before the outfall is utilized. In the event that the inflow rate of stormwater runoff into the system exceeds the pump station

pumping rate, flow in the pipeline between the pump station and the outfall will back up and discharge to the outfall while the pump station continues to pump the water quality flow rate. This allows the use of a portion of the pipe system as additional storage beyond the wet well. This reduces the number of required pump operation cycles and precludes the need for an additional storm line from the proposed pump station to the existing outfall.

1.5 Drainage to and from Adjacent Properties

The Port's facility and adjacent properties are mostly built-out and already have stormwater infrastructure installed. Offsite drainage improvements have been developed by tenants as separate projects; therefore, no offsite contributions of surface runoff are anticipated for the projects discussed here.

1.6 Downstream Boundary Condition

The two downstream boundary elements of the T5 stormwater conveyance system are the existing 36-inch outfall pipe discharging into the Columbia River and the proposed 30-inch force main between the new pump station and the T5 lagoons. The hydraulic capacity of the existing outfall pipe has been conservatively estimated to be at least 120 cfs which exceeds the maximum anticipated flow rate. The proposed pump station has been designed to pump the water quality flow rate through the 30-inch force main to the T5 lagoons.

2.0 Conveyance System Modeling

2.1 Model Development

A hydrologic and hydraulic model was developed using Bentley CivilStorm V8i to determine peak flow rates and size the conveyance system for the full build-out of the T5 Expansion. This model considers existing infrastructure that will remain in place and future infrastructure that is anticipated as part of the complete T5 Expansion project, as well as other future infrastructure that is not part of the T5 Expansion but will contribute to total runoff from the system. The model also assumes that all areas except track alignments are paved with impervious asphalt.

Civilstorm successively runs the hydrologic and hydraulic analysis. Rainfall depths for the 25-year, 24-hour and 100-year, 24-hour storm events were obtained from isopluvials for the state of Washington from the National Oceanic and Atmospheric Administration (NOAA) Atlas 2 (See Figure 2). The SCS Type-1 rainfall distribution was used for the project location. The Soil Conservation Service (SCS) Unit Hydrograph was used for the hydrology calculations. Curve numbers for the catchments were estimated using the data provided in Table 2.2 of the 2005 SMMWW Volume III; all curve numbers are 98 assuming full build out and paving for the entire terminal except on areas occupied by railroad tracks. Appendix B provides the curve number information and hydrologic modeling results for the T5 Expansion stormwater system. All times of concentration were assumed to be five minutes with the exception of two basins that have longer than typical flowpath lengths and the basin which will be occupied by the mining company. The time of concentration for this basin is adjusted such that the modeled peak flow rate matches the peak flow rate estimated by others and provided to HDR. Table B1 only

shows basin results for basins that drain to new structures and pipes constructed as part of the Terminal 5 Expansion project. Other basins shown in Figure 9 drain to existing or proposed structures and pipes.

2.2 Pipe Capacity

The 25-year storm event was used to determine if each pipe has sufficient capacity and the 100-year storm event was used to check for surcharging of structures. The modeling results presented in this report represent fully built-out conditions of the proposed stormwater conveyance system in T5 (See Appendix C).

Velocities in some of the pipes in the system may not meet flushing velocity requirements per the City of Vancouver's requirements, but the Port has been made aware of this and is prepared to increase maintenance activities as required. Due to modeling limitations in CivilStorm, the pump station has not been included in the model. This approach is conservative, as the pump station would in reality be pumping a constant 9 cfs out of the stormwater system before the flows back up in the pipe system and discharge to the existing outfall. In some cases, modeling results show that the existing pipes do not have sufficient capacity. This could be attributed to conservatism in the model or, in other cases, limitations of the model in representing the pipe systems accurately. In particular, some of the existing pipes are perforated pipes installed at a very shallow slope, and are designed to flow full. Since the model does not accommodate perforated pipes, they have been modeled as solid pipes with an inlet upstream. The lack of capacity shown in the model results is not due to insufficient downstream conveyance capacity. These pipes are designed by others and already exist at Terminal 5.

Figure C1 shows the hydrograph for the 100 year event through the outfall pipe to the Columbia River. The peak flow rate is 94 cfs. Note that this is assuming that the pump station is not in operation since the model does not account for the water quality flow rate being pumped to the T5 Lagoons. The final outfall pipe maximum capacity depends on the methods used to reline the pipe in the future. The current capacity of the pipe is estimated to be approximately 114 cfs. The pipe will be relined in the SPL Project. With a smoother interior but reduced diameter, the future maximum capacity of the pipe is estimated to be 120 cfs.

In conclusion, the modeling results indicate that the stormwater system design functions as intended to accommodate the 25- and 100-year storm events using conservative modeling techniques.

APPENDIX A

Project Figures

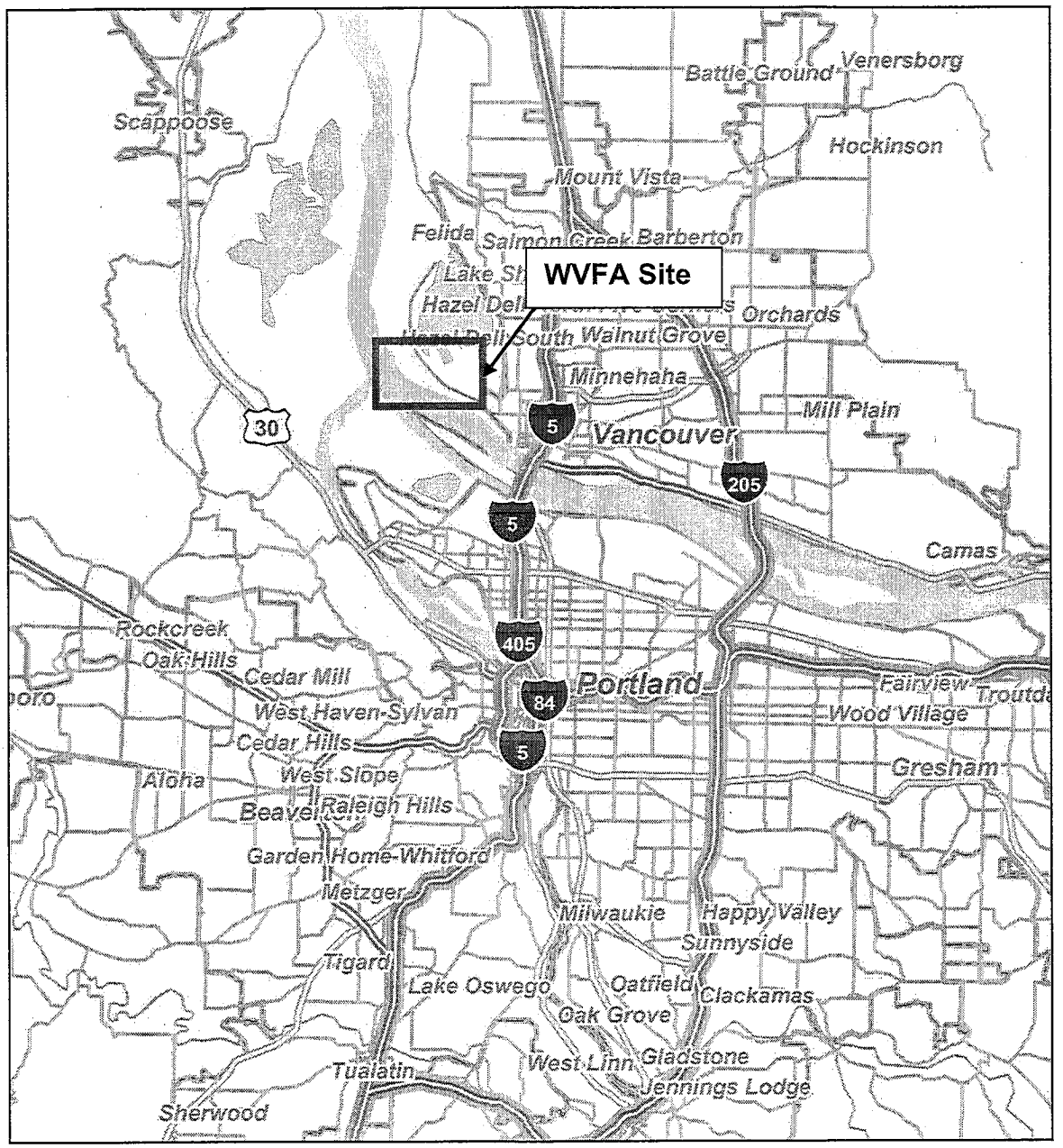

Figure 1. Vicinity Map

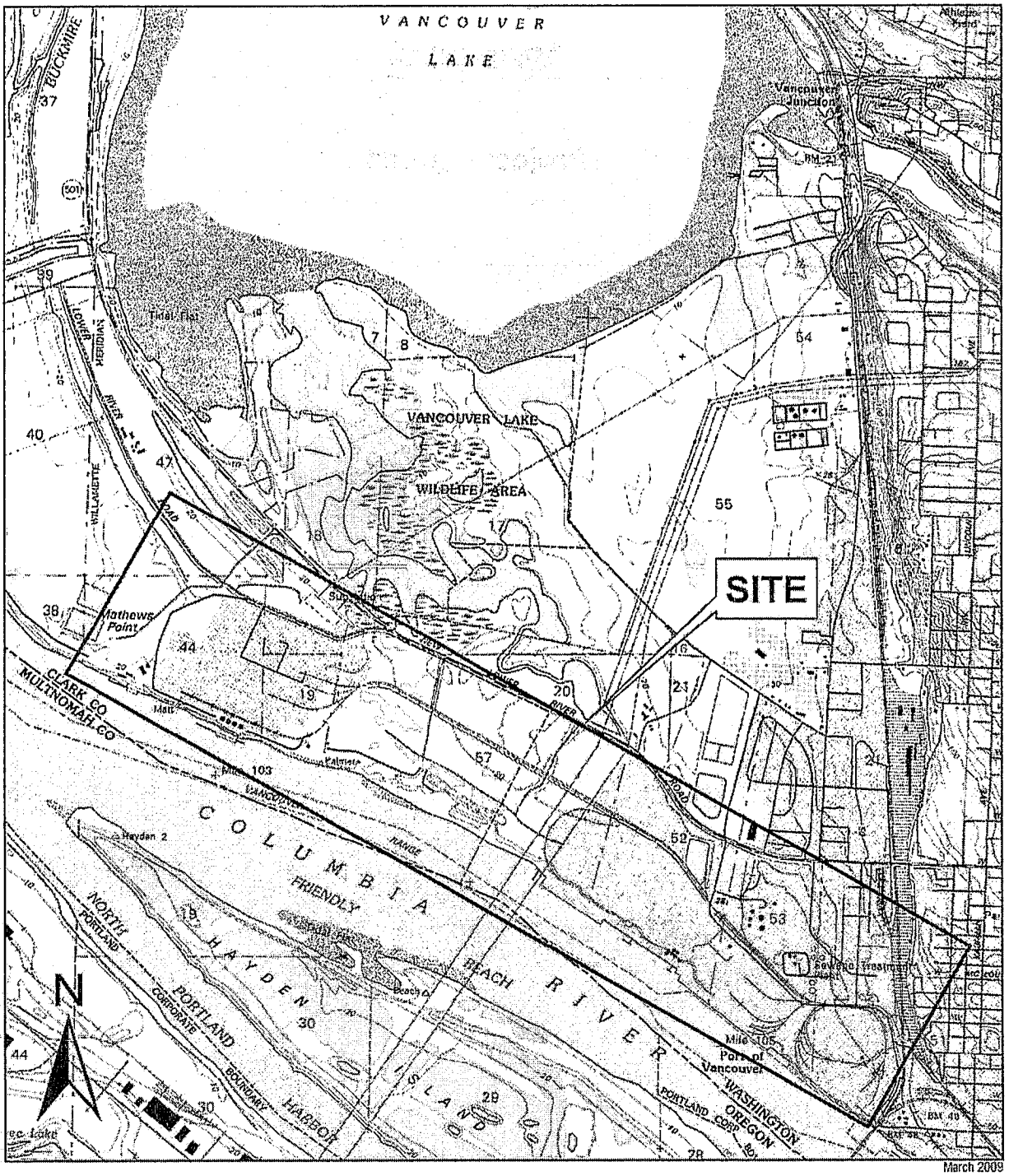

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Figure 2. USGS Map

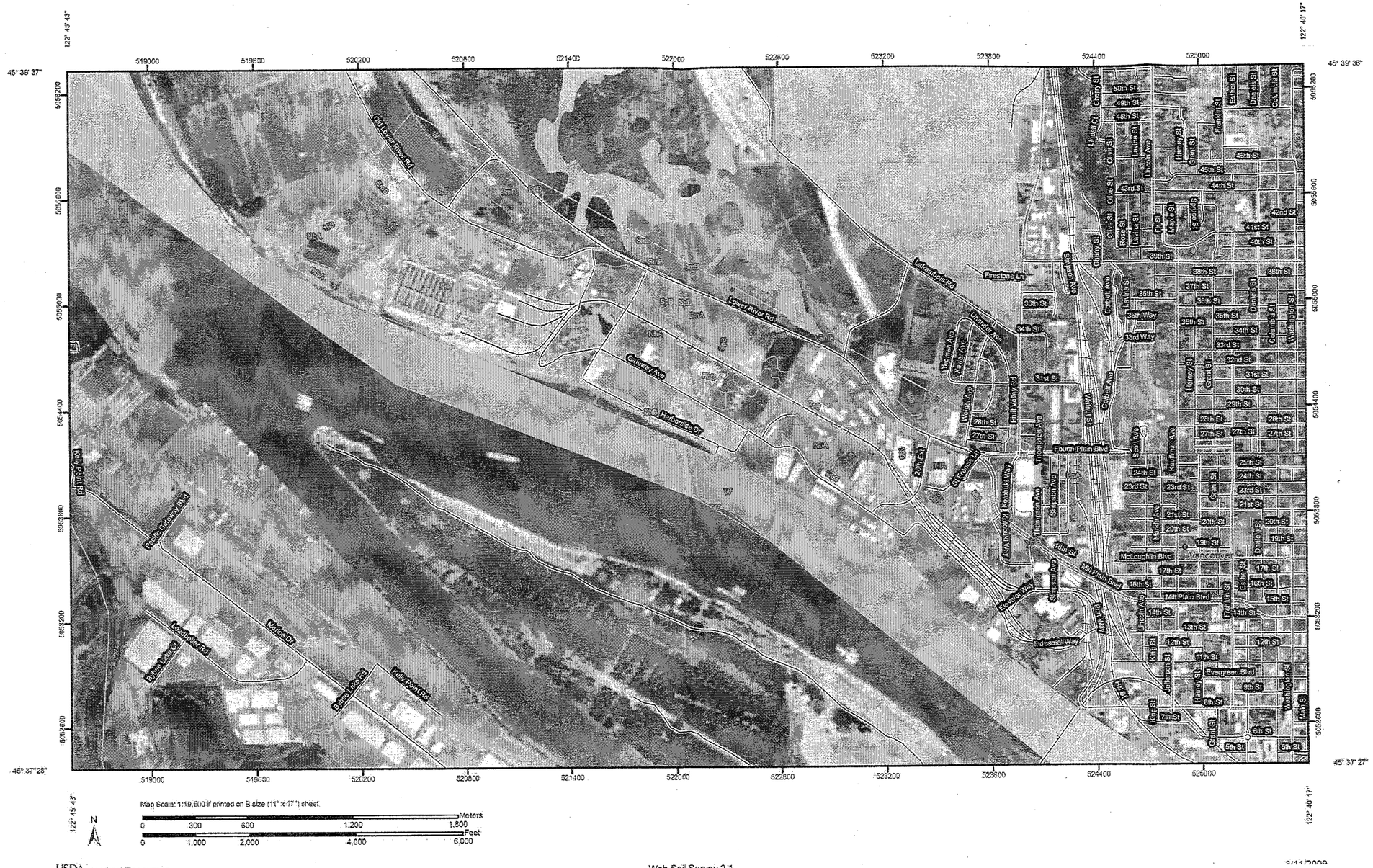


Figure 3. NRCS Soils Map

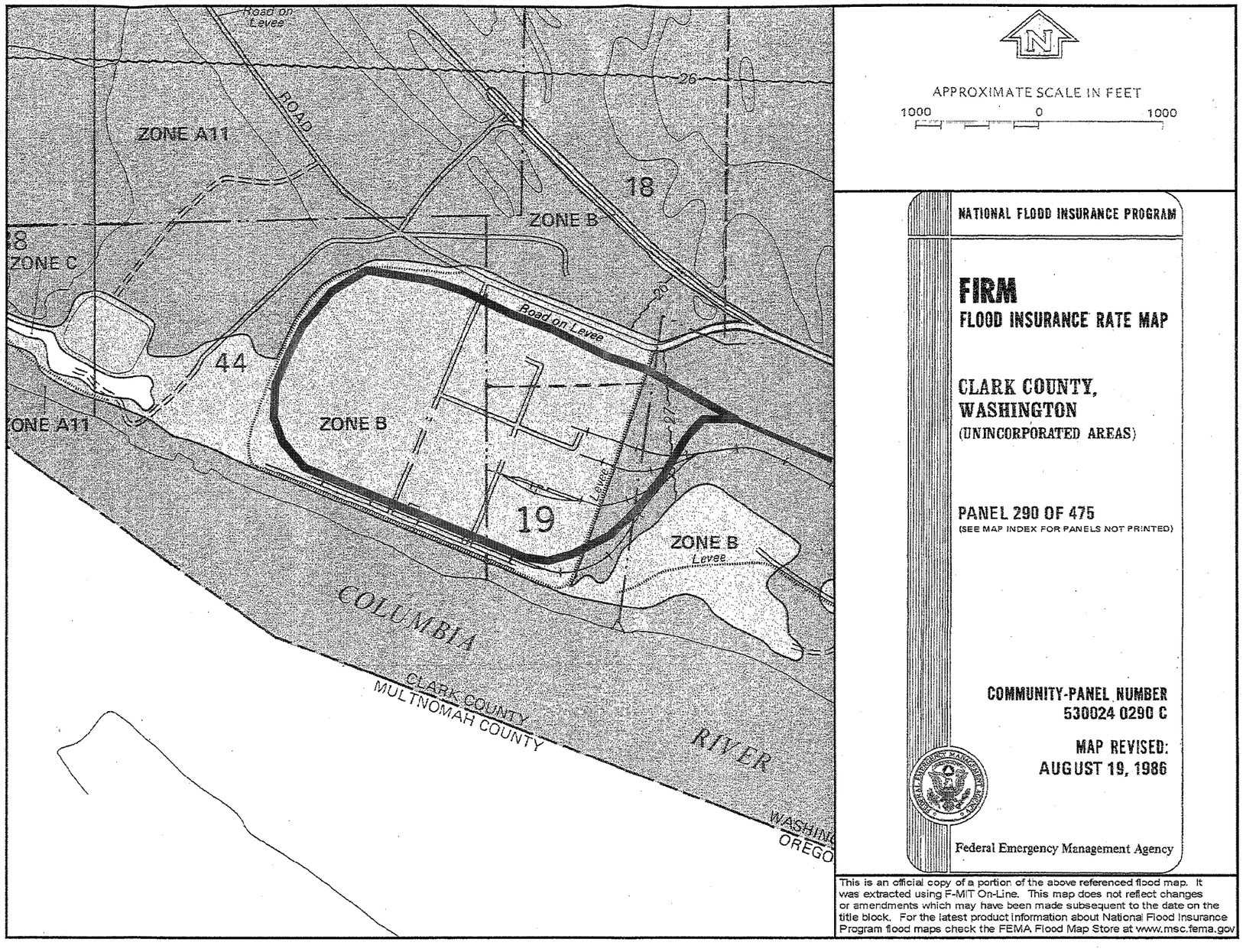


Figure 4. Port of Vancouver Terminal 5 Vicinity Floodplain Map

Key for NRCS soils map:

Clark County, Washington (WA011)	
Map Unit Symbol	**Map Unit Name**
193	Miscellaneous water
Fn	Fill land
HlA	Hillsboro silt loam, 0 to 3 percent slopes
HlB	Hillsboro loam, 3 to 8 percent slopes
HoA	Hillsboro silt loam, 0 to 3 percent slopes
MlA	McBee silt loam, coarse variant, 0 to 3 percent slopes
NbA	Newberg silt loam, 0 to 3 percent slopes
NbB	Newberg silt loam, 3 to 8 percent slopes
PhB	Pilchuck fine sand, 0 to 8 percent slopes
SmA	Sauvie silt loam, 0 to 3 percent slopes
SmB	Sauvie silt loam, 3 to 8 percent slopes
SpB	Sauvie silty clay loam, 0 to 8 percent slopes
W	Water

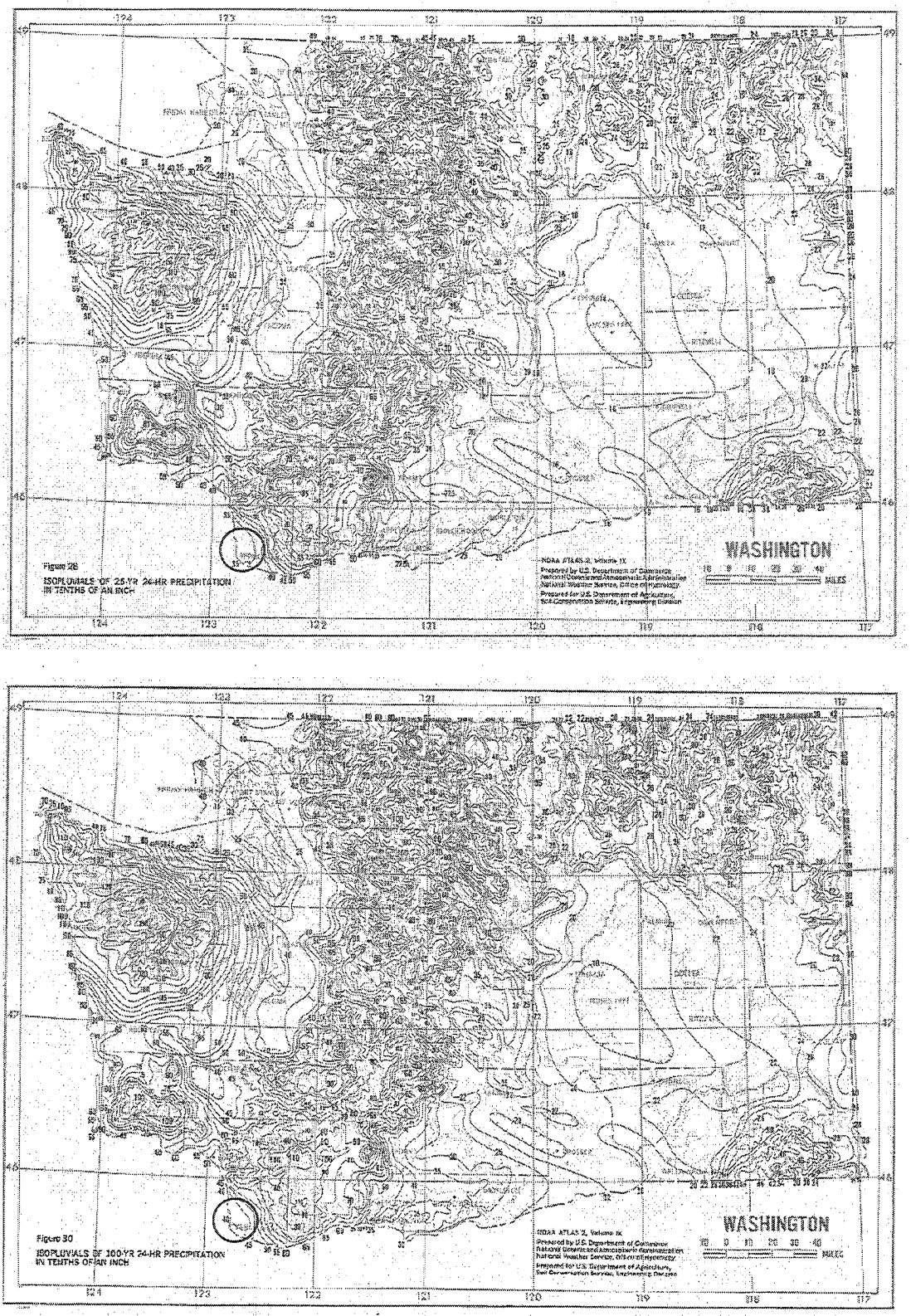


Figure 5. 25-Year and 100-Year 24-Hour Isopluvials

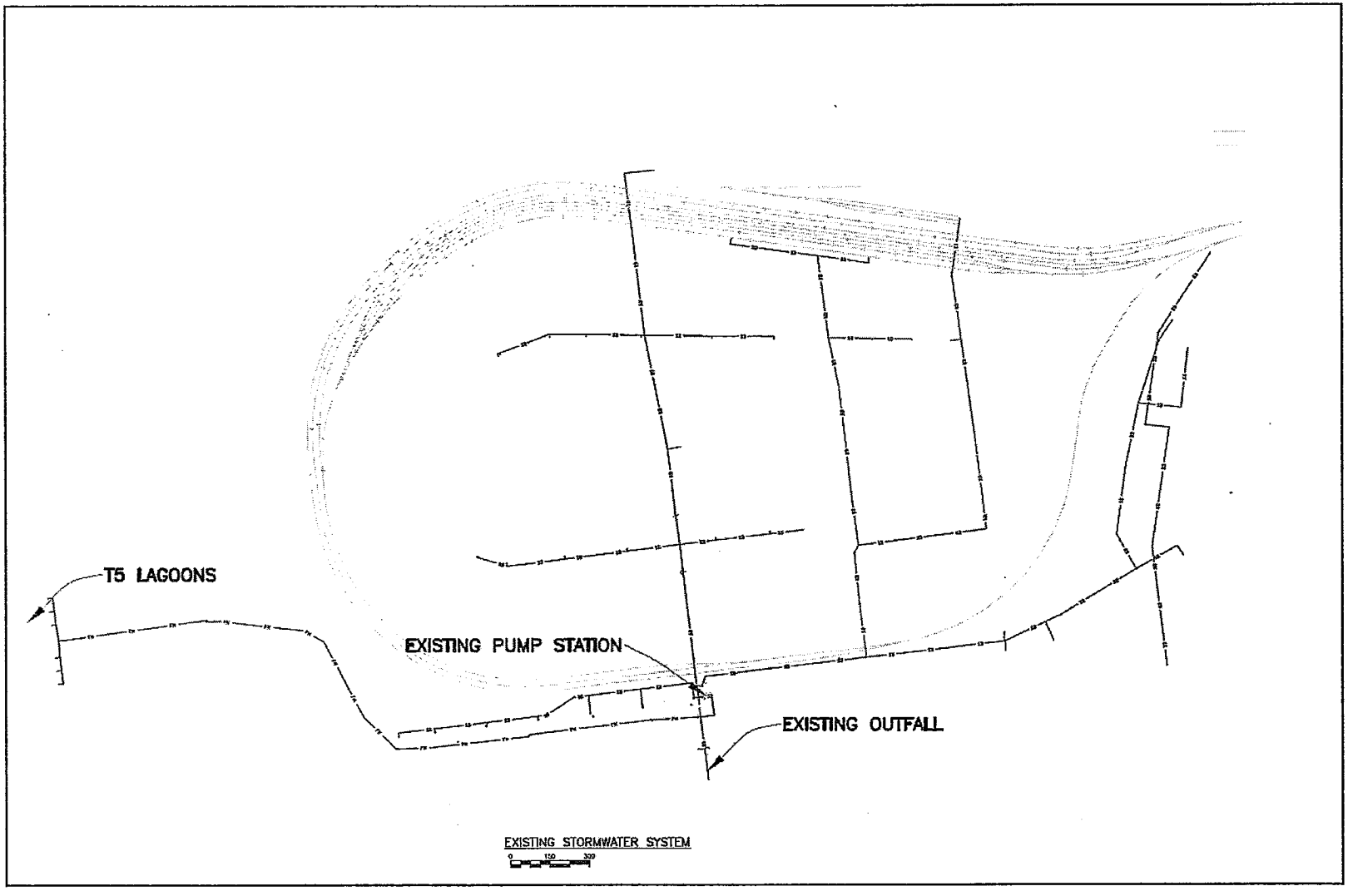


Figure 6. Existing Stormwater System

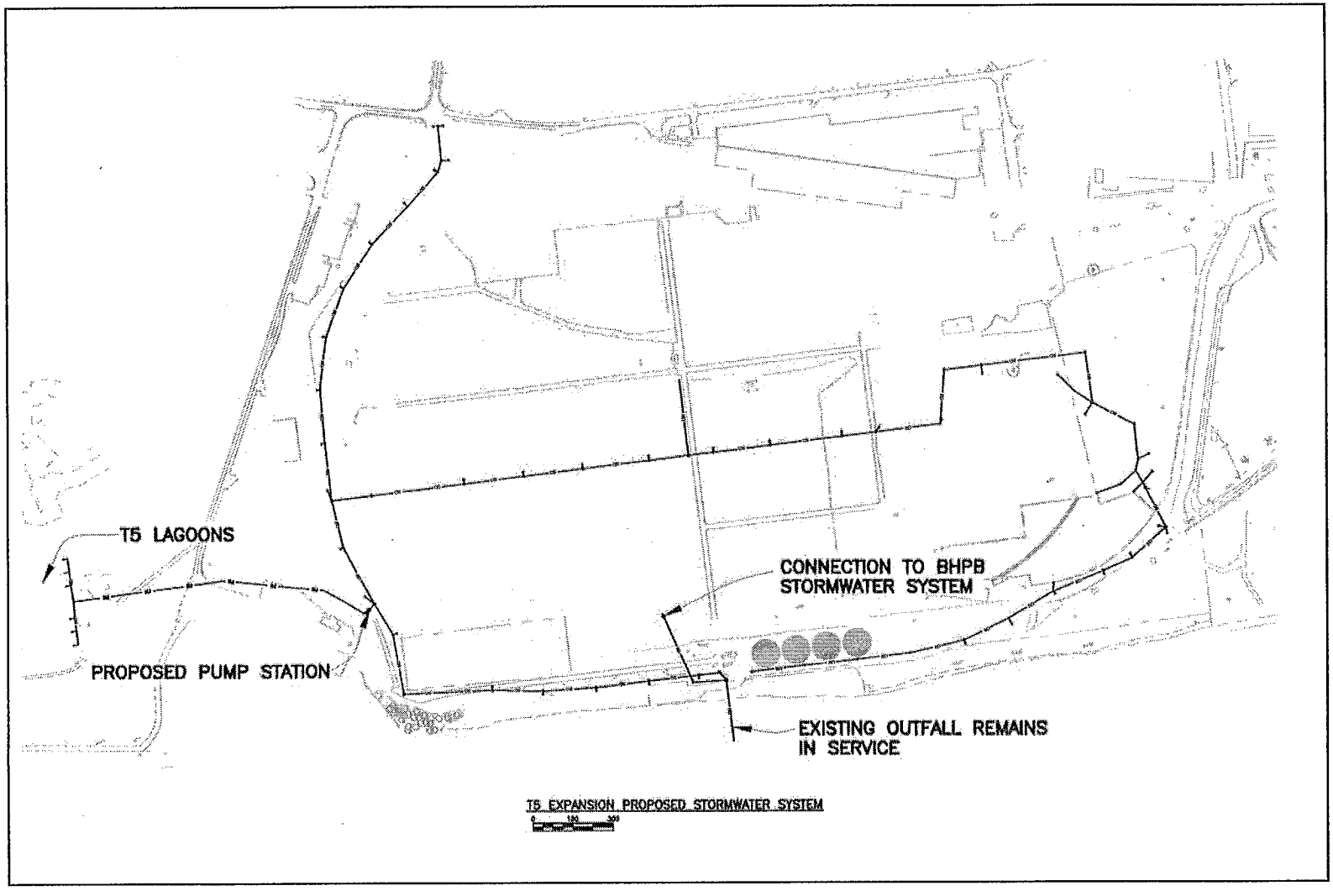


Figure 7. T5 Expansion Proposed Stormwater System

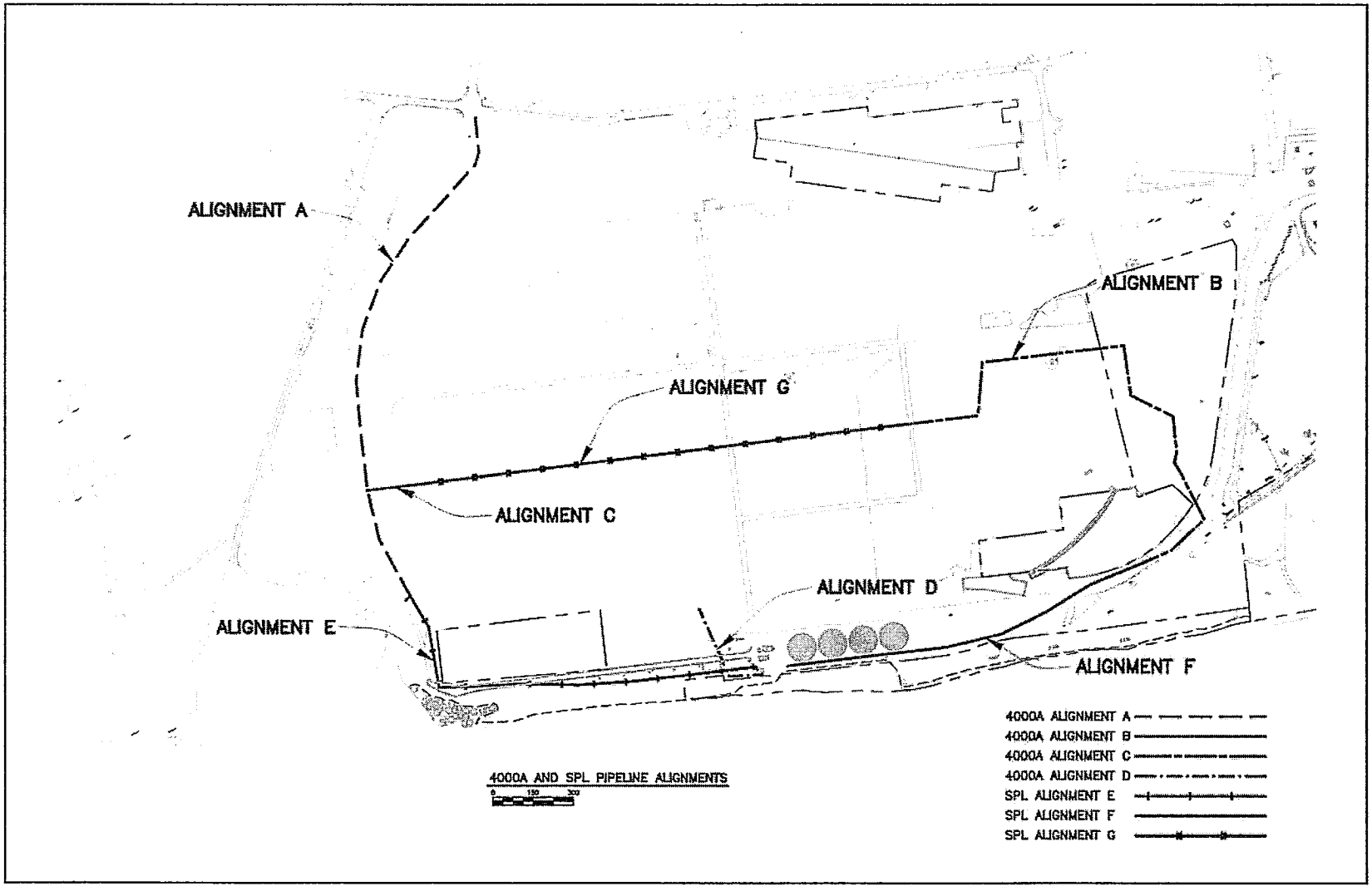


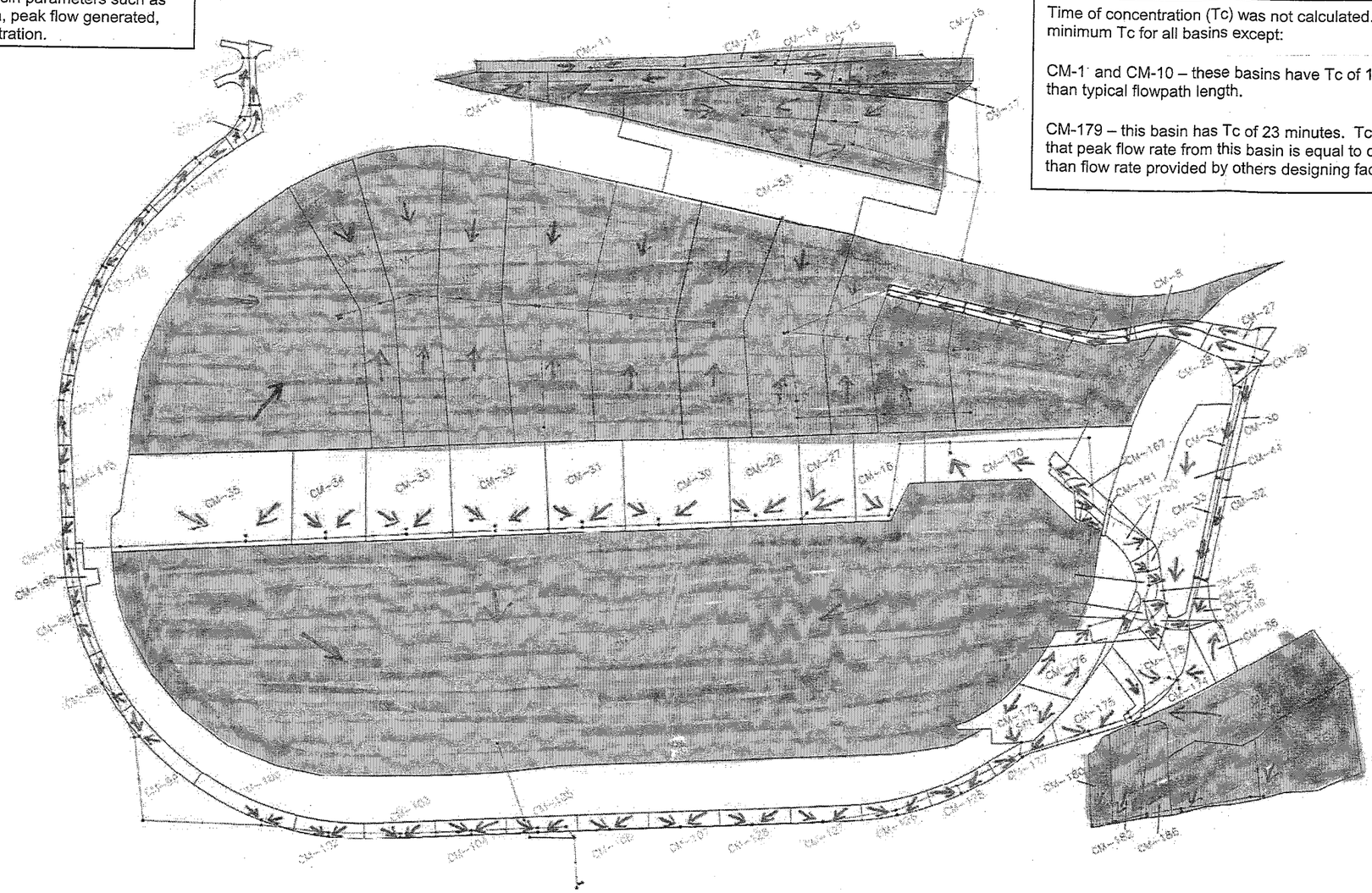
Figure 8. 4000A and SPL Pipe Alignments

See table B1 for basin parameters such as curve number, area, peak flow generated, and time of concentration.

Time of concentration (Tc) was not calculated. Assumed 5 minute minimum Tc for all basins except:

CM-1 and CM-10 – these basins have Tc of 10 mins due to longer than typical flowpath length.

CM-179 – this basin has Tc of 23 minutes. Tc was adjusted such that peak flow rate from this basin is equal to or slightly greater than flow rate provided by others designing facilities in this basin.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APPENDIX B

Hydrology Calculations

Curve Numbers

Curve numbers were selected for each basin based on Table 2.2 in the 2005 SMMWW Vol. III:

Table 2.2
Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Areas

(Sources: TR 55, 1986, and Stormwater Management Manual, 1992. See Section 2.1.1 for explanation)

Cover type and hydrologic condition.	CNs for hydrologic soil group A	B	C	D
Curve Numbers for Pre-Development Conditions				
Pasture, grassland, or range-continuous forage for grazing:				
Fair condition (ground cover 50% to 75% and not heavily grazed).	49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed)	39	61	74	80
Woods:				
Fair (Woods are grazed but not burned, and some forest litter covers the soil).	36	60	73	79
Good (Woods are protected from grazing, and litter and brush adequately cover the soil).	30	55	70	77
Curve Numbers for Post-Development Conditions				
Open space (lawns, parks, golf courses, cemeteries, landscaping, etc.)[1]				
Fair condition (grass cover on 50% - 75% of the area).	77	85	90	92
Good condition (grass cover on >75% of the area)	68	80	86	90
Impervious areas:				
Open water bodies: lakes, wetlands, ponds etc.	100	100	100	100
Paved parking lots, roofs[2], driveways, etc. (excluding right-of-way)	98	98	98	98
Permeable Pavement (See Appendix C to decide which condition below to use)				
Landscaped area	77	85	90	92
50% landscaped area/50% impervious	87	91	94	96
100% impervious area	98	98	98	98
Paved	98	98	98	98
Gravel (including right-of-way)	76	85	89	91
Dirt (including right-of-way)	72	82	87	89
Pasture, grassland, or range-continuous forage for grazing:				
Poor condition (ground cover <50% or heavily grazed with no mulch).	68	79	86	89
Fair condition (ground cover 50% to 75% and not heavily grazed).	49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed)	39	61	74	80
Woods:				
Poor (Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning).	45	66	77	83
Fair (Woods are grazed but not burned, and some forest litter covers the soil).	36	60	73	79
Good (Woods are protected from grazing, and litter and brush adequately cover the soil).	30	55	70	77

Single family residential[3]: Dwelling Unit/Gross Acre	Should only be used for subdivisions > 50 acres	Average Percent impervious area[3,4]	
1.0 DU/GA		15	Separate curve number
1.5 DU/GA		20	shall be selected for
2.0 DU/GA		25	pervious & impervious
2.5 DU/GA		30	portions of the site or
3.0 DU/GA		34	basin
3.5 DU/GA		38	
4.0 DU/GA		42	
4.5 DU/GA		46	
5.0 DU/GA		48	
5.5 DU/GA		50	
6.0 DU/GA		52	
6.5 DU/GA		54	
7.0 DU/GA		56	
7.5 DU/GA		58	

PUD's, condos, apartments, commercial businesses, industrial areas & & subdivisions < 50 acres	%impervious must be computed	Separate curve numbers shall be selected for pervious and impervious portions of the site

For a more detailed and complete description of land use curve numbers refer to chapter two (2) of the Soil Conservation Service's Technical Release No. 55 . (210-VI-TR-55. Second Ed., June 1986).

A curve number of 98 was used for pavement.

Table B1. Catchment Modeling Parameters and Results for the 25-year Storm Event

Catchment Name	SCS Curve Number	Scaled Area (acres)	Peak 25-year Flow (cfs)	Time of Concentration (mins)	Unit Hydrograph Method
Alignment A					
CM-121	98	0.167	0.14	5	SCS Unit Hydrograph
CM-113	98	0.161	0.13	5	SCS Unit Hydrograph
CM-110	98	0.160	0.13	5	SCS Unit Hydrograph
CM-95	98	0.168	0.14	5	SCS Unit Hydrograph
CM-98	98	0.159	0.13	5	SCS Unit Hydrograph
CM-118	98	0.100	0.08	5	SCS Unit Hydrograph
CM-119	98	0.072	0.06	5	SCS Unit Hydrograph
CM-120	98	0.082	0.07	5	SCS Unit Hydrograph
CM-117	98	0.260	0.22	5	SCS Unit Hydrograph
CM-123	98	0.114	0.09	5	SCS Unit Hydrograph
CM-115	98	0.157	0.13	5	SCS Unit Hydrograph
CM-124	98	0.158	0.13	5	SCS Unit Hydrograph
CM-114	98	0.158	0.13	5	SCS Unit Hydrograph
CM-190	98	0.100	0.07	5	SCS Unit Hydrograph
Alignment B					
CM-136	98	0.073	0.06	5	SCS Unit Hydrograph
CM-149	98	0.108	0.09	5	SCS Unit Hydrograph
CM-148	98	0.022	0.02	5	SCS Unit Hydrograph
CM-165	98	0.100	0.08	5	SCS Unit Hydrograph
CM-154	98	0.055	0.05	5	SCS Unit Hydrograph
CM-191	98	0.024	0.02	5	SCS Unit Hydrograph
CM-170	98	1.942	1.61	5	SCS Unit Hydrograph
CM-16	98	0.943	0.78	5	SCS Unit Hydrograph
CM-175	98	0.631	0.52	5	SCS Unit Hydrograph
CM-176	98	0.221	0.18	5	SCS Unit Hydrograph
CM-174	98	0.327	0.27	5	SCS Unit Hydrograph
CM-178	98	0.632	0.52	5	SCS Unit Hydrograph
CM-27	98	0.853	0.7	5	SCS Unit Hydrograph
CM-135	98	0.063	0.05	5	SCS Unit Hydrograph
CM-140	98	0.029	0.02	5	SCS Unit Hydrograph
CM-153	98	0.115	0.1	5	SCS Unit Hydrograph
CM-151	98	0.084	0.07	5	SCS Unit Hydrograph
CM-150	98	0.245	0.2	5	SCS Unit Hydrograph
CM-155	98	0.062	0.05	5	SCS Unit Hydrograph
CM-167	98	0.120	0.1	5	SCS Unit Hydrograph
CM-176	98	0.628	0.5	5	SCS Unit Hydrograph
Alignment C					
No catchments in Alignment C. Upstream basins and existing system contribute flow.					

Table B1. Catchment Modeling Parameters and Results for the 25-year Storm Event

Catchment Name	SCS Curve Number	Scaled Area (acres)	Peak 25-year Flow (cfs)	Time of Concentration (mins)	Unit Hydrograph Method
Alignment D					
CM-179	98	37.829	23.9	23	SCS Unit Hydrograph
Alignment E					
CM-105	98	0.197	0.16	5	SCS Unit Hydrograph
CM-104	98	0.197	0.16	5	SCS Unit Hydrograph
CM-103	98	0.196	0.16	5	SCS Unit Hydrograph
CM-102	98	0.193	0.16	5	SCS Unit Hydrograph
CM-100	98	0.292	0.24	5	SCS Unit Hydrograph
CM-99	98	0.265	0.22	5	SCS Unit Hydrograph
Alignment F					
CM-106	98	0.197	0.16	5	SCS Unit Hydrograph
CM-107	98	0.198	0.16	5	SCS Unit Hydrograph
CM-128	98	0.197	0.16	5	SCS Unit Hydrograph
CM-127	98	0.196	0.16	5	SCS Unit Hydrograph
CM-126	98	0.196	0.16	5	SCS Unit Hydrograph
CM-125	98	0.198	0.16	5	SCS Unit Hydrograph
CM-177	98	0.191	0.16	5	SCS Unit Hydrograph
CM-175	98	0.652	0.52	5	SCS Unit Hydrograph
Alignment G					
CM-29	98	1.111	0.83	5	SCS Unit Hydrograph
CM-30	98	1.704	1.27	5	SCS Unit Hydrograph
CM-31	98	1.254	0.92	5	SCS Unit Hydrograph
CM-32	98	1.593	1.31	5	SCS Unit Hydrograph
CM-33	98	1.418	1.17	5	SCS Unit Hydrograph
CM-34	98	1.232	1.02	5	SCS Unit Hydrograph
CM-35	98	2.970	2.46	5	SCS Unit Hydrograph

MGS Flood Water Quality Flow Rate Results

MGS FLOOD
PROJECT REPORT

Program Version: 3.13 Run Date: 01/10/2012 10:01 AM

Input File Name: mgs test.fld
Project Name: POV T5 WQ flow
Analysis Title: POV T5 WQ flow
Comments:

********** Precipitation Input**********

Extended Precipitation Timeseries Selected
Climatic Region Number: 20
Full Period of Record Available used for Routing
Precipitation Station : 970044 Vancouver 44 in MAP 10/01/1939-10/01/2060
Evaporation Station : 971044 Vancouver 44 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** Watershed Definition **********

Number of Subbasins: 1

********** Subbasin Number: 1 **********

***Tributary to Node: 1
***Bypass to Node : None

	Area(Acres)		
		Developed	
	Predeveloped	To Node	Bypass Node
Till Forest	0.000	0.000	0.000
Till Pasture	0.000	0.000	0.000
Till Grass	0.000	0.000	0.000
Outwash Forest	0.000	0.000	0.000
Outwash Pasture	0.000	0.000	0.000
Outwash Grass	91.320	0.000	0.000
Wetland	0.000	0.000	0.000
Impervious	0.000	91.320	0.000
Subbasin Total	91.320	91.320	0.000

**********Water Quality Facility Data **********

Node No: 2
2-Year Discharge Rate : 25.033 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 14.68 cfs
Off-line Design Discharge Rate (91% Exceedance): 8.65 cfs

APPENDIX C

Hydraulic Calculations

Table C1. Conduit Modeling Parameters and Results for the 25-year Storm Event

Conduit Name	Diameter (in)	Slope (ft/ft)	Maximum 25-year Flow (cfs)	Calculated Design Capacity (cfs)	Maximum Flow to Calculated Design Capacity Ratio
Alignment A					
CO-A5	12	0.020	0.14	5.45	0.03
CO-A10	12	0.020	0.08	5.47	0.01
CO-A15	12	0.002	0.34	1.71	0.20
CO-A20	12	0.020	0.06	5.47	0.01
CO-A25	12	0.002	0.58	1.74	0.33
CO-A30	12	0.020	0.07	5.41	0.01
CO-A35	12	0.002	0.65	1.73	0.38
CO-A40	12	0.020	0.22	5.45	0.04
CO-A45	12	0.002	0.69	1.74	0.40
CO-A50	12	0.020	0.09	5.44	0.02
CO-A55	12	0.002	0.71	1.74	0.41
CO-A60	12	0.020	0.13	5.44	0.02
CO-A65	12	0.002	0.74	1.74	0.43
CO-A70	12	0.020	0.13	5.44	0.02
CO-A75	18	0.002	0.8	5.13	0.16
CO-A80	12	0.020	0.13	5.44	0.02
CO-A85	24	0.002	0.91	11.00	0.08
CO-A90	12	0.020	0.13	5.44	0.02
CO-A95	24	0.002	1.03	10.94	0.09
CO-A100	12	0.020	0.13	5.47	0.02
CO-A105	48	0.002	57.59	69.94	0.82
CO-A110	12	0.020	0.14	5.44	0.03
CO-A115	48	0.002	57.81	66.94	0.86
CO-A120	12	0.020	0.13	5.45	0.02
Alignment B					
CO-B37	12	0.020	0.52	5.40	0.10
CO-B40	30	0.002	3.96	19.99	0.20
CO-B43	12	0.020	0.18	5.44	0.03
CO-B45	30	0.002	7.58	19.63	0.39
CO-B47	12	0.020	0.27	5.48	0.05
CO-B49	12	0.020	0.52	5.48	0.09
CO-B50	30	0.003	8.87	25.07	0.35
CO-B53/300	15	0.005	2.59	4.94	0.52
CO-B55	12	0.020	0.06	5.47	0.01

Table C1. Conduit Modeling Parameters and Results for the 25-year Storm Event

Conduit Name	Diameter (in)	Slope (ft/ft)	Maximum 25-year Flow (cfs)	Calculated Design Capacity (cfs)	Maximum Flow to Calculated Design Capacity Ratio
CO-B55	30	0.003	10.91	25.10	0.43
CO-B60	12	0.020	0.09	5.45	0.02
CO-B63	12	0.005	0.52	2.51	0.21
CO-B65	30	0.002	11.06	19.87	0.56
CO-B70	12	0.020	0.57	5.45	0.10
CO-B75	30	0.002	11.44	19.87	0.58
CO-B80	12	0.020	0.02	5.45	0.00
CO-B85	30	0.002	11.54	19.88	0.58
CO-B90	30	0.002	11.6	19.87	0.58
CO-B95	30	0.002	11.75	19.87	0.59
CO-B100	12	0.020	0.08	5.45	0.01
CO-B105	12	0.020	0.18	5.46	0.03
CO-B110	12	0.020	0.06	5.45	0.01
CO-B120	36	0.002	12.04	32.05	0.38
CO-B125	36	0.002	12.1	32.41	0.37
CO-B126	12	0.020	1.61	5.46	0.29
CO-B127	36	0.002	13.02	32.20	0.40
CO-B130	36	0.002	13.07	32.31	0.40
CO-B135	12	0.020	0.78	5.49	0.14
CO-B140	36	0.002	13.56	32.32	0.42
CO-B150	12	0.020	0.71	5.49	0.13
Alignment C					
CO-C235	48	0.002	53.54	69.69	0.77
Alignment D					
CO-D5	36	0.005	23.83	51.06	0.47
CO-D10	36	0.005	23.80	51.23	0.46
Alignment E					
CO-E1/E3	36	0.025	58.71	115.15	0.51
CO-E5	48	0.002	58.71	69.93	0.84
CO-E10	12	0.020	0.16	5.44	0.03
CO-E15	48	0.002	58.66	69.83	0.84
CO-E20	12	0.020	0.16	5.44	0.03
CO-E25	48	0.002	58.5	69.59	0.84
CO-E30	12	0.020	0.16	5.44	0.03
CO-E35	48	0.002	58.29	69.95	0.83
CO-E40	12	0.020	0.16	5.44	0.03
CO-E45	48	0.002	58.15	69.50	0.84
CO-E50	12	0.020	0.24	5.48	0.04
CO-E55	48	0.002	57.94	69.44	0.83
CO-E60	48	0.002	57.97	69.35	0.84

Table C1. Conduit Modeling Parameters and Results for the 25-year Storm Event

Conduit Name	Diameter (in)	Slope (ft/ft)	Maximum 25-year Flow (cfs)	Calculated Design Capacity (cfs)	Maximum Flow to Calculated Design Capacity Ratio
CO-E65	12	0.020	57.84	5.48	0.04
CO-E70/ A127	48	0.002	58.71	70.62	0.82
Alignment F					
CO-F5	12	0.002	0.16	1.78	0.09
CO-F10	18	0.002	0.33	4.70	0.07
CO-F15	18	0.002	0.49	4.70	0.10
CO-F20	18	0.002	0.65	4.72	0.14
CO-F23	12	0.020	0.16	5.00	0.03
CO-F25	18	0.002	0.95	4.69	0.20
CO-F27	12	0.020	0.16	5.45	0.03
CO-F30	24	0.002	1.73	10.31	0.17
CO-F32	12	0.005	0.54	2.54	0.21
CO-F33	12	0.020	0.16	5.49	0.03
CO-F35	24	0.002	2.96	10.05	0.29
Alignment G					
CO-G155	36	0.002	26.18	34.85	0.75
CO-G160	12	0.020	0.92	5.46	0.17
CO-G165	42	0.002	26.66	52.42	0.51
CO-G170	12	0.020	1.41	5.46	0.26
CO-G175	42	0.002	27.46	52.65	0.52
CO-G180	12	0.020	1.04	5.46	0.19
CO-G185	42	0.002	28.36	52.54	0.54
CO-G187	36	0.002	23.29	31.37	0.74
CO-G190	48	0.002	51.34	69.63	0.74
CO-G195	12	0.020	1.32	5.44	0.24
CO-G200	48	0.002	52.49	69.58	0.75
CO-G205	12	0.020	1.17	5.49	0.21
CO-G210	48	0.002	53.54	69.72	0.77
CO-G215	12	0.020	1.02	5.46	0.19
CO-G220	48	0.002	54.26	69.72	0.78
CO-G225	12	0.020	2.46	5.44	0.45
CO-G230	48	0.002	56.55	69.42	0.81

Table C2. Structures Modeling Results for the 100-year Storm Event

Structure Name	Structure Type	Structure surcharged for the 100-year Storm?
Alignment A		
CB1-A10	WSDOT Catch Basin Type 1	No
CB1-A100	WSDOT Catch Basin Type 1	No
CB1-A110	WSDOT Catch Basin Type 1	No
CB1-A120	WSDOT Catch Basin Type 1	No
CB1-A130	WSDOT Catch Basin Type 1	No
CB1-A20	WSDOT Catch Basin Type 1	No
CB1-A30	WSDOT Catch Basin Type 1	No
CB1-A40	WSDOT Catch Basin Type 1	No
CB1-A50	WSDOT Catch Basin Type 1	No
CB1-A60	WSDOT Catch Basin Type 1	No
CB1-A70	WSDOT Catch Basin Type 1	No
CB1-A80	WSDOT Catch Basin Type 1	No
CB1-A90	WSDOT Catch Basin Type 1	No
MH-A10	WSDOT Manhole Type 3	No
MH-A20	WSDOT Manhole Type 3	No
MH-A30	WSDOT Manhole Type 3	No
MH-A40	WSDOT Manhole Type 3	No
MH-A50	WSDOT Manhole Type 3	No
MH-A60	WSDOT Manhole Type 3	No
MH-A70	WSDOT Manhole Type 3	No
MH-A80	WSDOT Manhole Type 3	No
MH-A90	WSDOT Manhole Type 3	No
MH-A100	WSDOT Manhole Type 3	No
MH-A110	WSDOT Manhole Type 3	No
MH-A120	WSDOT Manhole Type 3	No
Alignment B		
CB1-B100	WSDOT Catch Basin Type 1	No
CB1-B110	WSDOT Catch Basin Type 1	No
CB1-B130	WSDOT Catch Basin Type 1	No
CB1-B140	WSDOT Catch Basin Type 1	No
CB1-B160	WSDOT Catch Basin Type 1	No
CB1-B170	WSDOT Catch Basin Type 1	No
CB1-B180	WSDOT Catch Basin Type 1	No
CB1-B80	WSDOT Catch Basin Type 1	No
CB1-B85	WSDOT Catch Basin Type 1	No
CB1-B87	WSDOT Catch Basin Type 1	No
CB1-B90	WSDOT Catch Basin Type 1	No
CB1-B90	WSDOT Catch Basin Type 1	No
72" STM MH 22	Existing Manhole	No

Table C2. Structures Modeling Results for the 100-year Storm Event

Structure Name	Structure Type	Structure surcharged for the 100-year Storm?
MH-B80	WSDOT Manhole Type 3	No
MH-B85	WSDOT Manhole Type 3	No
MH-B90	WSDOT Manhole Type 3	No
MH-B95	WSDOT Manhole Type 3	No
MH-B100	WSDOT Manhole Type 3	No
MH-B103	WSDOT Manhole Type 3	No
MH-B160	WSDOT Manhole Type 3	No
MH-B165	WSDOT Manhole Type 3	No
MH-B170	WSDOT Manhole Type 3	No
MH-B180	WSDOT Manhole Type 3	No
Alignment C		
MH-C260	WSDOT Manhole Type 3	No
Alignment D		
MH-D10	WSDOT Manhole Type 3	No
MHV-D10	120 Inch Manhole	No
MHV-D20	120 Inch Manhole	No
Alignment E		
CB1-E10	WSDOT Catch Basin Type 1	No
CB1-E20	WSDOT Catch Basin Type 1	No
CB1-E30	WSDOT Catch Basin Type 1	No
CB1-E40	WSDOT Catch Basin Type 1	No
CB1-E50	WSDOT Catch Basin Type 1	No
CB1-E60	WSDOT Catch Basin Type 1	No
MH-E10	WSDOT Manhole Type 3	No
MH-E20	WSDOT Manhole Type 3	No
MH-E30	WSDOT Manhole Type 3	No
MH-E40	WSDOT Manhole Type 3	No
MH-E50	WSDOT Manhole Type 3	No
MH-E60	WSDOT Manhole Type 3	No
MH-E70	WSDOT Manhole Type 3	No
MH-E80	WSDOT Manhole Type 3	No
Alignment F		
CB1-F10	WSDOT Catch Basin Type 1	No
CB1-F20	WSDOT Catch Basin Type 1	No
CB1-F30	WSDOT Catch Basin Type 1	No
CB1-F40	WSDOT Catch Basin Type 1	No
CB1-F50	WSDOT Catch Basin Type 1	No
CB1-F60	WSDOT Catch Basin Type 1	No
CB1-F70	WSDOT Catch Basin Type 1	No
MH-F50	WSDOT Manhole Type 3	No

Table C2. Structures Modeling Results for the 100-year Storm Event

Structure Name	Structure Type	Structure surcharged for the 100-year Storm?
MH-F60	WSDOT Manhole Type 3	No
MH-F65	WSDOT Manhole Type 3	No
MH-F70	WSDOT Manhole Type 3	No
Alignment G		
CB1-G200	WSDOT Catch Basin Type 1	No
CB1-G210	WSDOT Catch Basin Type 1	No
CB1-G220	WSDOT Catch Basin Type 1	No
CB1-G230	WSDOT Catch Basin Type 1	No
CB1-G240	WSDOT Catch Basin Type 1	No
CB1-G250	WSDOT Catch Basin Type 1	No
CB1-G260	WSDOT Catch Basin Type 1	No
MH-G200	WSDOT Manhole Type 3	No
MH-G205	WSDOT Manhole Type 3	No
MH-G210	WSDOT Manhole Type 3	No
MH-G215	WSDOT Manhole Type 3	No
MH-G220	WSDOT Manhole Type 3	No
MH-G230	WSDOT Manhole Type 3	No
MH-G240	WSDOT Manhole Type 3	No
MH-G250	WSDOT Manhole Type 3	No

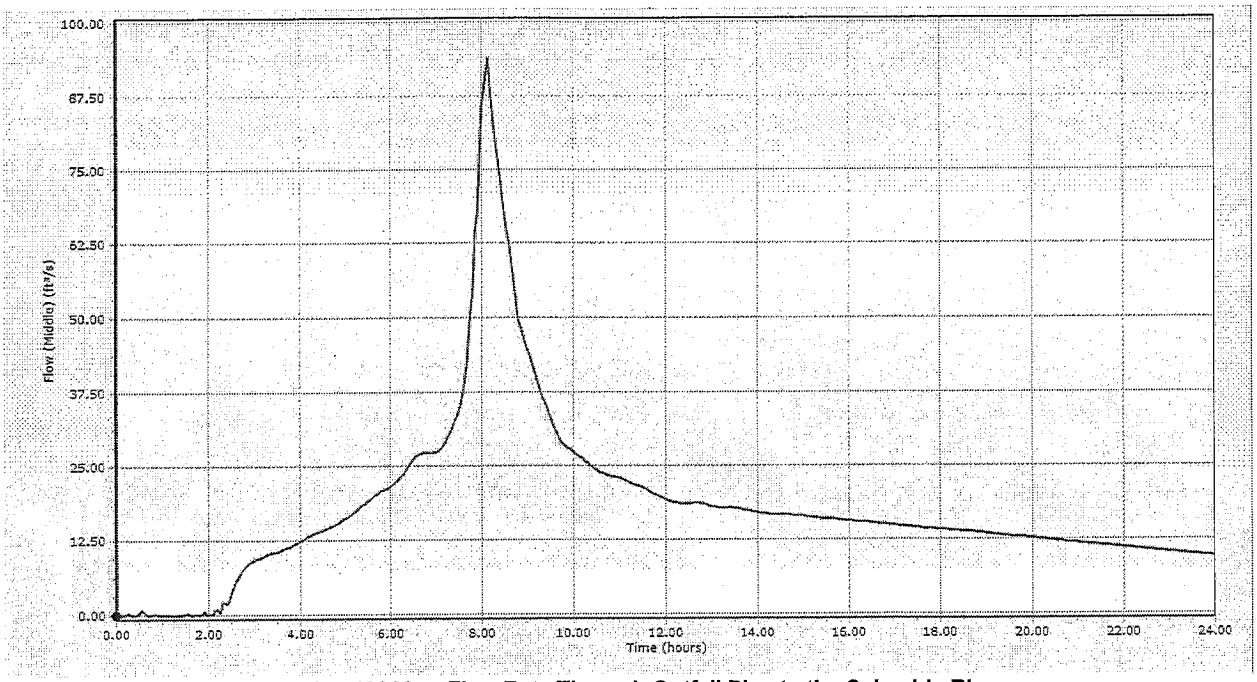
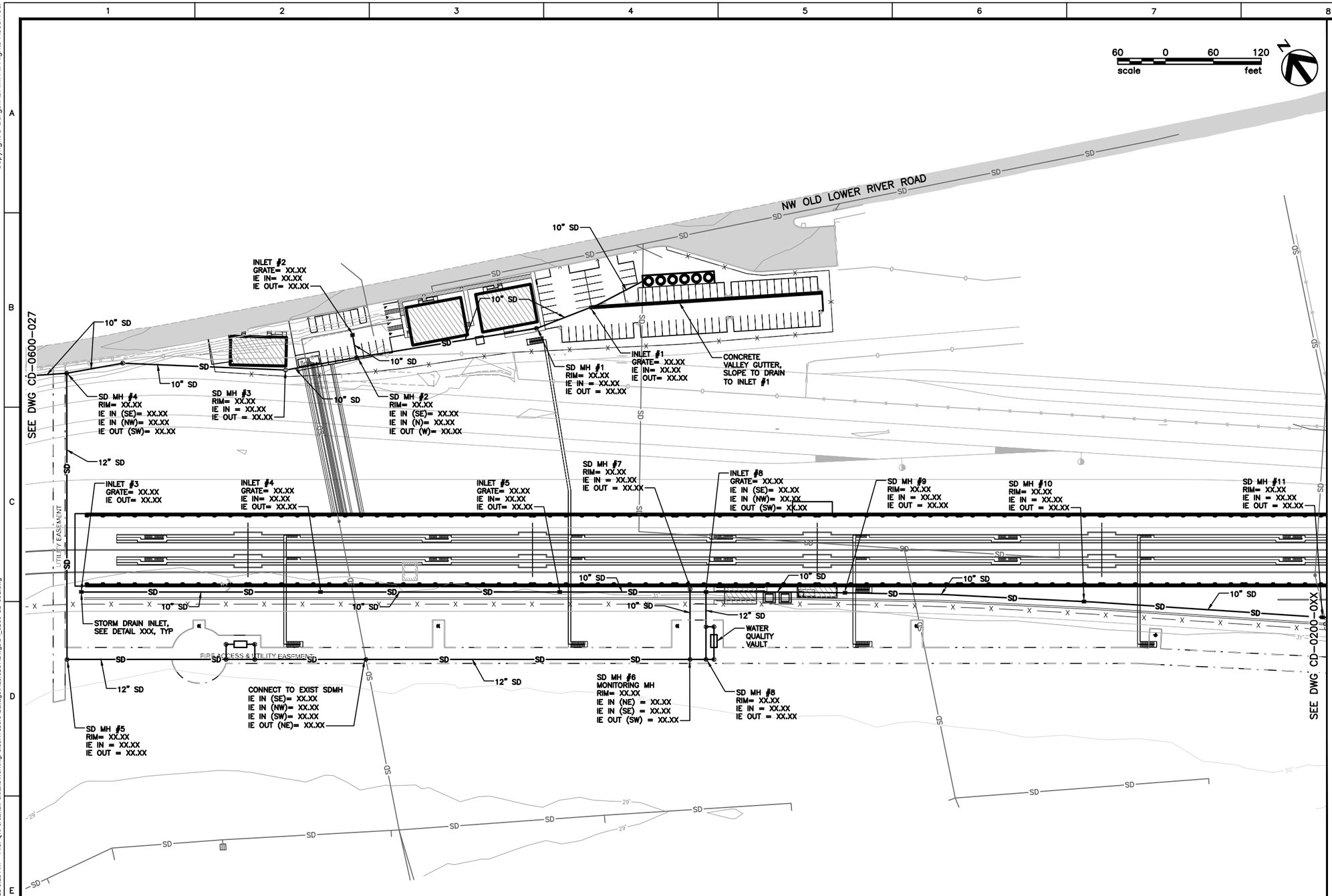


Figure C1. Hydrograph Showing 100 Year Flow Rate Through Outfall Pipe to the Columbia River

Attachment I
Stormwater Site Plans



NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM TERMINAL LLC

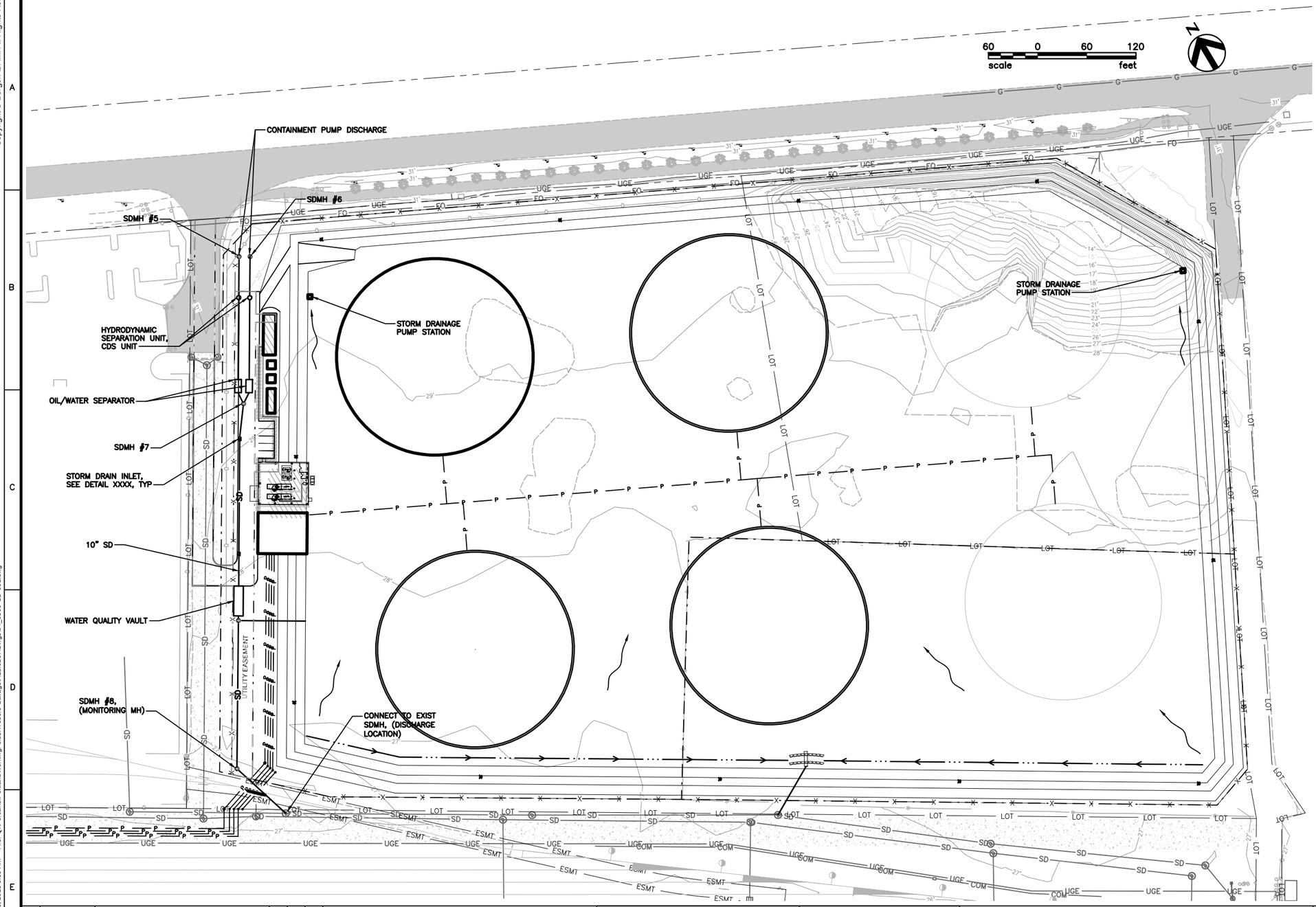
PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: GRADING AND DRAINAGE PLAN – UNLOADING & OFFICE AREA

DESIGN:	DES	START DATE:	8/9/2013	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	8/20/2013	PROJECT MANAGER:	PM
CHECKED:	CHK	APPROVED:	APPR	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-001		0

Last Saved by: Tony.pritchett on: Aug 20, 2013 9:28 AM File: Q:\Portland\Portland\Working\Folder\Tesoro-Savage\A13.0267\Dwgs\04_0200-CD-001.dwg



NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

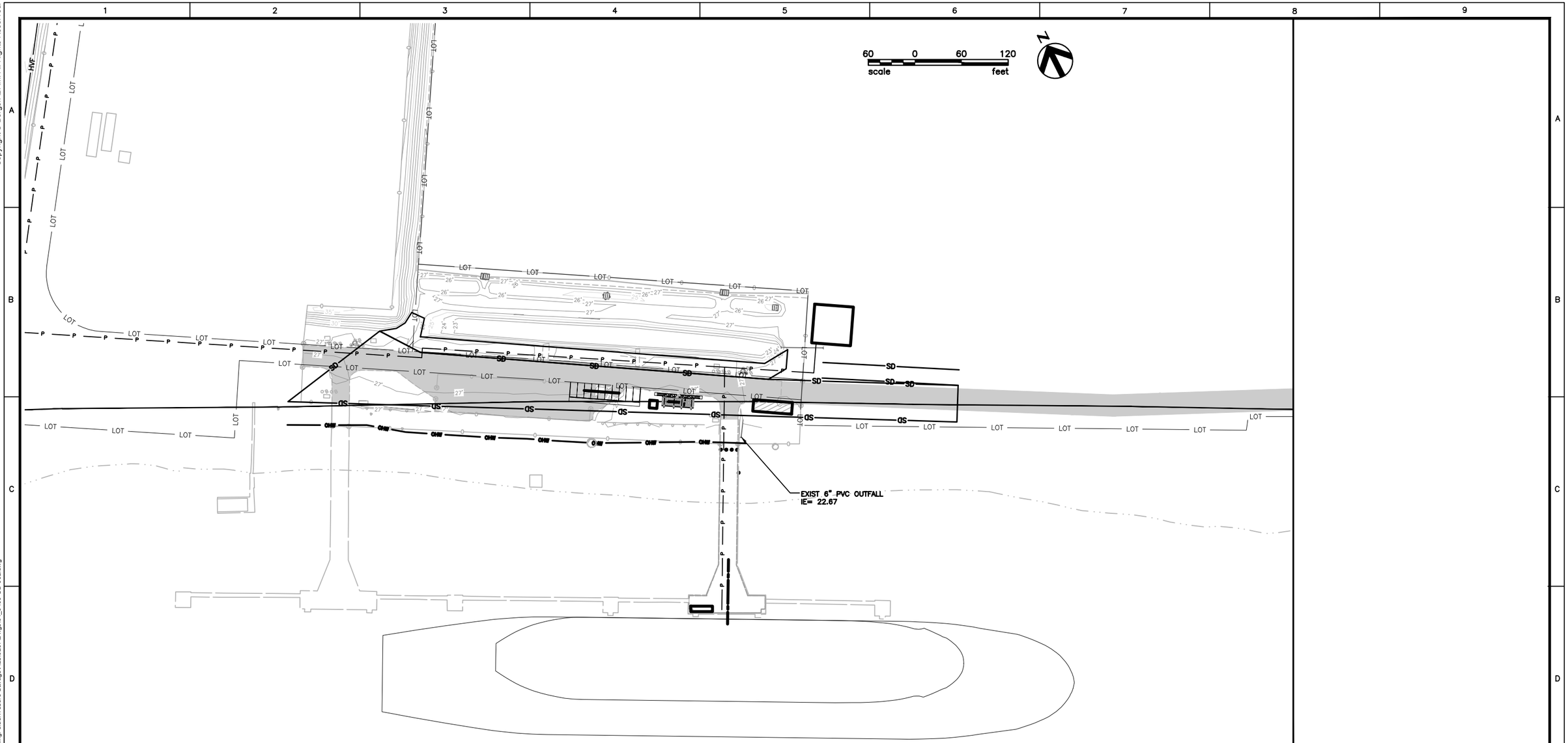
CUSTOMER: TESORO SAVAGE PETROLEUM TERMINAL LLC

PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: GRADING AND DRAINAGE PLAN – TANK FARM AREA

DESIGN:	DES	START DATE:	8/9/2013	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	8/20/2013	PROJECT MANAGER:	PM
CHECKED:	CHK	APPROVED:	APPR	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-001		0



NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

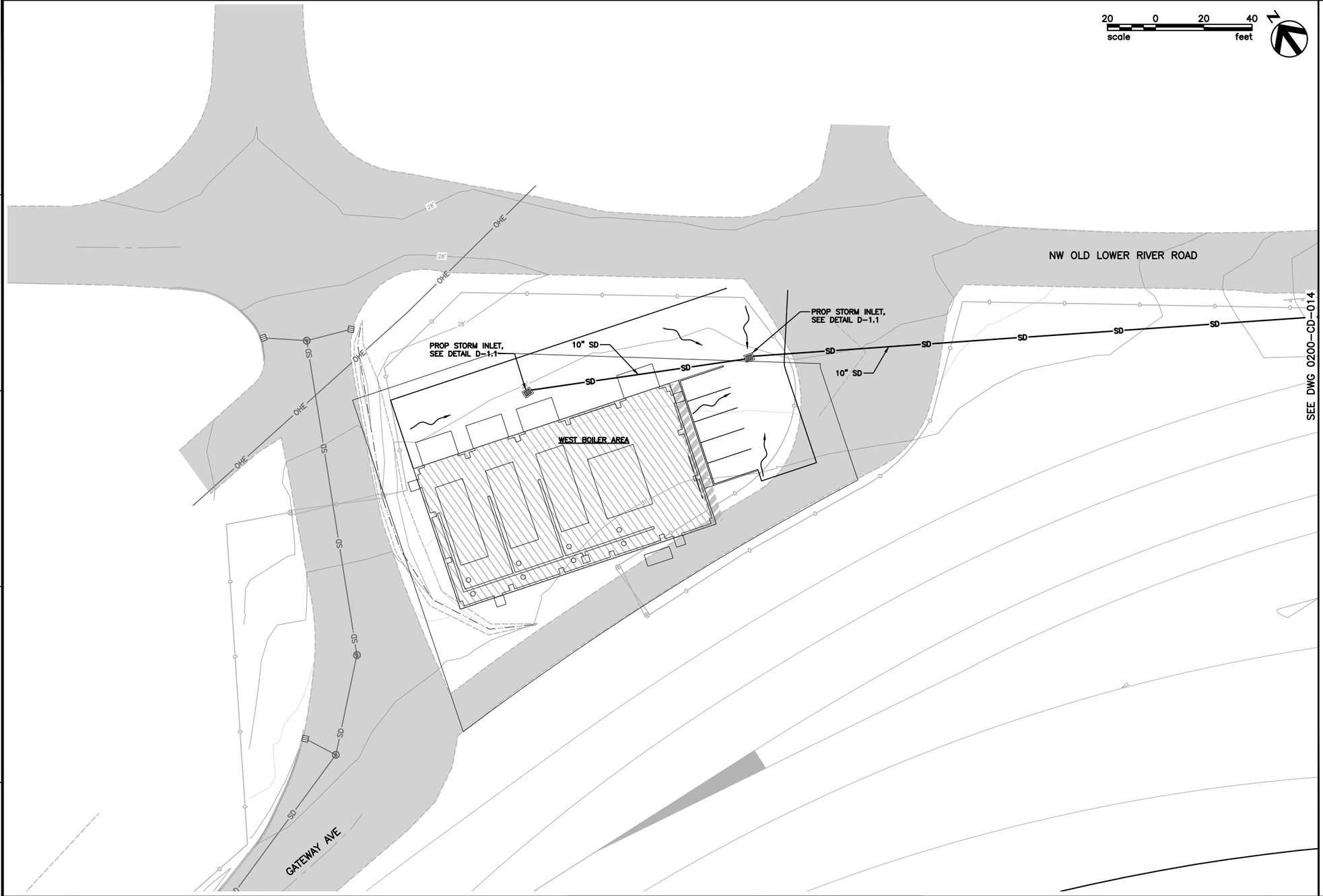
CUSTOMER: TESORO SAVAGE PETROLEUM TERMINAL LLC

PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: GRADING AND DRAINAGE PLAN – DOCK AREA

DESIGN:	DES	START DATE:	8/9/2013	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	8/20/2013	PROJECT MANAGER:	PM
CHECKED:	CHK	APPROVED:	APPR	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0400-CD-001	/	0



NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM TERMINAL LLC

PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: GRADING AND DRAINAGE PLAN – WEST BOILER AREA

DESIGN:	DES	START DATE:	8/9/2013	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	8/20/2013	PROJECT MANAGER:	PM
CHECKED:	CHK	APPROVED:	APPR	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0600-CD-001	/	0

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Attachment J
Port of Vancouver, West Vancouver Freight Access Project
Parcel 1A Drainage Study

BergerABAM

700 Northeast Multnomah Street, Suite 900, Portland, Oregon 97232-4189
503/872-4100 • 503/872-4101 Fax • www.abam.com

Memorandum

Date: June 10, 2010

Subject: Port of Vancouver – West Vancouver Freight Access Project
Parcel 1A Drainage Study

From: Shawn Ellis, PE

To: Kurt Reichelt, HDR
Scott Hale, HDR

Route to: Papor-09-121 File

As requested by the Port of Vancouver, we have completed a review of drainage options for the Port's Parcel 1A property. Our understanding for the Port's desired future use of Parcel 1A and the results of our analyses based on this understanding is summarized in this memorandum.

Future Parcel 1A Sub-Basins

The purpose of this study is to determine the feasibility of providing for future drainage facilities for Parcel 1A after it is divided into three sub-basins. Two of the sub-basins will be approximately 22 acres each, and will be developed for light industrial use by outside parties or Port tenants. The balance of the parcel (15 acres) will remain Port property, and be used for rail and other Port access and as a utility corridor along the north side of the existing and future track corridor.

According to Port staff, the two 22-acre parcels will each provide on-site water quality treatment for storm water runoff. Treated storm water will be conveyed by Port-owned conveyance facilities for discharge to the Columbia River via the Port's outfall. The runoff will bypass the Port's existing water quality treatment facility (the T4 Pond). The 15-acre parcel will be conveyed for treatment in the T4 Pond.

Hydrology and Hydraulics

We have completed preliminary analyses to determine peak flows for a 25-year rainfall event from the combined 22-acre parcels and the 15-acre parcel to determine the size of the systems necessary to convey peak flows. The Santa Barbara Unit Hydrograph (SBUH) method was used for the analyses. Calculations are attached to this memo, but are summarized below. The design storm is the 25-year rainfall depth of 3.5 inches. Times of concentration are based on 100 feet of

overland flow for each system, 100 feet of concentrated flow, and the balance as pipe flow. Peak flow from the two combined parcels is predicted to be 30.8 cfs. Peak flow from the 15-acre parcel is predicted to be 9.5 cfs.

Required pipe sizes for the above peak discharges are determined from likely maximum slope requirements for each system based on the elevations for each system connection location. The 44-acre parcels will require a 36-inch pipe with a minimum slope assume to be xxx. The 15-acre parcel will require a 24-inch pipe with a minimum slope of 2.3%.

SBUH Input	44-acre Parcels	15-acre Parcel
Area (acres)	44 acres	15 acres
Percent Impervious	100%	100%
Curve Number	98	98
25-year Design Event	3.5 inches	3.5 inches
Time of Concentration	98	27.2 minutes
Peak Flow	30.8 cfs	9.5 cfs
Pipe Size	36-inch	24-inch

Grade Requirements For T4 Pond By-pass Conveyance System

The following assumptions and existing conditions have been considered to evaluate the feasibility of extending a gravity conveyance system from the western 22-acre parcel to the manhole south of the T4 pond.

- The conveyance system will be connected to the manhole just south of the T4 pond, and it has an invert elevation of 11.00 feet for the 60-inch pipe proposed from the T4 pond. The existing 60-inch outlet pipe has an invert elevation of 10.50 feet.
- Matching crowns at this manhole would require an invert elevation of 13.00 feet for the 36-inch conveyance pipe from Parcel 1A.
- Approximately 3,650 linear feet of conveyance pipe will be required to convey the two 22-acre sites runoff to the discharge at the Port's manhole south of the T4 pond. Assuming a minimum slope of 0.2% results in a 7.3-foot grade drop to this manhole.
- Approximately 900 linear feet of pipe in the westernmost 22-acre site at a slope of 0.5% will require a 4½-foot grade drop within the site.

- Site elevation in the NW corner of Parcel 1A will be at least 29 feet, based on adjacent survey data.
- The invert elevation for the upstream end of the on-site conveyance system, could be as low as 24.80 feet given the above criteria. The site elevation in the NW corner of Parcel 1A is likely to be at least 29 feet, based on adjacent survey data from Gateway Road and SR 501. Therefore, a depth of 4.2 feet for this upstream point is possible.
- Shallower depth for the on-site system may be required if water quality treatment systems selected by parcel owners/tenants require a hydraulic head to function.

It is recommended that 36-inch conveyance system be constructed as deeply as possible in order to allow for the most flexibility for design of the on-site storm water systems.

Options for Crossing the Track Corridor

An existing 42-inch pipe currently crosses the track corridor, extending towards the T4 pond from an inlet and manhole at the southeast corner of Parcel 1A. Existing Project 6 (Terminal 3 Rail Access) plans show modifications to this pipe system to provide access from Parcel 1A to the T4 pond. This pipe can be used for either the 44-acre conveyance or the 15-acre conveyance, although conditions for each are not ideal (see option discussions below).

For whichever system the 42-inch pipe is used, we recommend that a second storm pipe be installed as part of Project 6 (or partially during Project 6 with completion as part of Project 11). The second pipe will be either for conveyance of the 44-acre parcel or the 15-acre parcel.

Options for providing conveyance for the parallel pipe systems are described below:

- *Existing 42-inch Pipe for 44-acre Conveyance.* The existing 42-inch pipe could be used for conveyance of the 44-acre parcel. However, the pipe does not provide the same upstream or downstream elevations listed in the Grade Requirements above. The downstream end of the pipe on the south side of the track corridor is at elevation 15.31 feet. Approximately 1270 feet of pipe would be required to extend the system to the manhole south of the T4 pond. At a slope of 0.2% the invert at the manhole would be 12.77 feet. This would function hydraulically, but would not allow for matching pipe crowns.

  If the existing 42-inch pipe is proposed for conveyance of the 44-acre sites, a second storm crossing (24-inch pipe) should be installed for conveyance of the 15-acre parcel. The Project 6 plans should be modified to complete the connection as part of the project 6 project, so that future modification to the system won't be necessary, and to ensure that the required configuration of the both systems can function in the limited space available near the northwest corner of the pond.

- *Existing* **42-inch Pipe for 15-acre Conveyance.** The current Project 6 plans provide for extension of the 42-inch to the T4 Pond. However, the existing pipe is below the pond water surface elevation of 16.65 feet, and is generally partially filled with water except when the pond's water surface drops due to evaporation during very dry periods. If the 15-acre parcel is used by this existing pipe, a second 36-inch storm crossing should be installed for the 44-acre parcel future conveyance.

Conveyance Calculations & Pipe Sizing

Project: West Vancouver Freight Access Project - Project 9
PAPOR-11-127
Date: 4/18/2011

Storm Drain A

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
Gateway Ave	MH P9-A1	238	2.030	0.9	1.83	1.83	6.5		6.5	2.31	4.22	18	0.0028	0.013	5.57	3.15	0.76
MH P9-A1	MH P9-A2	300	1.670	0.9	1.50	3.33		1.3	7.8	2.11	7.03	24	0.002	0.013	10.14	3.23	0.69
MH P9-A2	MH P9-A3	300	1.670	0.9	1.50	4.83		1.5	9.3	1.92	9.28	24	0.002	0.013	10.14	3.23	0.92
MH P9-A3	MH P9-A4	300	1.670	0.9	1.50	6.34		1.5	10.9	1.77	11.24	30	0.0015	0.013	15.92	3.24	0.71
MH P9-A4	MH P9-A5	300	1.670	0.9	1.50	7.84		1.5	12.4	1.66	12.99	30	0.0015	0.013	15.92	3.24	0.82
MH P9-A1	MH P9-A6	300	1.670	0.9	1.50	9.34		1.5	13.9	1.56	14.58	30	0.0015	0.013	15.92	3.24	0.92
MH P9-A5	MH P9-A7	300	1.670	0.9	1.50	10.85		1.5	15.5	1.48	16.03	36	0.0012	0.013	23.16	3.28	0.69
MH P9-A1	MH P9-A8	300	1.670	0.9	1.50	12.35		1.5	17.0	1.41	17.39	36	0.0012	0.013	23.16	3.28	0.75
MH P9-A1	MH P9-A9	241	1.670	0.9	1.50	13.85		1.5	18.5	1.35	18.66	36	0.0012	0.013	23.16	3.28	0.81
MH P9-A9	Exisiting MH	358	1.670	0.9	1.50	15.35		1.2	19.8	1.30	20.02	36	0.0012	0.013	23.16	3.28	0.86
		Total Area	17.06														

Storm Drain B

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
Farwest	MH P9-B1	5	22.000	0.9	19.80	19.80	98.0		98.0	0.57	11.32	30	0.0015	0.013	15.92	3.24	0.71
MH P9-B1	MH P9-B2	203	0.000	0.9	0.00	19.80		0.0	98.0	0.57	11.31	30	0.002	0.013	18.38	3.75	0.62
MH P9-B2	MH P9-B3	300	5.250	0.9	4.73	24.53		0.9	98.9	0.57	13.95	36	0.002	0.013	29.89	4.23	0.47
MH P9-B3	MH P9-B4	254	5.250	0.9	4.73	29.25		1.2	100.1	0.57	16.53	36	0.0015	0.013	25.89	3.66	0.64
MH P9-B4	MH P9-B5	279	5.250	0.9	4.73	33.98		1.2	101.3	0.56	19.09	42	0.0015	0.013	39.05	4.06	0.49
MH P9-B5	MH P9-B6	279	5.250	0.9	4.73	38.70		1.1	102.4	0.56	21.62	42	0.0015	0.013	39.05	4.06	0.55
MH P9-B6	Existing MH	50	1.000	0.9	0.90	39.60		1.1	103.6	0.56	22.00	42	0.0012	0.013	34.93	3.63	0.63
		Total Area	44.00														

Intensity (I)
From the WSDOT Hydraulics Manual, $I = m/Tc^n$
where m = 6.06 and n = 0.515 for the 25-year return period

Gateway Avenue Contribution to Storm Drain A taken from Project 19 calculations.
Farwest Steel contribution to Storm Drain B taken from Farwest Steel calculations.

Conveyance Calculations & Pipe Sizing

Project: West Vancouver Freight Access Project - Gateway Avenue Grade Separation
PAPOR-11-127
Date: 4/18/2011

Gateway Avenue From Lower River Road to MH-13

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I* (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-15	MH-14	294	0.180	0.9	0.16	0.16	5.0		5.0	2.65	0.43	12	0.005	0.013	2.52	3.22	0.17
MH-14	MH-13	109	0.295	0.9	0.27	0.43		1.5	6.5	2.31	0.99	12	0.005	0.013	2.52	3.22	0.39
		Total Area	0.48														

Gateway Avenue From High Point at Station G22+48.47 to MH-13

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-7	MH-8	125	0.390	0.9	0.35	0.35	5.0		5.0	2.65	0.93	12	0.0534	0.013	8.25	10.51	0.11
MH-8	MH-9	170	0.000	0.9	0.00	0.35		0.2	5.2	2.59	0.91	12	0.0537	0.013	8.27	10.54	0.11
MH-9	MH-10	134	0.374	0.9	0.34	0.69		0.3	5.5	2.53	1.74	12	0.0446	0.013	7.54	9.60	0.23
MH-10	MH-11	122	0.000	0.9	0.00	0.69		0.2	5.7	2.47	1.70	12	0.019	0.013	4.92	6.27	0.35
MH-11	MH-12	53	0.386	0.9	0.35	1.04		0.3	6.0	2.40	2.49	12	0.0049	0.013	2.50	3.19	0.99
MH-12	MH-13	101	0.262	0.9	0.24	1.27		0.3	6.0	2.40	3.05	15	0.005	0.013	4.58	3.73	0.67
		Total Area	1.41														

Gateway Avenue From MH-13 to Discharge to Conveyance at Parcel 1A Tract

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-13	Parcel 1A	238	0.141	0.9	0.13	1.83	6.5		6.5	2.31	4.21	18	0.0028	0.013	5.57	3.15	0.76
		Total Area	2.03	Includes areas from two tables above													

Gateway Avenue From High Point at Station G22+48.47 to discharge into the Terminal 5 System

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I* (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-6	MH-5	93	0.512	0.9	0.46	0.46	5.0		5.0	2.65	1.22	12	0.0322	0.013	6.40	8.16	0.19
MH-5	MH-4	260	0.215	0.9	0.19	0.65		0.2	5.2	2.60	1.70	12	0.0396	0.013	7.10	9.05	0.24
MH-4	MH-3	285	0.363	0.9	0.33	0.98		0.5	5.7	2.48	2.43	12	0.0391	0.013	7.06	8.99	0.34
MH-3	MH-2	119	0.319	0.9	0.29	1.27		0.5	6.2	2.37	3.00	12	0.0172	0.013	4.68	5.96	0.64
MH-2	MH-1	69	0.440	0.9	0.40	1.66		0.3	6.5	2.31	3.84	15	0.0077	0.013	5.68	4.63	0.68
MH-1	T5		0.132	0.9	0.12	1.78		0.2	6.8	2.26	4.03	15	0.005	0.013	4.58	3.73	0.88
		Total Area	1.98														

* Intensity (I)
From the WSDOT Hydraulics Manual, $I = m/Tc^n$
where m = 6.06 and n = 0.515 for the 25-year return period

Attachment K
Port of Vancouver Municipal Phase II General Stormwater Permit

Issuance Date: August 1, 2012
Effective Date: August 1, 2013
Expiration Date: July 31, 2018

Western Washington Phase II Municipal Stormwater Permit

National Pollutant Discharge Elimination System and
State Waste Discharge General Permit
for discharges from Small Municipal Separate Storm Sewers
in Western Washington

State of Washington
Department of Ecology
Olympia, Washington 98504-7600

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

Until this permit expires, is modified, or revoked, Permittees that have properly obtained coverage under this permit are authorized to discharge to waters of the state in accordance with the special and general conditions which follow.

Kelly Susewind, P.E., P.G.
Water Quality Program Manager
Department of Ecology

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TABLE OF CONTENTS

SPECIAL AND GENERAL CONDITIONS

APPENDICES

SPECIAL CONDITIONS

S1. PERMIT COVERAGE AREA AND PERMITTEES

A. Geographic Area of Permit Coverage

This Permit is applicable to owners or operators of regulated small municipal separate storm sewer systems (MS4s) located west of the eastern boundaries of the following counties: Whatcom, Skagit, Snohomish, King, Pierce, Lewis and Skamania.

1. For all cities required to obtain coverage under this permit, the geographic area of coverage is the entire incorporated area of the city.

2. For all counties required to have coverage under this Permit, the geographic area of coverage is the urbanized areas and urban growth areas associated with permitted cities under the jurisdictional control of the county. The geographic area of coverage also includes any urban growth area contiguous to permitted urbanized areas under the jurisdictional control of the county.

   For Whatcom County, the geographic area of coverage also includes the unincorporated Birch Bay urban growth area.

3. For Secondary Permittees required to obtain coverage under this permit, the minimum geographic area of coverage is all areas identified under S1.A.1 and S1.A.2. At the time of permit coverage, Ecology may establish a geographic area of coverage specific to an individual Secondary Permittee.

4. All regulated small MS4s owned or operated by the Permittees named in S1.D.2.a(i) and (ii),and S1.D.2.b and located in another city or county area requiring coverage under this permit or the *Phase I Municipal Stormwater Permit* or the *Eastern Washington Phase II Municipal Stormwater Permit* are also covered under this permit.

B. Regulated Small Municipal Separate Storm Sewer Systems (MS4s)

All operators of regulated small MS4s are required to apply for and obtain coverage under this Permit or be permitted under a separate individual permit, unless waived or exempted in accordance with condition S1.C.

1. A regulated small MS4:

   a. Is a "Small MS4" as defined in the *Definitions and Acronyms* section at the end of this Permit; and

   b. Is located within, or partially located within, an urbanized area as defined by the latest decennial census conducted by the U.S. Bureau of Census, or designated by Ecology pursuant to 40 CFR 123.35(b) or 40 CFR 122.26(f); and

c. Discharges stormwater from the MS4 to a surface water of Washington State; and

d. Is not eligible for a waiver or exemption under S1.C. below.

2. All other operators of MS4s, including special purpose districts, which meet the criteria for a regulated small MS4 shall obtain coverage under this Permit. Other operators of small MS4s may include, but are not limited to: flood control, or diking and drainage districts, schools including universities, and correctional facilities that own or operate a small MS4 serving non-agricultural land uses.

3. Any other operators of small MS4s may be required by Ecology to obtain coverage under this permit or an alternative NPDES permit if Ecology determines the small MS4 is a significant source of pollution to surface waters of the state. Notification of Ecology's determination that permit coverage is required will be through the issuance of an Administrative Order issued in accordance with RCW 90.48.

4. The owner or operator of a regulated small MS4 may obtain coverage under this Permit as a Permittee, Co-permittee, or Secondary Permittee as defined in S1.D.1. below.

5. Pursuant to 40 CFR 122.26(f), any person or organization may petition Ecology to require that additional small MS4s obtain coverage under this Permit. The process for petitioning Ecology is:

   a. The person or organization shall submit a complete petition in writing to Ecology. A complete petition shall address each of the relevant factors for petitions outlined on Ecology's website.

   b. In making its determination on the petition, Ecology may request additional information from either the petitioner or the entity that is the subject of the petition.

   c. Ecology will make a final determination on a complete petition within 180 days of receipt of the petition and inform both the petitioner and the MS4 of the decision, in writing.

   d. If Ecology's final determination is that the candidate MS4 will be regulated, Ecology will issue an order to the operator of the MS4 requiring them to obtain coverage under this Permit. The order will specify:

      i. The geographic area of permit coverage for the MS4;

      ii. Any modified dates or deadlines for developing and implementing this Permit, as appropriate to the MS4, and for submitting their first annual report; and

iii. A deadline for the operator of the MS4 to submit a complete Notice of Intent (see Appendix 5) to Ecology.

C. Owners and operators of an otherwise regulated small MS4 are not required to obtain coverage under this Permit if:

1. The small MS4 is operated by:

a. A federal entity, including any department, agency or instrumentality of the executive, legislative, and judicial branches of the Federal government of the United States.

b. Federally recognized Indian Tribes located within Indian Country, including all trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians; or

c. The Washington State Department of Transportation.

or:

2. The portions of the small MS4 located within the census defined urban area(s) serve a total population of less than 1000 people and a, b, and c, below all apply:

a. The small MS4 is not contributing substantially to the pollutant loadings of a physically interconnected MS4 that is regulated by the NPDES stormwater program.

b. The discharge of pollutants from the small MS4 has not been identified as a cause of impairment of any water body to which the MS4 discharges.

c. In areas where an EPA approved TMDL has been completed, stormwater controls on the MS4 have not been identified as being necessary.

In determining the total population served, both resident and commuter populations shall be included. For example:

- For publicly operated school complexes including universities and colleges the total population served would include the sum of the average annual student enrollment plus staff.

- For flood control, diking, and drainage districts the total population served would include residential population and any non-residents regularly employed in the areas served by the small MS4.

D. Obtaining coverage under this Permit

All operators of regulated small MS4s are required to apply for and obtain coverage in accordance with this section, unless waived or exempted in accordance with section S1.C.

1. Unless otherwise noted, the term "Permittee" shall include a city, town or county Permittee, New Permittee, Co-Permittee, Secondary Permittee, and New Secondary Permittee as defined below:

    a. "Permittee" is a city, town, or county owning or operating a regulated small MS4 applying and receiving a permit as a single entity.

    b. "New Permittee" is a city, town or county that is subject to the *Western Washington Phase II Municipal Stormwater General Permit* and was not subject to the permit prior to August 1, 2013.

    c. "Co-Permittee" is any owner or operator of a regulated small MS4 that is applying in a cooperative agreement with at least one other applicant for coverage under this Permit. Co-Permittees own or operate a regulated small MS4 located within or in proximity to another regulated small MS4.

    d. A "Secondary Permittee" is an operator of a regulated small MS4 that is not a city, town or county. Secondary Permittees include special purpose districts and other MS4s that meet the criteria for a regulated small MS4 in S1.B. above.

    e. "New Secondary Permittee" is a Secondary Permittee that is covered under a municipal stormwater general permit and was not covered by the permit prior to August 1, 2013.

2. Operators of regulated small MS4s have submitted or shall submit to Ecology either a *Notice of Intent (NOI) for Coverage under National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit* provided in Appendix 5 or a *Duty to Reapply - NOI.*

    a. The following Permittees and Secondary Permittees submitted a *Duty to Reapply - NOI* to Ecology prior to August 19, 2011:

        i. Cities and towns: Aberdeen, Algona, Anacortes, Arlington, Auburn, Bainbridge Island, Battle Ground, Bellevue, Bellingham, Black Diamond, Bonney Lake, Bothell, Bremerton, Brier, Buckley, Burien, Burlington, Camas, Centralia, Clyde Hill, Covington, Des Moines, DuPont, Duvall, Edgewood, Edmonds, Enumclaw, Everett, Federal Way, Ferndale, Fife, Fircrest, Gig Harbor, Granite Falls, Issaquah, Kelso, Kenmore, Kent, Kirkland, Lacey, Lake Forest Park, Lake Stevens, Lakewood, Longview, Lynnwood, Maple Valley, Marysville, Medina, Mercer Island, Mill Creek, Milton, Monroe, Mountlake Terrace, Mount Vernon, Mukilteo, Newcastle, Normandy Park, Oak Harbor, Olympia, Orting, Pacific, Port Orchard, Port Angeles, Poulsbo, Puyallup, Redmond, Renton, Sammamish, SeaTac, Sedro-Woolley, Shoreline, Snohomish, Steilacoom, Sumner, Tukwila, Tumwater, University Place, Vancouver, Washougal, and Woodinville.

ii. Counties: Cowlitz, Kitsap, Thurston, Skagit, and Whatcom.

iii. Secondary Permittees: Bainbridge Island School District #303, Bellingham School District, Bellingham Technical College, Cascadia College, Central Kitsap School District, Centralia College, Clark College, Consolidated Diking Improvement District #1 of Cowlitz County, Edmonds Community College, Evergreen College, Highline Community College, Kelso School District, Kent School District, Longview School District, Lower Columbia College, Port of Anacortes, Port of Bellingham, Port of Olympia, Port of Skagit County, Port of Vancouver, Skagit County Drainage District #19, Skagit Valley College, University of Washington Bothell, Washington State University Vancouver, Washington State General Administration (Capitol Campus), Washington Department of Corrections, Western Washington University, and Whatcom Community College.

b. Operators of regulated small MS4s have submitted or shall submit to Ecology a *Notice of Intent (NOI) for Coverage under National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit* provided in Appendix 5 before the effective date of this permit, with the following exceptions:

i. Operators of regulated small MS4s located in the Cities of Lynden and Snoqualmie shall submit a NOI or application to Ecology no later than 30 days after the effective date of this permit.

ii. Operators of regulated small MS4s listed in S1.D.2.a do not need to submit a new application to be covered under this permit.

c. For operators of regulated small MS4s listed in S1.D.2.a, coverage under this permit is automatic and begins on the effective date of this permit, unless the operator chooses to opt out of this General Permit. Any operator of a regulated small MS4 that is opting out of this permit shall submit an application for an individual MS4 permit in accordance with 40 CFR 122.33(b)(2)(ii) no later than the effective date of this permit.

d. Operators of regulated small MS4s which want to be covered under this permit as Co-Permittees shall each submit a NOI to Ecology.

e. Operators of regulated small MS4s which are relying on another entity to satisfy all of their permit obligations shall submit a NOI to Ecology.

f. Operators of small MS4s designated by Ecology pursuant to S1.B.3 of this permit shall submit a NOI to Ecology within 120 days of receiving notification from Ecology that permit coverage is required.

3. Application Requirements

a. For NOIs submitted after the issuance date of this Permit, the applicant shall include a certification that the public notification requirements of WAC 173-226-130(5) have been satisfied. Ecology will notify applicants in writing of their status concerning coverage under this Permit within 90 days of Ecology's receipt of a complete NOI.

b. Each Permittee applying as a Co-Permittee shall submit a NOI provided in Appendix 5. The joint NOI shall clearly identify the areas of the MS4 for which the Co-Permittee is responsible.

c. Permittees relying on another entity or entities to satisfy one or more of their permit obligations shall notify Ecology in writing. The notification shall include a summary of the permit obligations that will be carried out by another entity. The summary shall identify the other entity or entities and shall be signed by the other entity or entities. During the term of the permit, permittees may terminate or amend shared responsibility arrangements by notifying Ecology, provided this does not alter implementation deadlines.

d. Secondary Permittees required to obtain coverage under this Permit, and the *Phase I Municipal Stormwater Permit* or the *Eastern Washington Phase II Municipal Stormwater Permit* may obtain coverage by submitting a single NOI.

S2. AUTHORIZED DISCHARGES

A. This Permit authorizes the discharge of stormwater to surface waters and to ground waters of the state from MS4s owned or operated by each Permittee covered under this permit, in the geographic area covered pursuant to S1.A. These discharges are subject to the following limitations:

1. Discharges to ground waters of the state through facilities regulated under the Underground Injection Control (UIC) program, chapter 173-218 WAC, are not authorized under this Permit.

2. Discharges to ground waters not subject to regulation under the federal Clean Water Act are authorized in this permit only under state authorities, chapter 90.48 RCW, the Water Pollution Control Act.

B. This Permit authorizes discharges of non-stormwater flows to surface waters and to ground waters of the state from MS4s owned or operated by each Permittee covered under this permit, in the geographic area covered pursuant to S1.A, only under one or more of the following conditions:

1. The discharge is authorized by a separate NPDES or State Waste Discharge permit.

2. The discharge is from emergency fire fighting activities.

3. The discharge is from another illicit or non-stormwater discharge that is managed by the Permittee as provided in Special Condition S5.C.3 or S6.C.3.

These discharges are also subject to the limitations in S2.A.1 and S.2.A.2 above.

C. This Permit does not relieve entities that cause illicit discharges, including spills of oil or hazardous substances, from responsibilities and liabilities under state and federal laws and regulations pertaining to those discharges.

D. Discharges from MS4s constructed after the effective date of this permit shall receive all applicable state and local permits and use authorizations, including compliance with chapter 43.21C RCW (the State Environmental Policy Act).

E. This Permit does not authorize discharges of stormwater to waters within Indian Country or to waters subject to water quality standards of Indian Tribes, including portions of the Puyallup River and other waters on trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians Reservation, except where authority has been specifically delegated to Ecology by the U.S. Environmental Protection Agency. The exclusion of such discharges from this Permit does not waive any rights the State may have with respect to the regulation of the discharges.

S3. RESPONSIBILITIES OF PERMITTEES

A. Each Permittee covered under this Permit is responsible for compliance with the terms of this Permit for the regulated small MS4s that they own or operate. Compliance with (1) or (2) below is required as applicable to each Permittee, whether the Permittee has applied for coverage as a Permittee, Co-Permittee, or Secondary Permittee.

1. All city, town and county Permittees are required to comply with all conditions of this Permit, including any appendices referenced therein, except for Special Condition S6 Stormwater Management Program for Secondary Permittees.

2. All Secondary Permittees are required to comply with all conditions of this Permit, including any appendices referenced therein, except for section S5 Stormwater Management Program for Cities, Towns and Counties and S8.B, S8.C, and S8.D Monitoring.

B. Permittees may rely on another entity to satisfy one or more of the requirements of this Permit. Permittees that are relying on another entity to satisfy one or more of their permit obligations remain responsible for permit compliance if the other entity fails to implement permit conditions. Permittees may rely on another entity provided all the requirements of 40 CFR 122.35(a) are satisfied, including but not limited to:

1. The other entity, in fact, implements the Permit requirements.

2. The other entity agrees to take on responsibility for implementation of the Permit requirement(s) as indicated on the NOI.

S4. COMPLIANCE WITH STANDARDS

A. In accordance with RCW 90.48.520, the discharge of toxicants to waters of the state of Washington which would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria is prohibited. The required response to such discharges is defined in section S4.F, below.

B. This Permit does not authorize a discharge which would be a violation of Washington State Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Quality Standards (chapter 173-200 WAC), Sediment Management Standards (chapter 173-204 WAC), or human health-based criteria in the national Toxics Rule (Federal Register, Vol. 57, NO. 246, Dec. 22, 1992, pages 60848-60923). The required response to such discharges is defined in section S4.F, below.

C. The Permittee shall reduce the discharge of pollutants to the maximum extent practicable (MEP).

D. The Permittee shall use all known, available, and reasonable methods of prevention, control and treatment (AKART) to prevent and control pollution of waters of the state of Washington.

E. In order to meet the goals of the Clean Water Act, and comply with S4.A , S4.B, S4.C, and S4.D each Permittee shall comply with all of the applicable requirements of this Permit as identified in S3 Responsibilities of Permittees.

F. A Permittee remains in compliance with S4 despite any discharges prohibited by S4.A or S4.B, when the Permittee undertakes the following response toward long-term water quality improvement:

1. A Permittee shall notify Ecology in writing within 30 days of becoming aware, based on credible site-specific information that a discharge from the MS4 owned or operated by the Permittee is causing or contributing to a known or likely violation of Water Quality Standards in the receiving water. Written notification provided under this subsection shall, at a minimum, identify the source of the site-specific information, describe the nature and extent of the known or likely violation in the receiving water, and explain the reasons why the MS4 discharge is believed to be causing or contributing to the problem. For ongoing or continuing violations, a single written notification to Ecology will fulfill this requirement.

2. In the event that Ecology determines, based on a notification provided under S4.F.1 or through any other means, that a discharge from an MS4 owned or operated by the Permittee is causing or contributing to a violation of Water Quality Standards in a receiving water, Ecology will notify the Permittee in writing that an adaptive management response outlined in S4.F.3 below is required, unless:

a. Ecology also determines that the violation of Water Quality Standards is already being addressed by a Total Maximum Daily Load (TMDL) or other enforceable water quality cleanup plan; or

b. Ecology concludes the MS4 contribution to the violation will be eliminated through implementation of other permit requirements.

3. Adaptive Management Response

a. Within 60 days of receiving a notification under S4.F.2, or by an alternative date established by Ecology, the Permittee shall review its Stormwater Management Program (SWMP) and submit a report to Ecology. The report shall include:

i. A description of the operational and/or structural BMPs that are currently being implemented to prevent or reduce any pollutants that are causing or contributing to the violation of Water Quality Standards, including a qualitative assessment of the effectiveness of each best management practice (BMP).

ii. A description of potential additional operational and/or structural BMPs that will or may be implemented in order to apply AKART on a site-specific basis to prevent or reduce any pollutants that are causing or contributing to the violation of Water Quality Standards.

iii. A description of the potential monitoring or other assessment and evaluation efforts that will or may be implemented to monitor, assess, or evaluate the effectiveness of the additional BMPs.

iv. A schedule for implementing the additional BMPs including, as appropriate: funding, training, purchasing, construction, monitoring, and other assessment and evaluation components of implementation.

b. Ecology will, in writing, acknowledge receipt of the report within a reasonable time and notify the Permittee when it expects to complete its review of the report. Ecology will either approve the additional BMPs and implementation schedule or require the Permittee to modify the report as needed to meet AKART on a site-specific basis. If modifications are required, Ecology will specify a reasonable time frame in which the Permittee shall submit and Ecology will review the revised report.

c. The Permittee shall implement the additional BMPs, pursuant to the schedule approved by Ecology, beginning immediately upon receipt of written notification of approval.

d. The Permittee shall include with each subsequent annual report a summary of the status of implementation and the results of any monitoring, assessment or evaluation efforts conducted during the reporting period. If, based on the information provided under this subsection, Ecology determines that modification of the BMPs or implementation schedule is

necessary to meet AKART on a site-specific basis, the Permittee shall make such modifications as Ecology directs. In the event there are ongoing violations of water quality standards despite the implementation of the BMP approach of this section, the Permittee may be subject to compliance schedules to eliminate the violation under WAC 173-201A-510(4) and WAC 173-226-180 or other enforcement orders as Ecology deems appropriate during the term of this permit.

e. A TMDL or other enforceable water quality cleanup plan that has been approved and is being implemented to address the MS4's contribution to the Water Quality Standards violation supersedes and terminates the S4.F.3 implementation plan.

f. Provided the Permittee is implementing the approved adaptive management response under this section, the Permittee remains in compliance with Condition S4, despite any on-going violations of Water Quality Standards identified under S4.A or B above.

g. The adaptive management process provided under Section S.4.F is not intended to create a shield for the Permittee from any liability it may face under 42 U.S.C. 9601 *et seq.* or chapter 70.105D RCW.

G. Ecology may modify or revoke and reissue this General Permit in accordance with G14 General Permit Modification and Revocation, if Ecology becomes aware of additional control measures, management practices or other actions beyond what is required in this Permit that are necessary to:

1. Reduce the discharge of pollutants to the MEP,

2. Comply with the state AKART requirements, or

3. Control the discharge of toxicants to waters of the State of Washington.

S5. STORMWATER MANAGEMENT PROGRAM FOR CITIES, TOWNS AND COUNTIES

A. Each Permittee shall develop and implement a Stormwater Management Program SWMP. A SWMP is a set of actions and activities comprising the components listed in S5 and any additional actions necessary, to meet the requirements of applicable TMDLs pursuant to S7 *Compliance with TMDL Requirements*, and S8 *Monitoring and Assessment*. This section applies to all cities, towns and counties covered under this Permit, including cities, towns and counties that are Co-permittees. Where the term "Permittee" is used in this section the requirements apply to all cities, towns and counties covered under this Permit.

New Permittees subject to this permit as described in S1.D.1.b shall fully meet the requirements in S5 as modified in footnotes below, or as specified in an alternate schedule as a condition of coverage by Ecology. Permittees obtaining coverage after

the issuance date of this permit shall fully meet the requirements in S5 as specified in an alternate schedule as a condition of coverage by Ecology.

1. At a minimum the Permittee's SWMP shall be implemented throughout the geographic area subject to this Permit as described in S1.A.[1]

2. Each Permittee shall prepare written documentation of the SWMP, called the SWMP Plan. The SWMP Plan shall be organized according to the program components in S5.C or a format approved by Ecology, and shall be updated at least annually for submittal with the Permittee's annual reports to Ecology (see S9 Reporting and Record Keeping). The SWMP Plan shall be written to inform the public of the planned SWMP activities for the upcoming calendar year, and shall include a description of:

    a. Planned activities for each of the program components included in S5.C.

    b. Any additional planned actions to meet the requirements of applicable TMDLs pursuant to S7 Compliance with Total Maximum Daily Load Requirements.

    c. Any additional planned actions to meet the requirements of S8 Monitoring.

3. The SWMP shall include an ongoing program for gathering, tracking, maintaining, and using information to evaluate SWMP development, implementation and permit compliance and to set priorities.

    a. Each Permittee shall track the cost or estimated cost of development and implementation of each component of the SWMP.[2] This information shall be provided to Ecology upon request.

    b. Each Permittee shall track the number of inspections, official enforcement actions and types of public education activities as required by the respective program component. This information shall be included in the annual report.

4. Permittees shall continue implementation of existing stormwater management programs until they begin implementation of the updated stormwater management program in accordance with the terms of this permit, including implementation schedules.

5. Coordination among Permittees

[1] New Permittees shall fully develop and implement the SWMP in accordance with the schedules contained in this section no later than February 2, 2018.

[2] New Permittees shall begin implementing the requirements of S5.A.3.a no later than August 1, 2015.

a. Coordination among entities covered under municipal stormwater NPDES permits may be necessary to comply with certain conditions of the SWMP. The SWMP should include, when needed, coordination mechanisms among entities covered under a municipal stormwater NPDES permit to encourage coordinated stormwater-related policies, programs and projects within adjoining or shared areas, including:

i. Coordination mechanisms clarifying roles and responsibilities for the control of pollutants between physically interconnected MS4s covered by a municipal stormwater permit.

ii. Coordinating stormwater management activities for shared water bodies among Permittees to avoid conflicting plans, policies and regulations.

b. The SWMP shall include coordination mechanisms among departments within each jurisdiction to eliminate barriers to compliance with the terms of this permit. Permittees shall include a written description of internal coordination mechanisms in the Annual Report due no later than March 31, 2015.

B. The SWMP shall be designed to reduce the discharge of pollutants from regulated small MS4s to the MEP, meet state AKART requirements, and protect water quality.

C. The SWMP shall include the components listed below. To the extent allowable under state or federal law, all components are mandatory for city, town or county Permittees covered under this permit.

1. Public Education and Outreach

The SWMP shall include an education and outreach program designed to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts and encourage the public to participate in stewardship activities. The education program may be developed and implemented locally or regionally.

The minimum performance measures are:

a. Each Permittee shall provide an education and outreach program for the area served by the MS4. The program shall be designed to educate target audiences about the stormwater problem and provide specific actions they can follow to minimize the problem.[3]

i. To build general awareness, Permittees shall select from the following target audiences and subject areas:

[3] New Permittees shall begin implementing the requirements of S5.C.1 no later than August 1, 2015.

(a) General public (including school age children), and businesses (including home-based and mobile businesses)

- General impacts of stormwater on surface waters.
- Impacts from impervious surfaces.
- Impacts of illicit discharges and how to report them.
- Low impact development (LID) principles and LID BMPs.
- Opportunities to become involved in stewardship activities.

(b) Engineers, contractors, developers and land use planners

- Technical standards for stormwater site and erosion control plans.
- LID principles and LID BMPs.
- Stormwater treatment and flow control BMPs/facilities.

ii. To effect behavior change, Permittees shall select from the following target audiences and BMPs:

(a) General public (which may include school age children), businesses (including home-based and mobile businesses)

- Use and storage of automotive chemicals, hazardous cleaning supplies, carwash soaps and other hazardous materials.
- Equipment maintenance.
- Prevention of illicit discharges.

(b) Residents, landscapers and property managers/owners

- Yard care techniques protective of water quality.
- Use and storage of pesticides and fertilizers and other household chemicals.
- Carpet cleaning and auto repair and maintenance.
- Vehicle, equipment and home/building maintenance.

- Pet waste management and disposal.
- LID principles and LID BMPs.
- Stormwater facility maintenance.
- Dumpster and trash compactor maintenance.

b. Each Permittee shall create stewardship opportunities and/or partner with existing organizations to encourage residents to participate in activities such as stream teams, storm drain marking, volunteer monitoring, riparian plantings and education activities.

c. Each Permittee shall measure the understanding and adoption of the targeted behaviors for at least one target audience in at least one subject area. No later than February 2, 2016, Permittees shall use the resulting measurements to direct education and outreach resources most effectively, as well as to evaluate changes in adoption of the targeted behaviors.[4] Permittees may meet this requirement individually or as a member of a regional group.

2. Public Involvement and Participation

Permittees shall provide ongoing opportunities for public involvement and participation through advisory councils, public hearings, watershed committees, participation in developing rate-structures or other similar activities. Each Permittee shall comply with applicable state and local public notice requirements when developing elements of the SWMP.

The minimum performance measures are:

a. Permittees shall create opportunities for the public to participate in the decision-making processes involving the development, implementation and update of the Permittee's SWMP.[5]

b. Each Permittee shall post on their website their SWMP Plan and the annual report required under S9.A no later than May 31 each year. All other submittals shall be available to the public upon request. To comply with the posting requirement, a Permittee that does not maintain a website may submit the updated SWMP in electronic format to Ecology for posting on Ecology's website.

[4] By no later than August 1, 2017, New Permittees shall begin using the results of measuresments to direct education and outreach resources more effectively, as well as to evaluate changes in adopted behaviors.

[5] New Permittees shall develop and begin to implement requirements of S5.C.2.a no later than August 1, 2014.

3. Illicit Discharge Detection and Elimination

The SWMP shall include an ongoing program designed to prevent, detect, characterize, trace and eliminate illicit connections and illicit discharges into the MS4.

The minimum performance measures are:

a. Mapping of the MS4 shall continue on an ongoing basis.[6] MS4 maps shall be periodically updated. At a minimum, maps shall include the following information:

i. Known MS4 outfalls.

ii. Receiving waters, other than ground water.

iii. Stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee.

iv. Tributary conveyances to all known outfalls with a 24 inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems. The following attributes shall be mapped:

- Tributary conveyance type, material, and size where known.
- Associated drainage areas.
- Land use.

v. All connections to the MS4 authorized or allowed by the Permittee after February 16, 2007.[7]

vi. Geographic areas served by the Permittee's MS4 that do not discharge stormwater to surface waters.

vii. To the extent consistent with national security laws and directives, each Permittee shall make available to Ecology upon request, MS4 map(s) depicting the information required in S5.C.3.a.i through vi above. The preferred format for mapping will be an electronic format with fully described mapping standards. An example description is available on Ecology website.

viii. Upon request, and to the extent appropriate, Permittees shall provide mapping information to federally-recognized Indian Tribes, municipalities, and other Permittees. This permit does not preclude

[6] New Permittees shall meet the requirements to map the MS4 according to S5.C.3.a no later than August 1, 2017, except where otherwise noted in this section.

[7] New Permittees shall meet the requirements of S5.C.3.a.v. after August 1, 2013 for all connections to the MS4 authorized after August 1, 2013.

Permittees from recovering reasonable costs associated with fulfilling mapping information requests by federally-recognized Indian Tribes, municipalities, and other Permittees.

b. Each Permittee shall implement an ordinance or other regulatory mechanism to effectively prohibit non-stormwater, illicit discharges into the Permittee's MS4 to the maximum extent allowable under state and federal law.[8]

i. Allowable Discharges: The regulatory mechanism does not need to prohibit the following categories of non-stormwater discharges:

- Diverted stream flows
- Rising ground waters
- Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20))
- Uncontaminated pumped ground water
- Foundation drains
- Air conditioning condensation
- Irrigation water from agricultural sources that is commingled with urban stormwater
- Springs
- Uncontaminated water from crawl space pumps
- Footing drains
- Flows from riparian habitats and wetlands
- Non-stormwater discharges authorized by another NPDES or state waste discharge permit
- Discharges from emergency fire fighting activities in accordance with S2 Authorized Discharges

ii. Conditionally Allowable Discharges: The regulatory mechanism may allow the following categories of non-stormwater discharges only if the stated conditions are met:

- Discharges from potable water sources, including but not limited to water line flushing, hyperchlorinated water line

[8] New Permittees shall meet the requirements of S5.C.3.b no later than February 2, 2016.

flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted, if necessary, and volumetrically and velocity controlled to prevent re-suspension of sediments in the MS4.

- Discharges from lawn watering and other irrigation runoff. These discharges shall be minimized through, at a minimum, public education activities (see section S5.C.1) and water conservation efforts.

- Dechlorinated swimming pool, spa and hot tub discharges. The discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted and reoxygenized if necessary, volumetrically and velocity controlled to prevent re-suspension of sediments in the MS4. Discharges shall be thermally controlled to prevent an increase in temperature of the receiving water. Swimming pool cleaning wastewater and filter backwash shall not be discharged to the MS4.

- Street and sidewalk wash water, water used to control dust, and routine external building washdown that does not use detergents. The Permittee shall reduce these discharges through, at a minimum, public education activities (see section S5.C.1) and/or water conservation efforts. To avoid washing pollutants into the MS4, Permittees shall minimize the amount of street wash and dust control water used.

- Other non-stormwater discharges. The discharges shall be in compliance with the requirements of a pollution prevention plan reviewed by the Permittee, which addresses control of such discharges.

iii. The Permittee shall further address any category of discharges in (i) or (ii) above if the discharges are identified as significant sources of pollutants to waters of the State.

iv. The ordinance or other regulatory mechanism shall include escalating enforcement procedures and actions.

v. The Permittee shall implement a compliance strategy that includes informal compliance actions such as public education and technical assistance as well as the enforcement provisions of the ordinance or other regulatory mechanism. To implement an effective compliance strategy, the Permittee's ordinance or other regulatory mechanism may need to include the following tools:

- The application of operational and/or structural source control BMPs for pollutant generating sources associated with existing land uses and activities where necessary to prevent illicit discharges. The source control BMPs referenced in this subsection are in Volume IV of the 2012 *Stormwater Management Manual for Western Washington*, or an equivalent manual approved by Ecology under the 2013 Phase I Permit.

- The maintenance of stormwater facilities which discharge into the Permittee's MS4 in accordance with maintenance standards established under S5.C.4 and/or S5.C.5 where necessary to prevent illicit discharges.

vi. The Permittee's ordinance or other regulatory mechanism in effect as of the effective date of this permit shall be revised if necessary to meet the requirements of this section no later than February 2, 2018.

c. Each Permittee shall implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the Permittee's MS4.[9] The program shall include the following components:

i. Procedures for conducting investigations of the Permittee's MS4, including field screening and methods for identifying potential sources.

The Permittee shall implement a field screening methodology appropriate to the characteristics of the MS4 and water quality concerns. Screening for illicit connections may be conducted using: *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, October 2004, or another methodology of comparable or improved effectiveness. The Permittee shall document the field screening methodology in the relevant Annual Report.

All Permittees, except for the City of Aberdeen, shall complete field screening for at least 40% of the MS4 no later than December 31, 2017,[10] and on average 12% each year thereafter. The City of Aberdeen shall complete field screening for at least 40% of the system no later than June 30, 2018 and on average 12% each year thereafter.

[9] New Permittees shall fully implement the requirements of S5.C.3.c no later than February 2, 2018, except where otherwise noted in this section.

[10] New Permittees shall complete S5.C.3.c.i requirements for field screening covering at least 12% of the MS4 within the Permittee's coverage area no later than December 31, 2017, and on average 12% each year thereafter.

ii. A publicly listed and publicized hotline or other telephone number for public reporting of spills and other illicit discharges.[11]

iii. An ongoing training program for all municipal field staff, who, as part of their normal job responsibilities, might come into contact with or otherwise observe an illicit discharge and/or illicit connection to the MS4, on the identification of an illicit discharge and/or connection, and on the proper procedures for reporting and responding to the illicit discharge and/or connection. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of the trainings provided and the staff trained.[12]

iv. Permittees shall inform public employees, businesses, and the general public of hazards associated with illicit discharges and improper disposal of waste.[13]

d. Each Permittee shall implement an ongoing program designed to address illicit discharges, including spills and illicit connections, into the Permittee's MS4.[14] The program shall include:

i. Procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges found by or reported to the Permittee. Procedures shall address the evaluation of whether the discharge must be immediately contained and steps to be taken for containment of the discharge.

ii. Procedures for tracing the source of an illicit discharge; including visual inspections, and when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures.

iii. Procedures for eliminating the discharge; including notification of appropriate authorities; notification of the property owner; technical assistance; follow-up inspections; and use of the compliance strategy developed pursuant to S5.C.3.b.v, including escalating enforcement and legal actions if the discharge is not eliminated.

[11] New Permittees shall implement the requirements of S5.C.3.c.ii no later than August 1, 2015.

[12] New Permittees shall develop and begin implementing the ongoing training program described in S5.C.3.c.iii no later than February 2, 2016.

[13] New Permittees shall inform public employees, businesses, and the general public of hazards associated with illicit discharges no later than February 2, 2017.

[14] New Permittees shall fully develop and implement the requirements of S5.C.3.d no later than February 2, 2018.

iv. Compliance with the provisions in (i), (ii), and (iii), above, shall be achieved by meeting the following timelines:

- Immediately respond to all illicit discharges, including spills, which are determined to constitute a threat to human health, welfare, or the environment, consistent with General Condition G3.

- Investigate (or refer to the appropriate agency with the authority to act) within 7 days, on average, any complaints, reports or monitoring information that indicates a potential illicit discharge.

- Initiate an investigation within 21 days of any report or discovery of a suspected illicit connection to determine the source of the connection, the nature and volume of discharge through the connection, and the party responsible for the connection.

- Upon confirmation of an illicit connection, use the compliance strategy in a documented effort to eliminate the illicit connection within 6 months. All known illicit connections to the MS4 shall be eliminated.

e. Permittees shall train staff who are responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges, including spills, and illicit connections, to conduct these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements or staffing. Permittees shall document and maintain records of the training provided and the staff trained.[15]

f. Recordkeeping: Permittees shall track and maintain records of the activities conducted to meet the requirements of this section.

4. Controlling Runoff from New Development, Redevelopment and Construction Sites

Each Permittee shall implement and enforce a program to reduce pollutants in stormwater runoff to a regulated small MS4 from new development, redevelopment and construction site activities. The program shall apply to private and public development, including roads.[16]

The minimum performance measures are:

[15] New Permittees shall meet the requirements of S5.C.3.e no later than February 2, 2016.

[16] New permittees shall meet the requirements of S5.C.4 no later than December 31, 2017, except where otherwise specified in this section.

a. Implement an ordinance or other enforceable mechanism that addresses runoff from new development, redevelopment, and construction site projects. Except for Permittees in Lewis and Cowlitz counties and the City of Aberdeen, the ordinance or other enforceable mechanism to implement (i) through (iii), below, shall be adopted and effective no later than December 31, 2016. The local program adopted to meet the requirements of S5.C.5.a(i) through (iii), below shall apply to all applications[17] submitted on or after January 1, 2017 and shall apply to projects approved prior to January 1, 2017, which have not started construction[18] by January 1, 2022[19].

For permittees in Lewis and Cowlitz counties the ordinance or other enforceable mechanism to implement (i) through (iii), below, shall be adopted and effective no later than June 30, 2017. The local program adopted to meet the requirements of S5.C.5.a(i) through (iii), below shall apply to all applications submitted on or after July 1, 2017 and shall apply to projects approved prior to July 1, 2017, which have not started construction by June 30, 2022.

For the City of Aberdeen the ordinance or other enforceable mechanism to implement (i) through (iii), below, shall be adopted and effective no later than June 30, 2018. The local program adopted to meet the requirements of S5.C.5.a(i) through (iii), below shall apply to all applications submitted on or after July 1, 2018 and shall apply to projects approved prior to July 1, 2018, which have not started construction by June 30, 2023.

The ordinance or other enforceable mechanism shall include, at a minimum:

i. The Minimum Requirements, thresholds, and definitions in Appendix 1 or a program approved by Ecology under the 2013 NPDES Phase I Municipal Stormwater Permit, for new development, redevelopment, and construction sites. Adjustment and variance criteria equivalent to those in Appendix 1 shall be included. More stringent requirements may be used, and/or certain requirements may be tailored to local circumstances through the use

[17] In this context, "application" means, at a minimum a complete project description, site plan, and, if applicable, SEPA checklist. Permittees may establish additional elements of a completed application.

[18] In this context "started construction" means the site work associated with, and directly related to the approved project has begun. For example: grading the project site to final grade or utility installation. Simply clearing the project site does not constitute the start of construction. Permittees may establish additional requirements related to the start of construction.

[19] New Permittees shall meet the requirements of S5.C.4.a no later than December 31, 2017. The local program shall apply to all applications submitted on or after January 1, 2018 and shall apply to projects approved prior to January 1, 2018, which have not started construction by January 1, 2023.

of Ecology-approved basin plans or other similar water quality and quantity planning efforts. Such local requirements and thresholds shall provide equal protection of receiving waters and equal levels of pollutant control to those provided in Appendix 1.

ii. The local requirements shall include the following requirements, limitations, and criteria that, when used to implement the minimum requirements in Appendix 1 (or program approved by Ecology under the 2013 Phase I Permit) will protect water quality, reduce the discharge of pollutants to the MEP, and satisfy the State requirement under chapter 90.48 RCW to apply AKART prior to discharge:

(a) Site planning requirements

(b) BMP selection criteria

(c) BMP design criteria

(d) BMP infeasibility criteria

(e) LID competing needs criteria

(f) BMP limitations

Permittees shall document how the criteria and requirements will protect water quality, reduce the discharge of pollutants to the MEP, and satisfy State AKART requirements.

Permittees who choose to use the requirements, limitations, and criteria above in the 2012 *Stormwater Management Manual for Western Washington,* or a program approved by Ecology under the 2013 Phase I Permit, may cite this choice as their sole documentation to meet this requirement.

iii. The legal authority, through the approval process for new development and redevelopment, to inspect and enforce maintenance standards for private stormwater facilities approved under the provisions of this section that discharge to the Permittee's MS4.

b. The program shall include a permitting process with site plan review, inspection and enforcement capability to meet the standards listed in (i) through (iv) below, for both private and public projects, using qualified personnel (as defined in *Definitions and Acronyms*). At a minimum, this program shall be applied to all sites that meet the minimum thresholds adopted pursuant to S5.C.4.a.i, above.

i. Review of all stormwater site plans for proposed development activities.

ii. Inspect, prior to clearing and construction, all permitted development sites that have a high potential for sediment transport as determined

through plan review based on definitions and requirements in Appendix 7 Determining Construction Site Sediment Damage Potential. As an alternative to evaluating each site according to Appendix 7, Permittees may choose to inspect all construction sites that meet the minimum thresholds adopted pursuant to S5.C.4.a.i, above.

iii. Inspect all permitted development sites during construction to verify proper installation and maintenance of required erosion and sediment controls. Enforce as necessary based on the inspection.

iv. Inspect all permitted development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of permanent stormwater facilities. Verify that a maintenance plan is completed and responsibility for maintenance is assigned for stormwater treatment and flow control BMPs/facilities. Enforce as necessary based on the inspection.

v. Compliance with the inspection requirements in (ii), (iii) and (iv) above, shall be determined by the presence and records of an established inspection program designed to inspect all sites. Compliance during this permit term shall be determined by achieving at least 80% of scheduled inspections.

vi. An enforcement strategy shall be implemented to respond to issues of non-compliance.

c. The program shall include provisions to verify adequate long-term operation and maintenance (O&M) of stormwater treatment and flow control BMPs/facilities that are permitted and constructed pursuant to (b) above. Except for Permittees located in Lewis or Cowlitz Counties and the City of Aberdeen, these provisions shall be in place no later than December 31, 2016. [20] For Permittees in Lewis and Cowlitz counties, the provisions shall be in place no later than June 30, 2017. For the City of Aberdeen, the provisions shall be in place no later than June 30, 2018. The provisions shall include:

i. Implementation of an ordinance or other enforceable mechanism that clearly identifies the party responsible for maintenance, requires inspection of facilities in accordance with the requirements in (ii) through (iv) below, and establishes enforcement procedures.

ii. Each Permittee shall establish maintenance standards that are as protective or more protective of facility function than those specified in Chapter 4 of Volume V of the 2012 *Stormwater Management*

[20] New Permittees shall meet the requirements of S5.C.4.c no later than December 31, 2017.

Manual for Western Washington. For facilities which do not have maintenance standards, the Permittee shall develop a maintenance standard.

The purpose of the maintenance standard is to determine if maintenance is required. The maintenance standard is not a measure of the facility's required condition at all times between inspections. Exceeding the maintenance standard between the period of inspections is not a permit violation.

iii. Annual inspections of all stormwater treatment and flow control BMPs/facilities that discharge to the MS4 and were permitted by the Permittee according to S5.C.4.b, including those permitted in accordance with requirements adopted pursuant to the 2007-2012 Ecology municipal stormwater permits, unless there are maintenance records to justify a different frequency.

Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature.

iv. Inspections of all permanent stormwater treatment and flow control BMPs/facilities and catch basins in new residential developments every six months until 90% of the lots are constructed (or when construction is stopped and the site is fully stabilized) to identify maintenance needs and enforce compliance with maintenance standards as needed.

v. Compliance with the inspection requirements in (iii) and (iv) above shall be determined by the presence and records of an established inspection program designed to inspect all sites. Compliance during this permit term shall be determined by achieving at least 80% of scheduled inspections.

vi. Unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed:

- Within 1 year for typical maintenance of facilities, except catch basins.
- Within 6 months for catch basins.
- Within 2 years for maintenance that requires capital construction of less than $25,000.

Circumstances beyond the Permittee's control include denial or delay of access by property owners, denial or delay of necessary permit approvals, and unexpected reallocations of maintenance staff to perform emergency work. For each exceedance of the required timeframe, the Permittee shall document the circumstances and how they were beyond their control.

vii. The program shall include a procedure for keeping records of inspections and enforcement actions by staff, including inspection reports, warning letters, notices of violations, and other enforcement records. Records of maintenance inspections and maintenance activities shall be maintained.

d. The program shall make available as applicable copies of the "Notice of Intent for Construction Activity" and copies of the "Notice of Intent for Industrial Activity" to representatives of proposed new development and redevelopment. Permittees shall continue to enforce local ordinances controlling runoff from sites that are also covered by stormwater permits issued by Ecology.[21]

e. Each Permittee shall ensure that all staff whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including permitting, plan review, construction site inspections, and enforcement, are trained to conduct these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques or staffing. Permittees shall document and maintain records of the training provided and the staff trained.[22]

f. Low impact development code-related requirements.

i. No later than December 31, 2016,[23] Permittees shall review, revise and make effective their local development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs. For Permittees in Lewis and Cowlitz counties, the deadline for this requirement is no later than June 30, 2017; for the City of Aberdeen the deadline for this requirement is no later than June 30, 2018.

The intent of the revisions shall be to make LID the preferred and commonly-used approach to site development. The revisions shall be designed to minimize impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations. Permittees shall

[21] New Permittees shall meet the requirements of S5.C.4.d beginning no later than August 1, 2013.

[22] New Permittees shall meet the requirements of S5.C.4.e no later than December 31, 2017.

[23] New Permittees shall meet the requirements of S5.C.4.f.i no later than December 31, 2017.

conduct a similar review and revision process, and consider the range of issues, outlined in the following document: *Integrating LID into Local Codes: A Guidebook for Local Governments* (Puget Sound Partnership, 2012).

ii. Except for Permittees in Lewis and Cowlitz Counties and the City of Aberdeen, each Permittee shall submit a summary of the results of the review and revision process in (i) above with the annual report due no later than March 31, 2017[24]. Permittees in Lewis and Cowlitz counties shall submit the summary with the annual report due no later than March 31, 2018. The City of Aberdeen shall submit the summary with the Fifth Year annual report. This summary shall include, at a minimum, a list of the participants (job title, brief job description, and department represented), the codes, rules, standards, and other enforceable documents reviewed, and the revisions made to those documents which incorporate and require LID principles and LID BMPs. The summary shall include existing requirements for LID principles and LID BMPs in development-related codes. The summary shall be organized as follows:

(a) Measures to minimize impervious surfaces;

(b) Measures to minimize loss of native vegetation; and

(c) Other measures to minimize stormwater runoff.

g. Watershed-scale stormwater planning

Each Permittee that has all or part of its coverage area under this Permit in a watershed selected by a Phase I county for watershed-scale stormwater planning under condition S5.C.4.c of the *Phase I Municipal Stormwater General Permit* shall participate with the watershed-scale stormwater planning process led by the Phase I county.[25] As needed and as appropriate, the permittee shall:

i. Provide existing water quality and flow records.

ii. Provide existing and future land use and zoning maps to facilitate land cover projections.

iii. Participate in the development of strategies to prevent future and address existing impacts, including:

(a) Possible changes in development codes, rules, and standards.

[24] New Permittees shall meet the S5.C.4.f.ii reporting requirement in the annual report covering calendar year 2017 and due no later than March 31, 2018.

[25] For a description of the watershed-scale stormwater planning details, see Special Condition S5.C.5.c of the 2013 *Phase I Municipal Stormwater Permit*.

(b) Possible changes in land use management plans.

(c) Providing land ownership information and drainage conveyance maps to facilitate watershed modeling and regional facility siting.

iv. Provide monitoring locations.

5. Municipal Operations and Maintenance

Each Permittee shall implement an operations and maintenance (O&M) program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.[26]

The minimum performance measures are:

a. Each Permittee shall implement maintenance standards that are as protective, or more protective, of facility function than those specified in Chapter 4 of Volume V of the 2012 *Stormwater Management Manual for Western Washington*. For facilities which do not have maintenance standards, the Permittee shall develop a maintenance standard. Except for Permittees located in Lewis and Cowlitz Counties and the City of Aberdeen, no later than December 31, 2016, Permittees shall update their maintenance standards as necessary to meet the requirements of this section.[27] For Permittees in Lewis and Cowlitz counties, this requirement shall apply no later than June 30, 2017; for the City of Aberdeen this requirement shall apply no later than June 30, 2018.

i. The purpose of the maintenance standard is to determine if maintenance is required. The maintenance standard is not a measure of the facility's required condition at all times between inspections. Exceeding the maintenance standard between inspections and/or maintenance is not a permit violation.

ii. Unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed:

- Within 1 year for typical maintenance of facilities, except catch basins.

- Within 6 months for catch basins.

[26] New Permittees shall develop and implement the requirements of S5.C.5 no later than December 31, 2017 except where otherwise noted in this section.

[27] New Permittees shall adopt the updated maintenance standards in Chapter 4 of Volume V of the 2012 *Stormwater Management Manual for Western Washington* or an Ecology-approved program under the 2013 Phase I Permit no later than December 31, 2017.

- Within 2 years for maintenance that requires capital construction of less than $25,000.

Circumstances beyond the Permittee's control include denial or delay of access by property owners, denial or delay of necessary permit approvals, and unexpected reallocations of maintenance staff to perform emergency work. For each exceedance of the required timeframe, the Permittee shall document the circumstances and how they were beyond their control.

b. Annual inspection of all municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities, and taking appropriate maintenance actions in accordance with the adopted maintenance standards.[28]

Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature.

c. Spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities after major storm events (24 hour storm event with a 10 year or greater recurrence interval). If spot checks indicate widespread damage/maintenance needs, inspect all stormwater treatment and flow control BMPs/facilities that may be affected. Conduct repairs or take appropriate maintenance action in accordance with maintenance standards established above, based on the results of the inspections.

d. Except for the City of Aberdeen, inspection of all catch basins and inlets owned or operated by the Permittee at least once no later than August 1, 2017 and every two years thereafter. [29] For the City of Aberdeen, the deadline for this requirement shall be no later than June 30, 2018. Clean catch basins if the inspection indicates cleaning is needed to comply with maintenance standards established in the 2012 *Stormwater Management Manual for Western Washington*. Decant water shall be disposed of in accordance with Appendix 6 *Street Waste Disposal*.

[28] New Permittees shall begin annual inspections of municipally owned and operated stormwater treatment and flow control facilities/BMPs no later than December 31, 2017.

[29] New Permittees shall inspect and, if needed, clean all catch basins and inlets owned or operated by the Permittee in accordance with the requirements of S5.C.5.c once during the permit term, to be completed no later than February 2, 2018.

The following alternatives to the standard approach of inspecting all catch basins once no later than August 1, 2017 and every two years thereafter (except no later than June 30, 2018 and every two years thereafter for the City of Aberdeen) may be applied to all or portions of the system:

i. The catch basin inspection schedule of every two years may be changed as appropriate to meet the maintenance standards based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records for catch basins, the Permittee may substitute written statements to document a specific, less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experiences and shall be certified in accordance with G19 Certification and Signature.

ii. Inspections at least once by August 1, 2017 and every two years thereafter may be conducted on a "circuit basis" whereby 25% of catch basins and inlets within each circuit are inspected to identify maintenance needs. Include an inspection of the catch basin immediately upstream of any system outfall, if applicable. Clean all catch basins within a given circuit for which the inspection indicates cleaning is needed to comply with maintenance standards established under S5.C.5.a, above.

iii. The Permittee may clean all pipes, ditches, catch basins, and inlets within a circuit once during the permit term. Circuits selected for this alternative must drain to a single point.

e. Compliance with the inspection requirements in b, c, and d above shall be determined by the presence of an established inspection program designed to inspect all sites and achieving at least 95% of inspections.

f. Implement practices, policies and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. Lands owned or maintained by the Permittee include, but are not limited to, streets, parking lots, roads, highways, buildings, parks, open space, road right-of-ways, maintenance yards, and stormwater treatment and flow control BMPs/facilities. The following activities shall be addressed:

- Pipe cleaning
- Cleaning of culverts that convey stormwater in ditch systems
- Ditch maintenance
- Street cleaning
- Road repair and resurfacing, including pavement grinding

- Snow and ice control
- Utility installation
- Pavement striping maintenance
- Maintaining roadside areas, including vegetation management
- Dust control
- Application of fertilizers, pesticides, and herbicides according to the instructions for their use, including reducing nutrients and pesticides using alternatives that minimize environmental impacts
- Sediment and erosion control
- Landscape maintenance and vegetation disposal
- Trash and pet waste management
- Building exterior cleaning and maintenance

g. Implement an ongoing training program for employees of the Permittee whose primary construction, operations or maintenance job functions may impact stormwater quality. The training program shall address the importance of protecting water quality, operation and maintenance standards, inspection procedures, selecting appropriate BMPs, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of training provided and the staff trained.

h. Implement a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the Permittee in areas subject to this Permit that are not required to have coverage under the *General NPDES Permit for Stormwater Discharges Associated with Industrial Activities* or another NPDES permit that authorizes stormwater discharges associated with the activity. A schedule for implementation of structural BMPs shall be included in the SWPPP. Generic SWPPPs that can be applied at multiple sites may be used to comply with this requirement. The SWPPP shall include periodic visual observation of discharges from the facility to evaluate the effectiveness of the BMP.

i. Maintain records of inspections and maintenance or repair activities conducted by the Permittee.

S6. STORMWATER MANAGEMENT PROGRAM FOR SECONDARY PERMITTEES

A. This section applies to all Secondary Permittees and all New Secondary Permittees, whether coverage under this Permit is obtained individually or as a Co-Permittee with a city, town, county or another Secondary Permittee.

New Secondary Permittees subject to this Permit shall fully meet the requirements of this section as modified in footnotes in S6.D below, or as established as a condition of coverage by Ecology.

1. To the extent allowable under state, federal or local law, all components are mandatory for each Secondary Permittee covered under this Permit, whether covered as an individual Permittee or as a Co-Permittee.

2. Each Secondary Permittee shall develop and implement a stormwater management program (SWMP). A SWMP is a set of actions and activities comprising the components listed in S6 and any additional actions necessary to meet the requirements of applicable TMDLs pursuant to S7 *Compliance with TMDL Requirements,* and S8 *Monitoring and Assessment*. The SWMP shall be designed to reduce the discharge of pollutants from regulated small MS4s to the MEP and protect water quality.

3. Unless an alternate implementation schedule is established by Ecology as a condition of permit coverage, the SWMP shall be developed and implemented in accordance with the schedules contained in this section and shall be fully developed and implemented no later than four and one-half years from the initial permit coverage date. Secondary Permittees that are already implementing some or all of the required SWMP components shall continue implementation of those components.

4. Secondary Permittees may implement parts of their SWMP in accordance with the schedule for cities, towns and counties in S5, provided they have signed a memorandum of understanding or other agreement to jointly implement the activity or activities with one or more jurisdictions listed in S1.D.2.a or S1.D.2.b, and submitted a copy of the agreement to Ecology.

5. Each Secondary Permittee shall prepare written documentation of the SWMP, called the SWMP Plan. The SWMP Plan shall include a description of program activities for the upcoming calendar year.

B. Coordination

Secondary Permittees shall coordinate stormwater-related policies, programs and projects within a watershed and interconnected MS4s. Where relevant and appropriate, the SWMP shall coordinate among departments of the Secondary Permittee to ensure compliance with the terms of this Permit.

C. Legal Authority

To the extent allowable under state law and federal law, each Secondary Permittee shall be able to demonstrate that they can operate pursuant to legal authority which authorizes or enables the Secondary Permittee to control discharges to and from MS4s owned or operated by the Secondary Permittee.

This legal authority may be a combination of statutes, ordinances, permits, contracts, orders, interagency agreements, or similar instruments.

D. Stormwater Management Program for Secondary Permittees

The SWMP for Secondary Permittees shall include the following components:

1. Public Education and Outreach

Each Secondary Permittee shall implement the following stormwater education strategies:

a. Storm drain inlets owned or operated by the Secondary Permittee that are located in maintenance yards, in parking lots, along sidewalks, and at pedestrian access points shall be clearly labeled with a message similar to "Dump no waste – Drains to water body".[30]

As identified during visual inspection and regular maintenance of storm drain inlets per the requirements of S6.D.3.d and S6.D.6.a.i below, or as otherwise reported to the Secondary Permittee, any inlet having a label that is no longer clearly visible and/or easily readable shall be re-labeled within 90 days.

b. Each year beginning no later than three years from the initial date of permit coverage, public ports, colleges, and universities shall distribute educational information to tenants and residents on the impact of stormwater discharges on receiving waters, and steps that can be taken to reduce pollutants in stormwater runoff. Distribution may be by hard copy or electronic means. Appropriate topics may include:

i. How stormwater runoff affects local water bodies.

ii. Proper use and application of pesticides and fertilizers.

iii. Benefits of using well-adapted vegetation.

iv. Alternative equipment washing practices, including cars and trucks, that minimize pollutants in stormwater.

v. Benefits of proper vehicle maintenance and alternative transportation choices; proper handling and disposal of vehicle wastes, including the location of hazardous waste collection facilities in the area.

[30] New Secondary Permittees shall label all inlets as described in S6.D.1.a no later than four years from the initial date of permit coverage.

vi. Hazards associated with illicit connections and illicit discharges.

vii. Benefits of litter control and disposal of pet waste.

2. Public Involvement and Participation

Each year no later than May 31, each Secondary Permittee shall:

a. Make the annual report available on the Permittee's website.

b. Make available on the Permittee's website the latest updated version of the SWMP Plan.

c. A Secondary Permittee that does not maintain a website may submit the updated SWMP Plan and annual report in electronic format to Ecology for posting on Ecology's website.

3. Illicit Discharge Detection and Elimination

Each Secondary Permittee shall:

a. From the initial date of permit coverage, comply with all relevant ordinances, rules, and regulations of the local jurisdiction(s) in which the Secondary Permittee is located that govern non-stormwater discharges.

b. Implement appropriate policies prohibiting illicit discharges,[31] and an enforcement plan to ensure compliance with illicit discharge policies.[32] These policies shall address, at a minimum: illicit connections, non-stormwater discharges, including spills of hazardous materials, and improper disposal of pet waste and litter.

i. Allowable discharges: The policies do not need to prohibit the following categories of non-stormwater discharges:

- Diverted stream flows
- Rising ground waters
- Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20))
- Uncontaminated pumped ground water
- Foundation drains.

[31] New Secondary Permittees shall develop and implement appropriate policies prohibiting illicit discharges, and identify possible enforcement mechanisms as described in S6.D.3.b no later than one year from the initial date of permit coverage.

[32] New Secondary Permittees shall develop and implement an enforcement plan as described in S6.D.3.b no later than 18 months from the initial date of permit coverage.

- Air conditioning condensation
- Irrigation water from agricultural sources that is commingled with urban stormwater
- Springs
- Uncontaminated water from crawl space pumps
- Footing drains
- Flows from riparian habitats and wetlands
- Discharges from emergency fire fighting activities in accordance with S2 Authorized Discharges
- Non-stormwater discharges authorized by another NPDES or state waste discharge permit

ii. Conditionally allowable discharges: The policies may allow the following categories of non-stormwater discharges only if the stated conditions are met and such discharges are allowed by local codes:

- Discharges from potable water sources, including but not limited to water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4.
- Discharges from lawn watering and other irrigation runoff. These discharges shall be minimized through, at a minimum, public education activities and water conservation efforts conducted by the Secondary Permittee and/or the local jurisdiction.
- Dechlorinated swimming pool, spa and hot tub discharges. The discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted and reoxygenated if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4. Discharges shall be thermally controlled to prevent an increase in temperature of the receiving water. Swimming pool cleaning wastewater and filter backwash shall not be discharged to the MS4.
- Street and sidewalk wash water, water used to control dust, and routine external building washdown that does not use

detergents. The Secondary Permittee shall reduce these discharges through, at a minimum, public education activities and/or water conservation efforts conducted by the Secondary Permittee and/or the local jurisdiction. To avoid washing pollutants into the MS4, the Secondary Permittee shall minimize the amount of street wash and dust control water used.

- Other non-stormwater discharges shall be in compliance with the requirements of a pollution prevention plan reviewed by the Permittee which addresses control of such discharges.

iii. The Secondary Permittee shall address any category of discharges in (i) or (ii) above if the discharge is identified as a significant source of pollutants to waters of the State.

c. Maintain a storm sewer system map showing the locations of all known storm drain outfalls, labeling the receiving waters (other than ground water) and delineating the areas contributing runoff to each outfall. Make the map (or completed portions of the map) available on request to Ecology and to the extent appropriate, to other Permittees. The preferred format for mapping is an electronic format with fully described mapping standards. An example description is provided on Ecology's website.[33]

d. Conduct field inspections and visually inspect for illicit discharges at all known MS4 outfalls. Visually inspect at least one third (on average) of all known outfalls each year beginning no later than two years from the initial date of permit coverage. Implement procedures to identify and remove any illicit discharges. Keep records of inspections and follow-up activities.

e. Implement a spill response plan that includes coordination with a qualified spill responder.[34]

f. No later than two years from initial date of permit coverage, provide staff training or coordinate with existing training efforts to educate staff on proper BMPs for preventing illicit discharges, including spills. Train all Secondary Permittee staff who, as part of their normal job responsibilities, have a role in preventing such illicit discharges.

4. Construction Site Stormwater Runoff Control

From the initial date of permit coverage, each Secondary Permittee shall:

[33] New Secondary Permittees shall meet the requirements of S6.D.3.c no later than four and one-half years from the initial date of permit coverage.

[34] New Secondary Permittees shall develop and implement a spill response plan as described in S6.D.3.e no later than four and one-half years from the initial date of permit coverage.

a. Comply with all relevant ordinances, rules, and regulations of the local jurisdiction(s) in which the Secondary Permittee is located that govern construction phase stormwater pollution prevention measures.

b. Ensure that all construction projects under the functional control of the Secondary Permittee which require a construction stormwater permit obtain coverage under the *NPDES General Permit for Stormwater Discharges Associated with Construction Activitie*s or an individual NPDES permit prior to discharging construction related stormwater.

c. Coordinate with the local jurisdiction regarding projects owned or operated by other entities which discharge into the Secondary Permittee's MS4, to assist the local jurisdiction with achieving compliance with all relevant ordinances, rules, and regulations of the local jurisdiction(s).

d. Provide training or coordinate with existing training efforts to educate relevant staff in erosion and sediment control BMPs and requirements, or hire trained contractors to perform the work.

e. Coordinate as requested with Ecology or the local jurisdiction to provide access for inspection of construction sites or other land disturbances which are under the functional control of the Secondary Permittee during land disturbing activities and/or construction period.

5. Post-Construction Stormwater Management for New Development and Redevelopment

From the initial date of permit coverage, each Secondary Permittee shall:

a. Comply with all relevant ordinances, rules and regulations of the local jurisdiction(s) in which the Secondary Permittee is located that govern post-construction stormwater pollution prevention measures.

b. Coordinate with the local jurisdiction regarding projects owned or operated by other entities which discharge into the Secondary Permittee's MS4, to assist the local jurisdiction with achieving compliance with all relevant ordinances, rules and regulations of the local jurisdiction(s).

6. Pollution Prevention and Good Housekeeping for Municipal Operations

Each Secondary Permittee shall:

a. Implement a municipal operation and maintenance (O&M) plan to minimize stormwater pollution from activities conducted by the Secondary Permittee. The O&M Plan shall include appropriate pollution prevention and good housekeeping procedures for all of the following operations, activities, and/or types of facilities that are present within the Secondary

Permittee's boundaries and under the functional control of the Secondary Permittee.[35]

i. Stormwater collection and conveyance systems, including catch basins, stormwater pipes, open channels, culverts, and stormwater treatment and flow control BMPs/facilities. The O&M Plan shall address, at a minimum: scheduled inspections and maintenance activities, including cleaning and proper disposal of waste removed from the system. Secondary Permittees shall properly maintain stormwater collection and conveyance systems owned or operated by the Secondary Permittee and regularly inspect and maintain all stormwater facilities to ensure facility function.

   Secondary Permittees shall establish maintenance standards that are as protective or more protective of facility function than those specified in Chapter 4 Volume V of the 2012 *Stormwater Management Manual for Western Washington*. Secondary Permittees shall review their maintenance standards to ensure they are consistent with the requirements of this section.

   Secondary Permittees shall conduct spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities following major storm events (24 hour storm event with a 10 year or greater recurrence interval).

ii. Roads, highways, and parking lots. The O&M Plan shall address, but is not limited to: deicing, anti-icing, and snow removal practices; snow disposal areas; material (e.g. salt, sand, or other chemical) storage areas; all-season BMPs to reduce road and parking lot debris and other pollutants from entering the MS4.

iii. Vehicle fleets. The O&M Plan shall address, but is not limited to: storage, washing, and maintenance of Secondary Permittee vehicle fleets; and fueling facilities. Secondary Permittees shall conduct all vehicle and equipment washing and maintenance in a self-contained covered building or in designated wash and/or maintenance areas.

iv. External building maintenance. The O&M Plan shall address, building exterior cleaning and maintenance including cleaning, washing, painting; and maintenance and management of dumpsters; and other maintenance activities.

v. Parks and open space. The O&M Plan shall address, but is not limited to: proper application of fertilizer, pesticides, and herbicides;

[35] New Secondary Permittees shall develop and implement the operation and maintenance plan described in S6.D.6.a no later than three years from initial date of permit coverage.

sediment and erosion control; BMPs for landscape maintenance and vegetation disposal; and trash and pet waste management.

vi. Material storage facilities and heavy equipment maintenance or storage yards. Secondary Permittees shall develop and implement a Stormwater Pollution Prevention Plan to protect water quality at each of these facilities owned or operated by the Secondary Permittee and not covered under the *General NPDES Permit for Stormwater Discharges Associated with Industrial Activities* or under another NPDES permit that authorizes stormwater discharges associated with the activity.

vii. Other facilities that would reasonably be expected to discharge contaminated runoff. The O&M Plan shall address proper stormwater pollution prevention practices for each facility.

b. From the initial date of permit coverage, Secondary Permittees shall also have permit coverage for all facilities operated by the Secondary Permittee that are required to be covered under the *General NPDES Permit for Stormwater Discharges Associated with Industrial Activities* or another NPDES permit that authorizes discharges associated with the activity.

c. The O&M Plan shall include sufficient documentation and records as necessary to demonstrate compliance with the O&M Plan requirements in S6.D.6.a.(i) through (vii) above.

d. No later than three years from the initial date of permit coverage, Secondary Permittees shall implement a program designed to train all employees whose primary construction, operations, or maintenance job functions may impact stormwater quality. The training shall address:

i. The importance of protecting water quality.

ii. The requirements of this Permit.

iii. Operation and maintenance requirements.

iv. Inspection procedures.

v. Ways to perform their job activities to prevent or minimize impacts to water quality.

vi. Procedures for reporting water quality concerns, including potential illicit discharges (including spills).

S7. COMPLIANCE WITH TOTAL MAXIMUM DAILY LOAD REQUIREMENTS

The following requirements apply if an applicable TMDL is approved for stormwater discharges from MS4s owned or operated by the Permittee. Applicable TMDLs are TMDLs

which have been approved by EPA on or before the issuance date of this Permit or prior to the date that Ecology issues coverage under this permit, whichever is later.

A. For applicable TMDLs listed in Appendix 2, affected Permittees shall comply with the specific requirements identified in Appendix 2. Each Permittee shall keep records of all actions required by this Permit that are relevant to applicable TMDLs within their jurisdiction. The status of the TMDL implementation shall be included as part of the annual report submitted to Ecology. Each annual report shall include a summary of relevant SWMP and Appendix 2 activities conducted in the TMDL area to address the applicable TMDL parameter(s).

B. For applicable TMDLs not listed in Appendix 2, compliance with this Permit shall constitute compliance with those TMDLs.

C. For TMDLs that are approved by EPA after this Permit is issued, Ecology may establish TMDL related permit requirements through future permit modification if Ecology determines implementation of actions, monitoring or reporting necessary to demonstrate reasonable further progress toward achieving TMDL waste load allocations, and other targets, are not occurring and shall be implemented during the term of this Permit or when this Permit is reissued. Permittees are encouraged to participate in development of TMDLs within their jurisdiction and to begin implementation.

S8. MONITORING AND ASSESSMENT

A. All Permittees including Secondary Permittees shall provide, in each annual report, a description of any stormwater monitoring or stormwater-related studies conducted by the Permittee during the reporting period. If other stormwater monitoring or stormwater-related studies were conducted on behalf of the Permittee during the reporting period, or if stormwater-related investigations conducted by other entities were reported to the Permittee during the reporting period, a brief description of the type of information gathered or received shall be included in the annual report.

Permittees are <u>not</u> required to provide descriptions of any monitoring, studies, or analyses conducted as part of the Regional Stormwater Management Program (RSMP) in annual reports. If a Permittee conducts independent monitoring in accordance with requirements in S8.B or S8.C below, annual reporting of such monitoring must follow the requirements specified in those sections.

B. Status and trends monitoring. By December 1, 2013, each city and county Permittee listed in S1.D.2.a(i) and S1.D.2.a(ii) located in Clallam, Island, King, Kitsap, Pierce, Skagit, Snohomish, Thurston, or Whatcom County shall notify Ecology in writing which of the following two options for status and trends monitoring the Permittee chooses to carry out during this permit cycle. Either option will fully satisfy the Permittee's obligations under this section (S8.B). Each Permittee shall select a single option for the duration of this permit term.

1. Status and Trends Monitoring Option #1: Each Permittee that chooses this option shall pay into a collective fund to implement RSMP small streams and marine nearshore status and trends monitoring in Puget Sound. The payments into the collective fund are due to Ecology annually beginning August 15, 2014. The payment amounts are (Permittees are listed alphabetically, by county):

Permittee	Annual payment amount	Permittee	Annual payment amount
Clallam Co.	N/A	Pierce Co.	N/A
Port Angeles	$4,732	Bonney Lake	$4,075
Island Co.	N/A	Buckley	$1,129
Oak Harbor	$5,719	DuPont	$1,936
King Co.	N/A	Edgewood	$2,350
Algona	$678	Fife	$2,005
Auburn	$16,914	Fircrest	$1,549
Bellevue	$30,009	Gig Harbor	$1,836
Black Diamond	$1,023	Lakewood	$14,367
Bothell	$8,163	Milton	$1,597
Burien	$11,238	Orting	$1,525
Clyde Hill	$695	Puyallup	$9,498
Covington	$4,307	Steilacoom	$1,538
Des Moines	$7,152	Sumner	$2,217
Duvall	$1,463	University Place	$7,704
Enumclaw	$2,806	Skagit Co.	$1,257
Federal Way	$21,673	Burlington	$2,194
Issaquah	$6,632	Anacortes	$4,102
Kenmore	$5,042	Mount Vernon	$7,574
Kent	$27,441	Sedro Woolley	$2,452
Kirkland	$12,116	Snohomish Co.	N/A
Lake Forest Park	$3,135	Arlington	$4,219
Maple Valley	$5,648	Brier	$1,585
Medina	$728	Edmonds	$9,987
Mercer Island	$5,589	Everett	$25,419
Newcastle	$2,431	Granite Falls	$824

Normandy Park	$1,597	Lake Stevens	$6,512
Pacific	$1,540	Lynnwood	$8,829
Redmond	$13,143	Marysville	$14,172
Renton	$21,055	Mill Creek	$4,566
Sammamish	$10,028	Monroe	$4,073
SeaTac	$6,322	Mountlake Terrace	$5,118
Shoreline	$13,327	Mukilteo	$4,920
Tukwila	$4,444	Snohomish	$2,276
Woodinville	$2,771	Thurston Co.	$12,841
Kitsap Co.	$17,133	Lacey	$9,799
Bainbridge Island	$5,709	Olympia	$11,110
Bremerton	$8,837	Tumwater	$4,095
Port Orchard	$2,664	Whatcom Co.	$3,714
Poulsbo	$2,187	Bellingham	$18,936
		Ferndale	$2,737

Or

2. Status and Trends Monitoring Option #2: Each Permittee that chooses this option shall conduct status and trends monitoring as follows:

    a. Beginning no later than July 31, 2014, conduct wadeable stream water quality, benthos, habitat, and sediment chemistry monitoring according to the Ecology-approved Quality Assurance Project Plan (QAPP) for RSMP Small Streams Status and Trends Monitoring.

        i. Permittees with population less than 10,000 in the permit coverage area shall conduct this monitoring at the first two qualified monitoring locations (as listed sequentially among the potential monitoring locations defined in the RSMP QAPP) that are located within the jurisdiction's boundaries. Counties shall monitor the first location inside UGA boundaries and the first location outside UGA boundaries.

        ii. Permittees with population equal to or greater than 10,000 and fewer than 50,000 in the permit coverage area shall conduct this monitoring at the first four qualified monitoring locations (as listed sequentially among the potential monitoring locations defined in the RSMP QAPP) that are located within the jurisdiction's boundaries. Counties shall monitor the first two locations inside UGA boundaries and the first two locations outside UGA boundaries.

iii. Permittees with population equal to or greater than 50,000 in the permit coverage area shall conduct this monitoring at the first eight qualified monitoring locations (as listed sequentially among the potential monitoring locations defined in the RSMP QAPP) that are located within the jurisdiction's boundaries. Counties shall monitor the first four locations inside UGA boundaries and the first four locations outside UGA boundaries.

Permittees with population equal to or greater than 50,000 in the permit coverage area and located entirely inland (*i.e.*, having no Puget Sound shoreline boundary) shall conduct this monitoring at an additional four monitoring locations (as listed sequentially among the potential monitoring locations defined in the RSMP QAPP), for a total of 12 monitoring locations.

And

b. Beginning no later than October 1, 2015, Permittees with Puget Sound shoreline shall conduct sediment chemistry, mussel, and bacteria monitoring according to the Ecology-approved QAPPs for RSMP Marine Nearshore Status and Trends Monitoring.

i. Permittees with population less than 10,000 shall conduct this monitoring at the first two qualified monitoring locations each, for sediment and for mussels and bacteria (as listed sequentially among the potential monitoring locations defined in the RSMP QAPPs), that are located adjacent to the jurisdiction's Puget Sound shoreline boundary.

ii. Permittees with population equal to or greater than 10,000 and fewer than 50,000 in the permit coverage area shall conduct this monitoring at the first four qualified monitoring locations each, for sediment and for mussels and bacteria (as listed sequentially among the potential monitoring locations defined in the RSMP QAPPs), that are located adjacent to the jurisdiction's Puget Sound shoreline boundary.

iii. Permittees with population equal to or greater than 50,000 in the permit coverage area shall conduct this monitoring at the first six qualified monitoring locations each, for sediment and for mussels and bacteria (as listed sequentially among the potential monitoring locations defined in the RSMP QAPPs), that are located adjacent to the jurisdiction's Puget Sound shoreline boundary.

And

c. Data and analyses shall be reported annually in accordance with the Ecology-approved QAPPs.

C. Stormwater management program effectiveness studies. By December 1, 2013, each city and county Permittee listed in S1.D.2.a(i) and S1.D.2.a(ii) shall notify Ecology in writing which of the following two options for effectiveness studies the Permittee chooses to carry out during this permit cycle. Either option will fully satisfy the Permittee's obligations under this section (S8.C). Each Permittee shall select a single option for the duration of this permit term.

1. Effectiveness Studies Option #1: Each Permittee that chooses this option shall pay into a collective fund to implement RSMP effectiveness studies. The payments into the collective fund are due to Ecology annually beginning August 15, 2014. The payment amounts are (Permittees are listed alphabetically, by county):

Permittee	Annual payment amount	Permittee	Annual payment amount
Clallam Co.	N/A	Lewis Co.	N/A
Port Angeles	$7,885	Centralia	$6,334
Clark Co.	N/A	Pierce Co.	N/A
Battle Ground	$7,079	Bonney Lake	$6,790
Camas	$7,002	Buckley	$1,882
Vancouver	$67,335	DuPont	$3,226
Washougal	$5,716	Edgewood	$3,916
Cowlitz Co.	$1,384	Fife	$3,340
Kelso	$4,793	Fircrest	$2,581
Longview	$14,687	Gig Harbor	$3,059
Grays Harbor Co.	N/A	Lakewood	$23,938
Aberdeen	$6,693	Milton	$2,661
Island Co.	N/A	Orting	$2,541
Oak Harbor	$9,528	Puyallup	$15,826
King Co.	N/A	Steilacoom	$2,563
Algona	$1,129	Sumner	$3,694
Auburn	$28,182	University Place	$12,836
Bellevue	$50,001	Skagit Co.	$2,094
Black Diamond	$1,705	Burlington	$3,655
Bothell	$13,601	Anacortes	$6,835
Burien	$18,724	Mount Vernon	$12,620
Clyde Hill	$1,157	Sedro Woolley	$4,085

Covington	$7,177	Snohomish Co.	N/A
Des Moines	$11,916	Arlington	$7,030
Duvall	$2,437	Brier	$2,640
Enumclaw	$4,675	Edmonds	$16,640
Federal Way	$36,111	Everett	$42,352
Issaquah	$11,050	Granite Falls	$1,373
Kenmore	$8,401	Lake Stevens	$10,850
Kent	$45,721	Lynnwood	$14,711
Kirkland	$20,187	Marysville	$23,613
Lake Forest Park	$5,224	Mill Creek	$7,608
Maple Valley	$9,410	Monroe	$6,786
Medina	$1,212	Mountlake Terrace	$8,527
Mercer Island	$9,313	Mukilteo	$8,198
Newcastle	$4,050	Snohomish	$3,792
Normandy Park	$2,661	Thurston Co.	$21,395
Pacific	$2,565	Lacey	$16,326
Redmond	$21,899	Olympia	$18,511
Renton	$35,082	Tumwater	$6,823
Sammamish	$16,709	Whatcom Co.	$6,188
SeaTac	$10,533	Bellingham	$31,550
Shoreline	$22,205	Ferndale	$4,561
Tukwila	$7,405		
Woodinville	$4,618		
Kitsap Co.	$28,547		
Bainbridge Island	$9,512		
Bremerton	$14,724		
Port Orchard	$4,439		
Poulsbo	$3,643		

Or

2. Effectiveness Studies Option #2: Each Permittee that chooses this option shall conduct stormwater discharge monitoring in accordance with Appendix 9 and the following:

    a. By February 2, 2014, each Permittee shall submit to Ecology a draft stormwater discharge monitoring QAPP for review and approval. If

Ecology does not request changes within 90 days, the draft QAPP is considered approved. Final QAPPs shall be submitted to Ecology as soon as possible following finalization.

i. Each Permittee with population fewer than 10,000 in the permit coverage area shall conduct stormwater discharge monitoring at one discharge monitoring location.

ii. Each Permittee with population equal to or greater than 10,000 but fewer than 50,000 in the permit coverage area shall conduct stormwater discharge monitoring at two discharge monitoring locations.

iii. Each Permittee with population equal to or greater than 50,000 but fewer than 100,000 in the permit coverage area shall conduct stormwater discharge monitoring at three discharge monitoring locations.

iv. Each Permittee with population 100,000 or more in the permit coverage area shall conduct stormwater discharge monitoring at four discharge monitoring locations.

b. Permittees shall document in the QAPP why selected discharge monitoring locations are of interest for long term stormwater discharge monitoring and associated stormwater management program effectiveness evaluations. Permittees are encouraged to monitor at locations chosen and submitted in the annual reports that were due March 31, 2011.

c. Flow monitoring at discharge monitoring locations shall be implemented beginning no later than October 1, 2014. Stormwater discharge monitoring shall be fully implemented no later than October 1, 2015. All monitoring shall be conducted in accordance with an Ecology-approved QAPP.

D. Source identification and diagnostic monitoring. Each city and county Permittee listed in S1.D.2.a(i) and S1.D.2.a(ii) shall pay into a collective fund to implement the RSMP Source Identification Information Repository (SIDIR). The payments into the collective fund are due to Ecology annually beginning August 15, 2014. The payment amounts are (Permittees are listed alphabetically, by county):

Permittee	Annual payment amount	Permittee	Annual payment amount
Clallam Co.	N/A	Lewis Co.	N/A
Port Angeles	$731	Centralia	$587
Clark Co.	N/A	Pierce Co.	N/A
Battle Ground	$657	Bonney Lake	$630

Camas	$649	Buckley	$175
Vancouver	$6,245	DuPont	$299
Washougal	$530	Edgewood	$363
Cowlitz Co.	$128	Fife	$310
Kelso	$444	Fircrest	$239
Longview	$1,362	Gig Harbor	$284
Grays Harbor Co.	N/A	Lakewood	$2,220
Aberdeen	$621	Milton	$247
Island Co.	N/A	Orting	$236
Oak Harbor	$884	Puyallup	$1,468
King Co.	N/A	Steilacoom	$238
Algona	$105	Sumner	$343
Auburn	$2,614	University Place	$1,190
Bellevue	$4,637	Skagit Co.	$194
Black Diamond	$158	Burlington	$339
Bothell	$1,261	Anacortes	$634
Burien	$1,736	Mount Vernon	$1,170
Clyde Hill	$107	Sedro Woolley	$379
Covington	$666	Snohomish Co.	N/A
Des Moines	$1,105	Arlington	$652
Duvall	$226	Brier	$245
Enumclaw	$434	Edmonds	$1,543
Federal Way	$3,349	Everett	$3,928
Issaquah	$1,025	Granite Falls	$127
Kenmore	$779	Lake Stevens	$1,006
Kent	$4,240	Lynnwood	$1,364
Kirkland	$1,872	Marysville	$2,190
Lake Forest Park	$484	Mill Creek	$706
Maple Valley	$873	Monroe	$629
Medina	$112	Mountlake Terrace	$791
Mercer Island	$864	Mukilteo	$760
Newcastle	$376	Snohomish	$352
Normandy Park	$247	Thurston Co.	$1,984

Pacific	$238	Lacey	$1,514
Redmond	$2,031	Olympia	$1,717
Renton	$3,253	Tumwater	$633
Sammamish	$1,550	Whatcom Co.	$574
SeaTac	$977	Bellingham	$2,926
Shoreline	$2,059	Ferndale	$423
Tukwila	$687		
Woodinville	$428		
Kitsap Co.	$2,647		
Bainbridge Island	$882		
Bremerton	$1,365		
Port Orchard	$412		
Poulsbo	$338		

S9. REPORTING REQUIREMENTS

A. No later than March 31 of each year beginning in 2015, each Permittee shall submit an annual report. The reporting period for the first annual report will be from January 1, 2014 through December 31, 2014. The reporting period for all subsequent annual reports will be the previous calendar year unless otherwise specified.

Permittees shall submit annual reports electronically using Ecology's WQWebDMR available on Ecology's website at http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html unless otherwise directed by Ecology.

Permittees unable to submit electronically through Ecology's WQWebDMR must contact Ecology to request a waiver and obtain instructions on how to submit an annual report in an alternative format.

B. Each Permittee is required to keep all records related to this permit and the SWMP for at least five years.

C. Each Permittee shall make all records related to this permit and the Permittee's SWMP available to the public at reasonable times during business hours. The Permittee will provide a copy of the most recent annual report to any individual or entity, upon request.

1. A reasonable charge may be assessed by the Permittee for making photocopies of records.

2. The Permittee may require reasonable advance notice of intent to review records related to this Permit.

D. The annual report for cities, towns, and counties

Each annual report shall include the following:

1. A copy of the Permittee's current SWMP Plan as required by S5.A.2.

2. Submittal of the annual report form as provided by Ecology pursuant to S9.A, describing the status of implementation of the requirements of this permit during the reporting period.

3. Attachments to the annual report form including summaries, descriptions, reports, and other information as required, or as applicable, to meet the requirements of this permit during the reporting period. Refer to Appendix 3 for annual report questions.

4. If applicable, notice that the MS4 is relying on another governmental entity to satisfy any of the obligations under this permit.

5. Certification and signature pursuant to G19.D, and notification of any changes to authorization pursuant to G19.C.

6. A notification of any annexations, incorporations or jurisdictional boundary changes resulting in an increase or decrease in the Permittee's geographic area of permit coverage during the reporting period.

E. Annual report for Secondary Permittees

Each annual report shall include the following:

1. Submittal of the annual report form as provided by Ecology pursuant to S9.A, describing the status of implementation of the requirements of this permit during the reporting period.

2. Attachments to the annual report form including summaries, descriptions, reports, and other information as required, or as applicable, to meet the requirements of this permit during the reporting period. Refer to Appendix 4 for annual report questions.

3. If applicable, notice that the MS4 is relying on another governmental entity to satisfy any of the obligations under this permit.

4. Certification and signature pursuant to G19.D, and notification of any changes to authorization pursuant to G19.C.

5. A notification of any jurisdictional boundary changes resulting in an increase or decrease in the Secondary Permittee's geographic area of permit coverage during the reporting period.

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this Permit shall be consistent with the terms and conditions of this Permit.

G2. PROPER OPERATION AND MAINTENANCE

The Permittee shall at all times properly operate and maintain all facilities and systems of collection, treatment, and control (and related appurtenances) which are installed or used by the Permittee for pollution control to achieve compliance with the terms and conditions of this Permit.

G3. NOTIFICATION OF DISCHARGE, INCLUDING SPILLS

If a Permittee has knowledge of a discharge, including spills, into or from a MS4 which could constitute a threat to human health, welfare, or the environment, the Permittee shall

A. Take appropriate action to correct or minimize the threat to human health, welfare and/or the environment.

B. Notify the Ecology regional office and other appropriate spill response authorities immediately but in no case later than within 24 hours of obtaining that knowledge. The Ecology Northwest Regional Office 24-hour number is 425-649-7000 and for the Southwest Regional Office the number is 360-407-6300.

C. Immediately report spills or other discharges which might cause bacterial contamination of marine waters, such as discharges resulting from broken sewer lines and failing onsite septic systems, to the Ecology regional office and to the Department of Health, Shellfish Program. The Department of Health's shellfish number is 360-236-3330 (business hours) or 360-789-8962 (24-hours).

D. Immediately report spills or discharges of oils or hazardous substances to the Ecology regional office and to the Washington Emergency Management Division at 1-800-258-5990.

G4. BYPASS PROHIBITED

The intentional bypass of stormwater from all or any portion of a stormwater treatment BMP whenever the design capacity of the treatment BMP is not exceeded, is prohibited unless the following conditions are met:

A. Bypass is: (1) unavoidable to prevent loss of life, personal injury, or severe property damage; or (2) necessary to perform construction or maintenance-related activities essential to meet the requirements of the Clean Water Act (CWA); and

B. There are no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated stormwater, or maintenance during normal dry periods.

"Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

G5. RIGHT OF ENTRY

The Permittee shall allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law at reasonable times:

A. To enter upon the Permittee's premises where a discharge is located or where any records must be kept under the terms and conditions of this Permit;

B. To have access to, and copy at reasonable cost and at reasonable times, any records that must be kept under the terms of the Permit;

C. To inspect at reasonable times any monitoring equipment or method of monitoring required in the Permit;

D. To inspect at reasonable times any collection, treatment, pollution management, or discharge facilities; and

E. To sample at reasonable times any discharge of pollutants.

G6. DUTY TO MITIGATE

The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this Permit which has a reasonable likelihood of adversely affecting human health or the environment.

G7. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G8. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in the Permit shall be construed as excusing the Permittee from compliance with any other applicable federal, state, or local statutes, ordinances, or regulations.

G9. MONITORING

A. Representative Sampling:

Samples and measurements taken to meet the requirements of this Permit shall be representative of the volume and nature of the monitored discharge, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

B. Records Retention:

The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for this permit, for a period of at least five years. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by the Ecology. On request, monitoring data and analysis shall be provided to Ecology.

C. Recording of Results:

For each measurement or sample taken, the Permittee shall record the following information: (1) the date, exact place and time of sampling; (2) the individual who performed the sampling or measurement; (3) the dates the analyses were performed; (4) who performed the analyses; (5) the analytical techniques or methods used; and (6) the results of all analyses.

D. Test Procedures:

All sampling and analytical methods used to meet the monitoring requirements in this Permit shall conform to the Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 CFR Part 136, unless otherwise specified in this permit or approved in writing by Ecology.

E. Flow Measurement:

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements is consistent with the accepted industry standard for that type of device. Frequency of calibration shall be in conformance with manufacturer's recommendations or at a minimum frequency of at least one calibration per year. Calibration records should be maintained for a minimum of three years.

F. Lab Accreditation:

All monitoring data, except for flow, temperature, conductivity, pH, total residual chlorine, and other exceptions approved by Ecology, shall be prepared by a laboratory registered or accredited under the provisions of, Accreditation of Environmental Laboratories, chapter 173-50 WAC. Soils and hazardous waste data are exempted from this requirement pending accreditation of laboratories for analysis of these media by Ecology. Quick methods of field detection of pollutants including nutrients, surfactants, salinity, and other parameters are exempted from this requirement when the purpose of the sampling is identification and removal of a suspected illicit discharge.

G. Additional Monitoring:

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G10. REMOVED SUBSTANCES

With the exception of decant from street waste vehicles, the Permittee shall not allow collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater to be resuspended or reintroduced to the storm sewer system or to waters of the state. Decant from street waste vehicles resulting from cleaning stormwater facilities may be reintroduced only when other practical means are not available and only in accordance with the Street Waste Disposal Guidelines in Appendix 6. Solids generated from maintenance of the MS4 may be reclaimed, recycled, or reused when allowed by local codes and ordinances. Soils that are identified as contaminated pursuant to chapter 173-350 WAC shall be disposed at a qualified solid waste disposal facility (see Appendix 6).

G11. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit shall not be affected thereby.

G12. REVOCATION OF COVERAGE

The director may terminate coverage under this General Permit in accordance with chapter 43.21B RCW and chapter 173-226 WAC. Cases where coverage may be terminated include, but are not limited to the following:

A. Violation of any term or condition of this general permit;

B. Obtaining coverage under this general permit by misrepresentation or failure to disclose fully all relevant facts;

C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

D. A determination that the permitted activity endangers human health or the environment, or contributes significantly to water quality standards violations;

E. Failure or refusal of the Permittee to allow entry as required in chapter 90.48.090 RCW;

F. Nonpayment of permit fees assessed pursuant to chapter 90.48.465 RCW;

Revocation of coverage under this general permit may be initiated by Ecology or requested by any interested person.

G13. TRANSFER OF COVERAGE

The director may require any discharger authorized by this General Permit to apply for and obtain an individual permit in accordance with chapter 43.21B RCW and chapter 173-226 WAC.

G14. GENERAL PERMIT MODIFICATION AND REVOCATION

This General Permit may be modified, revoked and reissued, or terminated in accordance with the provisions of WAC 173-226-230. Grounds for modification, revocation and reissuance, or termination include, but are not limited to the following:

A. A change occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this General Permit;

B. Effluent limitation guidelines or standards are promulgated pursuant to the CWA or chapter 90.48 RCW, for the category of dischargers covered under this General Permit;

C. A water quality management plan containing requirements applicable to the category of dischargers covered under this General Permit is approved; or

D. Information is obtained which indicates that cumulative effects on the environment from dischargers covered under this General Permit are unacceptable.

E. Changes in state law that reference this permit.

G15. REPORTING A CAUSE FOR MODIFICATION OR REVOCATION

A Permittee who knows or has reason to believe that any activity has occurred or will occur which would constitute cause for modification or revocation and reissuance under Condition G12, G14, or 40 CFR 122.62 must report such plans, or such information, to Ecology so that a decision can be made on whether action to modify, or revoke and reissue this Permit will be required. Ecology may then require submission of a new or amended application. Submission of such application does not relieve the Permittee of the duty to comply with this Permit until it is modified or reissued.

G16. APPEALS

A. The terms and conditions of this General Permit, as they apply to the appropriate class of dischargers, are subject to appeal within thirty days of issuance of this General Permit, in accordance with chapter 43.21B RCW, and chapter 173-226 WAC.

B. The terms and conditions of this General Permit, as they apply to an individual discharger, are appealable in accordance with chapter 43.21B RCW within thirty days of the effective date of coverage of that discharger. Consideration of an appeal of General Permit coverage of an individual discharger is limited to the General Permit's applicability or nonapplicability to that individual discharger.

C. The appeal of General Permit coverage of an individual discharger does not affect any other dischargers covered under this General Permit. If the terms and conditions of this General Permit are found to be inapplicable to any individual discharger(s), the matter shall be remanded to Ecology for consideration of issuance of an individual permit or permits.

D. Modifications of this Permit are appealable in accordance with chapter 43.21B RCW and chapter 173-226 WAC.

G17. PENALTIES

40 CFR 122.41(a)(2) and (3), 40 CFR 122.41(j)(5), and 40 CFR 122.41(k)(2) are hereby incorporated into this Permit by reference.

G18. DUTY TO REAPPLY

The Permittee shall apply for permit renewal at least 180 days prior to the specified expiration date of this permit.

G19. CERTIFICATION AND SIGNATURE

All formal submittals to Ecology shall be signed and certified.

A. All permit applications shall be signed by either a principal executive officer or ranking elected official.

B. All formal submittals required by this Permit shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to Ecology, and

2. The authorization specifies either an individual or a position having responsibility for the overall development and implementation of the stormwater management program. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

C. Changes to authorization. If an authorization under condition G19.B.2 is no longer accurate because a different individual or position has responsibility for the overall development and implementation of the stormwater management program, a new authorization satisfying the requirements of condition G19.B.2 must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a formal submittal under this Permit shall make the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that Qualified Personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for willful violations."

G20. NON-COMPLIANCE NOTIFICATION

In the event a Permittee is unable to comply with any of the terms and conditions of this Permit, the Permittee must:

A. Notify Ecology of the failure to comply with the permit terms and conditions in writing within 30 days of becoming aware that the non-compliance has occurred. The written notification must include all of the following:

1. A description of the non-compliance, including dates.

2. Beginning and end dates of the non-compliance, and if the compliance has not been corrected, the anticipated date of correction.

3. Steps taken or planned to reduce, eliminate, or prevent reoccurrence of the non-compliance.

B. Take appropriate action to stop or correct the condition of non-compliance.

G21. UPSETS

Permittees must meet the conditions of 40 CFR 122.41(n) regarding "Upsets." The conditions are as follows:

A. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (C) of this condition are met. Any determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, will not constitute final administrative action subject to judicial review.

C. Conditions necessary for demonstration of upset. A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset;

2. The permitted facility was at the time being properly operated; and

3. The Permittee submitted notice of the upset as required in 40 CFR 122.41(l)(6)(ii)(B) (24-hour notice of noncompliance).

4. The Permittee complied with any remedial measures required under 40 CFR 122.41(d) (Duty to Mitigate).

D. Burden of proof. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

DEFINITIONS AND ACRONYMS

This section includes definitions for terms used in the body of the permit and in all the appendices except Appendix 1. Terms defined in Appendix 1 are necessary to implement requirements related to Appendix 1.

40 CFR means Title 40 of the Code of Federal Regulations, which is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

AKART means all known, available, and reasonable methods of prevention, control and treatment. See also State Water Pollution Control Act, chapter 90.48.010 RCW and chapter 90.48.520 RCW.

All known, available and reasonable methods of prevention, control and treatment refers to the State Water Pollution Control Act, chapter 90.48.010 RCW and chapter 90.48.520 RCW.

Applicable TMDL means a TMDL which has been approved by EPA on or before the issuance date of this Permit, or prior to the date that Ecology issues coverage under this Permit, whichever is later.

Beneficial Uses means uses of waters of the state which include but are not limited to use for domestic, stock watering, industrial, commercial, agricultural, irrigation, mining, fish and wildlife maintenance and enhancement, recreation, generation of electric power and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.

Best Management Practices are the schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices approved by Ecology that, when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts to waters of Washington State.

BMP means Best Management Practice.

Bypass means the diversion of stormwater from any portion of a stormwater treatment facility.

Census defined urban area means Urbanized Area.

Circuit means a portion of a MS4 discharging to a single point or serving a discrete area determined by traffic volumes, land use, topography or the configuration of the MS4.

Component or **Program Component** means an element of the Stormwater Management Program listed in S5 Stormwater Management Program for Cities, Towns, and Counties or S6 Stormwater Management Program for Secondary Permittees, S7 Compliance with Total Maximum Daily Load Requirements, or S8 Monitoring of this permit.

Co-Permittee means an owner or operator of an MS4 which is in a cooperative agreement with at least one other applicant for coverage under this permit. A Co-Permittee is an owner or operator of a regulated MS4 located within or in proximity to another regulated MS4. A Co-Permittee is only responsible permit conditions relating to discharges from the MS4 the Co-Permittee owns or operates. See also 40 CFR 122.26(b)(1)

CWA means Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. (6-483 and Pub. L. 97-117, 33 U.S.C. 1251 et.seq).

Director means the Director of the Washington State Department of Ecology, or an authorized representative.

Entity means a governmental body, or a public or private organization.

EPA means the U.S. Environmental Protection Agency.

General Permit means a permit which covers multiple dischargers of a point source category within a designated geographical area, in lieu of individual permits being issued to each discharger.

Ground water means water in a saturated zone or stratum beneath the surface of the land or below a surface water body. Refer to chapter 173-200 WAC.

Hazardous substance means any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the physical, chemical, or biological properties described in WAC 173-303-090 or WAC 173-303-100.

Heavy equipment maintenance or storage yard means an uncovered area where any heavy equipment, such as mowing equipment, excavators, dump trucks, backhoes, or bulldozers are washed or maintained, or where at least five pieces of heavy equipment are stored on a long-term basis.

Highway means a main public road connecting towns and cities.

Hydraulically near means runoff from the site discharges to the sensitive feature without significant natural attenuation of flows that allows for suspended solids removal. See Appendix 7 Determining Construction Site Sediment Damage Potential for a more detailed definition.

Hyperchlorinated means water that contains more than 10 mg/Liter chlorine.

Illicit connection means any infrastructure connection to the MS4 that is not intended, permitted or used for collecting and conveying stormwater or non-stormwater discharges allowed as specified in this permit (S5.C.3 and S6.D.3). Examples include sanitary sewer connections, floor drains, channels, pipelines, conduits, inlets, or outlets that are connected directly to the MS4.

Illicit discharge means any discharge to a MS4 that is not composed entirely of stormwater or of non-stormwater discharges allowed as specified in this permit (S5.C.3 and S6.D.3).

Impervious surface means a non-vegetated surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A non-vegetated surface area which causes water to run off the surface in greater quantities or at an

increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or stormwater areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

Land disturbing activity means any activity that results in a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered land disturbing activity. Vegetation maintenance practices, including landscape maintenance and gardening, are not considered land disturbing activity. Stormwater facility maintenance is not considered land disturbing activity if conducted according to established standards and procedures.

LID means Low Impact Development.

LID BMP means low impact development best management practices.

LID Principles means land use management strategies that emphasize conservation, use of on-site natural features, and site planning to minimize impervious surfaces, native vegetation loss, and stormwater runoff.

Low Impact Development means a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

Low impact development best management practices means distributed stormwater management practices, integrated into a project design, that emphasize pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration. LID BMPs include, but are not limited to, bioretention/rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, vegetated roofs, minimum excavation foundations, and water re-use.

Material Storage Facilities means an uncovered area where bulk materials (liquid, solid, granular, etc.) are stored in piles, barrels, tanks, bins, crates, or other means.

Maximum Extent Practicable refers to paragraph 402(p)(3)(B)(iii) of the federal Clean Water Act which reads as follows: Permits for discharges from municipal storm sewers shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques, and system, design, and engineering methods, and other such provisions as the Administrator or the State determines appropriate for the control of such pollutants.

MEP means Maximum Extent Practicable.

MS4 means municipal separate storm sewer system.

Municipal Separate Storm Sewer System means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of Washington State.

(ii) Designed or used for collecting or conveying stormwater.

(iii) Which is not a combined sewer;

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.; and

(v) Which is defined as "large" or "medium" or "small" or otherwise designated by Ecology pursuant to 40 CFR 122.26.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking, and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the state from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington Department of Ecology.

Native vegetation means vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and which reasonably could have been expected to naturally occur on the site. Examples include trees such as Douglas Fir, western hemlock, western red cedar, alder, big-leaf maple; shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.

New development means land disturbing activities, including Class IV General Forest Practices that are conversions from timber land to other uses; structural development, including construction or installation of a building or other structure; creation of hard surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development. Refer to Appendix 1 for a definition of hard surfaces.

New Permittee means a city, town, or county that is subject to the *Western Washington Municipal Stormwater General Permit* and was not subject to the permit prior to August 1, 2013.

New Secondary Permittee means a Secondary Permittee that is covered under a municipal stormwater general permit and was not covered by the permit prior to August 1, 2013.

NOI means Notice of Intent.

Notice of Intent means the application for, or a request for coverage under a General Permit pursuant to WAC 173-226-200.

Notice of Intent for Construction Activity means the application form for coverage under the *Construction Stormwater General Permit.*

Notice of Intent for Industrial Activity means the application form for coverage under the *General Permit for Stormwater Discharges Associated with Industrial Activities*.

NPDES means National Pollutant Discharge Elimination System.

Outfall means point source as defined by 40 CFR 122.2 at the point where a discharge leaves the MS4 and discharges to waters of the State. Outfall does not include pipes, tunnels, or other conveyances which connect segments of the same stream or other surface waters and are used to convey primarily surface waters (i.e. culverts).

Permittee unless otherwise noted, the term "Permittee" includes city, town, or county Permittee, Co-Permittee, New Permittee, Secondary Permittee, and New Secondary Permittee.

Physically Interconnected means that one MS4 is connected to another storm sewer system in such a way that it allows for direct discharges to the second system. For example, the roads with drainage systems and municipal streets of one entity are physically connected directly to a storm sewer system belonging to another entity.

Project site means that portion of a property, properties, or right-of-ways subject to land disturbing activities, new hard surfaces, or replaced hard surfaces. Refer to Appendix 1 for a definition of hard surfaces.

QAPP means Quality Assurance Project Plan.

Qualified Personnel means someone who has had professional training in the aspects of stormwater management for which they are responsible and are under the functional control of the Permittee. Qualified Personnel may be staff members, contractors, or volunteers.

Quality Assurance Project Plan means a document that describes the objectives of an environmental study and the procedures to be followed to achieve those objectives.

RCW means the Revised Code of Washington State.

Receiving waters means bodies of water or surface water systems to which surface runoff is discharged via a point source of stormwater or via sheet flow. Receiving waters may also be ground water to which surface runoff is directed by infiltration.

Redevelopment means, on a site that is already substantially developed (i.e., has 35% or more of existing hard surface coverage), the creation or addition of hard surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; replacement of hard surface that is not part of a routine maintenance activity; and land disturbing activities. Refer to Appendix 1 for a definition of hard surfaces.

Regional Stormwater Monitoring Program means, for all of western Washington, a stormwater-focused monitoring and assessment program consisting of these components: status and trends monitoring in small streams and marine nearshore areas, stormwater management program effectiveness studies, and a source identification information repository (SIDIR). The priorities and scope for the RSMP are set by a formal stakeholder group. For this permit term, RSMP status and trends monitoring will be conducted in the Puget Sound basin only.

Regulated Small Municipal Separate Storm Sewer System means a Municipal Separate Storm Sewer System which is automatically designated for inclusion in the Phase II stormwater permitting program by its location within an Urbanized Area, or by designation by Ecology and is not eligible for a waiver or exemption under S1.C.

RSMP means Regional Stormwater Monitoring Program.

Runoff is water that travels across the land surface and discharges to water bodies either directly or through a collection and conveyance system. See also "Stormwater."

Secondary Permittee is an operator of a regulated small MS4 which is not a city, town or county. Secondary Permittees include special purpose districts and other public entities that meet the criteria in S1.B.

Sediment/Erosion-Sensitive Feature means an area subject to significant degradation due to the effect of construction runoff, or areas requiring special protection to prevent erosion. See Appendix 7 Determining Construction Site Sediment Transport Potential for a more detailed definition.

Shared water bodies means water bodies, including downstream segments, lakes and estuaries that receive discharges from more than one Permittee.

SIDIR means Source Identification Information Repository.

Significant contributor means a discharge that contributes a loading of pollutants considered to be sufficient to cause or exacerbate the deterioration of receiving water quality or instream habitat conditions.

Small Municipal Separate Storm Sewer System means an MS4 that is not defined as "large" or "medium" pursuant to 40 CFR 122.26(b)(4) & (7) or designated under 40 CFR 122.26 (a)(1)(v).

Source control BMP means a structure or operation that is intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants. The *SWMMWW* (2012) separates source control BMPs into two types. Structural Source Control BMPs are physical, structural, or mechanical devices, or facilities that are intended to prevent pollutants from entering stormwater. Operational BMPs are non-structural practices that prevent or reduce pollutants from entering stormwater. See Volume IV of the *SWMMWW* (2012) for details.

Stormwater means runoff during and following precipitation and snowmelt events, including surface runoff, drainage or interflow.

Stormwater Associated with Industrial and Construction Activity means the discharge from any conveyance which is used for collecting and conveying stormwater, which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant, or associated with clearing, grading and/or excavation, and is required to have an NPDES permit in accordance with 40 CFR 122.26.

Stormwater Management Program means a set of actions and activities designed to reduce the discharge of pollutants from the MS4 to the MEP and to protect water quality, and comprising the components listed in S5 (for cities, towns and counties) or S6 (for Secondary Permittees) of this Permit and any additional actions necessary to meet the requirements of

applicable TMDLs pursuant to S7 *Compliance with TMDL Requirements*, and S8 *Monitoring and Assessment*.

Stormwater Treatment and Flow Control BMPs/Facilities means detention facilities, treatment BMPs/facilities, bioretention, vegetated roofs, and permeable pavements that help meet Appendix 1 Minimum Requirements #6 (treatment), #7 (flow control), or both.

SWMMWW means *Stormwater Management Manual for Western Washington (2005).*

SWMP means Stormwater Management Program.

TMDL means Total Maximum Daily Load.

Total Maximum Daily Load means a water cleanup plan. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated. The calculation must also account for seasonable variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. The Clean Water Act, section 303, establishes the water quality standards and TMDL programs.

Tributary conveyance means pipes, ditches, catch basins, and inlets owned or operated by the Permittee and designed or used for collecting and conveying stormwater.

UGA means Urban Growth Area.

Urban Growth Area means those areas designated by a county pursuant to RCW 36.70A.110.

Urbanized Area is a federally-designated land area comprising one or more places and the adjacent densely settled surrounding area that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile. Urbanized Areas are designated by the U.S. Census Bureau based on the most recent decennial census.

Vehicle Maintenance or Storage Facility means an uncovered area where any vehicles are regularly washed or maintained, or where at least 10 vehicles are stored.

Water Quality Standards means Surface Water Quality Standards, chapter 173-201A WAC, Ground Water Quality Standards, chapter 173-200 WAC, and Sediment Management Standards, chapter 173-204 WAC.

Waters of the State includes those waters as defined as "waters of the United States" in 40 CFR Subpart 122.2 within the geographic boundaries of Washington State and "waters of the state" as defined in chapter 90.48 RCW which includes lakes, rivers, ponds, streams, inland waters, underground waters, salt waters and all other surface waters and water courses within the jurisdiction of the State of Washington.

Waters of the United States refers to the definition in 40 CFR 122.2.

Updated July 31, 2013

Washington Department of Ecology

Errata for 2013-2018 Western Washington Municipal Stormwater Permit

Issued on August 1, 2012

Permit Errata:

1. Page 10, S1.D.3.b, second sentence: Delete the second word "joint" that refers to the NOI.

2. Page 25, S5.C.4.a: In each of the first three paragraphs, the reference "*S5.C.5.a(i) through (iii)*" is incorrect. In all three, the reference is as follows: *"The local program adopted to meet the requirements of S5.C.4.a.(i) through (iii), below shall apply to all applications submitted……"*

3. Page 30, S5.C.4.g: The correct reference is to S5.C.5.c of the Phase I permit.

4. Page 32, footnote #28 should read: "New permittees shall begin annual inspections of municipally owned ~~and~~ or operated…."

5. Page 43, S.8.A Monitoring and Assessment, second paragraph, line 2: The statement says Regional Stormwater Management Program for "RSMP" instead of Regional Stormwater Monitoring Program.

6. Page 45, S8.B.2.a: Replace "July 31, 2014" with "October 31, 2014".

7. Page 60: Definition of Co-Permittee, missing word in third sentence: "*A Co-Permittee is only responsible for permit conditions relating to discharges from the MS4 the Co-Permittee owns or operates."*

8. Page 66: The acronym SWMMWW refers to the 2012 *Stormwater Management Manual for Western Washington* (rather than the 2005 manual).

9. Appendix 3: In order to provide an electronic method for annual reporting, Ecology will have to break-up several annual report questions into separate parts. Here is a listing of the annual report questions affected by this formatting change:

    - Annual report question (Q)7 now has a separate Q7b: "Attach description of how this requirement was met."
    - Q9 now has a separate Q9b: "List the website address in Comments field"
    - Q12 now has a separate Q12b: "Cite the Prohibited Discharge code reference in Comments field"

- Q17 now has a separate Q17b: "Describe information sharing actions in Comments field."
- Q23 now has a separate Q23b: "Cite code reference for revised ordinance or other enforceable mechanism to address runoff from new development, redevelopment and construction sites in Comments field."
- Q44 now has a separate Q44b: "Please note in the Comments field what kinds of facilities are covered by this alternative maintenance standard. (S5.C.5.a)"
- Q67 now has a separate Q67b: "List permit conditions described in non-compliance notification(s) in Comments field."

10. Appendix 3: Add question 13b to question 13: *"Cite methodology in Comments field."*

11. Appendix 3: Revise the permit reference in question 56 to "S8.A".

12. Appendix 3: Revise the permit reference in question 57 to "S8.B.1".

13. Appendix 3: Revise the permit reference in question 57b to "S8.B.2".

14. Appendix 3: Delete question 58b and renumber 58c to be 58b.

15. Appendix 3: Revise the permit reference in question 58 to "S8.C.1".

16. Appendix 3: Revise the permit reference in question 58b to "S8.C.2".

17. Appendix 3: Revise the permit reference in question 59 to "S8.D.1".

18. Appendix 3: In question 57b, replace "July 31, 2014" with "October 31, 2014".

19. Appendix 4: In order to provide an electronic method for annual reporting, Ecology will have to break-up several annual report questions into separate parts. Here is a listing of the annual report questions affected by this formatting change:
    - Annual report question (Q) 10 now has a separate Q10b: "[If applicable,] made the map available on request to Ecology or others."
    - Q13 now has a separate Q13b: "Attach a summary of each illicit discharge discovered and actions taken to eliminate each of the discharges. (S6.D.3.d)"

20. Appendix 8: In order to provide an electronic method for annual reporting, Ecology will have to break-up several annual report questions into separate parts. Here is a listing of the annual report questions affected by this formatting change:

- Annual report question (Q) 7 now has a separate Q7b: “Attach description of how this requirement was met.”
- Q9 now has a separate Q9b: “List the website address in Comments field”
- Q12 now has a separate Q12b: “Cite reference for ordinance or other regulatory mechanism to meet this requirement in Comments field.”
- Q14 now has a separate Q14b: “Cite methodology used in the Comments section.”
- Q16 now has a separate Q16c: “Provide hotline telephone number in the Comments field.”
- Q18 now has a separate Q18b: “Describe activities in Comments field.”
- Q24 now has a separate Q24b: “Cite the jurisdiction code reference used to meet this requirement in Comments field.”
- Q40 now has a separate Q40b: “Attach documentation of any maintenance delays. (S5.C.4.c.vi).”
- Q46 now has a separate Q46b: “Please note in the Comments field what kinds of facilities are covered by this alternative maintenance standard. (S5.C.5.a)”
- Q66 now has a separate Q66b: “List permit conditions described in non-compliance notification(s) in Comments field.”

21. Appendix 8: Revise the permit reference in question 58 to “S8.A”.

22. Appendix 9, Page 4, first sub-bullet under Organics: Correct the spelling of “dibenzo(a,h)” to “dibenzo(a,h)anthracene”.

23. Appendix 9, Page 4, second sub-bullet under Organics: Correct the spelling of “dichlobenyl” to “dichlobenil”.

24. Appendix 9, Page 4, second bullet under “Grab Samples”: delete “The lube oil fraction, not the diesel fraction, is targeted for NWTPH-Dx.”

25. Appendix 9, Page 5, first sub-bullet under Organics: Correct the spelling of “2,6-dimethylnapthalene” to “2,6-dimethylnaphthalene” and “2-ethylnapthalene” to “2-methylnaphthalene”.

26. Appendix 9, Page 9, Table A9-1, first row of second column under “Petroleum Hydrocarbons”: delete “or EPA SW-846 method 8015B; lube oil fraction”.

27. Appendix 9, Page 9, Table A9-1, the last sentence of the footnote a should read: “For non-detect values below the reporting limit, report results at the method detection limit from the lab and the qualifier of “U” for undetected at that concentration.”

28. Appendix 9 – At the back of Appendix 9, add the laboratory method for Wet Sieving and Mass Measurement for Laser Diffraction Analysis (from Appendix 9, of the Phase I Municipal Stormwater Permit effective September 1, 2012 pages 4-7). Available online here: www.ecy.wa.gov/programs/wq/stormwater/municipal/MUNIdocs/Appendix9errata.pdf

Response to Comments Errata:

1. Part III – Response to Comments on Western Washington Phase II Permit, page 9, add the words "more than" (see below) to the Response, which describes the rationale for allowing more than two years for projects with costs greater than $25,000.

   Comment: S5.C.4.c.iii - Clarify the purpose of language regarding construction of less than $25,000 as well as the category for circumstances beyond the Permittee's control.

   Response: Ecology provided a timeline of more than two years for capital construction costs of greater than $25,000 because it is anticipated that those projects need additional planning or implementation time compared to other maintenance projects. For larger, more expensive projects, Ecology recognizes the permittee may need to go through capital planning, with timeframes that could extend beyond the term of this permit. Circumstances beyond the control of the permittee may also result in failure to meet the designated timelines. Permittees must document the circumstances and how they were beyond the Permittee's control. The permit provides a list of circumstances that would justify a delay beyond the timelines in the permit.

Attachment L
Port of Vancouver Industrial General Stormwater Permit

Issuance Date: October 21, 2009
Effective Date: January 1, 2010
Expiration Date: January 1, 2015

Modification Issuance Date: May 16, 2012
Modification Effective Date: July 1, 2012

INDUSTRIAL STORMWATER GENERAL PERMIT

A National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated With Industrial Activities

State of Washington
Department of Ecology
Olympia, Washington 98504-7600

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

Until this permit expires, is modified or revoked, Permittees that have properly obtained coverage under this general permit are authorized to discharge in accordance with the special and general conditions which follow.

Kelly Susewind, P.E., P.G. Manager
Water Quality Program
Washington State Department of Ecology

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SUMMARY OF PERMIT REPORTS & SUBMITTALS

Permit Section	Submittal	Frequency	Due Date(s)
S1.F	Conditional "No Exposure" Certification Form	As necessary	As necessary
S2.B	*Application* for Permit Coverage	As necessary	As necessary
S2.B.	Request Modification of Permit Coverage	As necessary	As necessary
S2.D	Request Transfer of Coverage	As necessary	As necessary
S9.A	Discharge Monitoring Reports (DMRs)	1/quarter	within 45 days after the end of each quarter
S9.B	Annual Report	1/year	May 15th (except 2010)
S9.C.	SWPPP, if requested by *Ecology*	Per *Ecology* request	Within 14 days of request
S9.E	Noncompliance Notification	As necessary	Within 30 days of noncompliance event

SUMMARY OF REQUIRED ONSITE DOCUMENTATION[1]

Permit Condition(s)	Document Title
S3.A.4.a	*Stormwater Pollution Prevention Plan* (SWPPP)[2]
S9.B	Copies of Annual Reports
S9.C.1.a	Copy of Permit
S9.C.1.b	Copy of Permit Coverage Letter
S9.C.1.c	Original Sampling Records (Field Notes and Laboratory Reports)
S7.C & S9.C.1.d	Site Inspection Reports
S9.C.1.j	Copies of Discharge Monitoring Reports (DMRs)

[1] A complete list is contained in Condition S9.C. The permittee shall make all plans, documents and records required by this permit immediately available to Ecology or the local jurisdiction upon request.
[2] With signed and completed SWPPP Certification Form(s) – see Appendix 3

SPECIAL CONDITIONS

S1. PERMIT COVERAGE

A. Facilities Required to Seek Coverage Under This General Permit

This statewide permit applies to *facilities* conducting *industrial activities* that *discharge stormwater* to a surface water body or to a *storm sewer* system that drains to a surface water body. Beginning on the effective date of this permit and lasting through its expiration date, the Permittee is authorized to *discharge stormwater* and conditionally approved non-stormwater *discharges* to *waters of the state*. All *discharge*s and activities authorized by this permit shall be consistent with the terms and conditions of this permit.

The permit requires coverage for private entities, state, and *local government* facilities, and includes *existing facilities* and *new facilities*. Facilities conducting industrial activities listed in Table 1 or referenced in S1.A3 shall apply for coverage under this permit or apply for a Conditional No Exposure exemption, if eligible (Condition S1.F). The *Department of Ecology (Ecology)* may also require permit coverage for any *facility* on a case-by-case basis in order to protect *waters of the state* (Condition S1.B).

1. Facilities engaged in any industrial activities in Table 1 shall apply for coverage if *stormwater* from the *facility discharge*s to a surface water body, or to a *storm sewer* system that *discharge*s to a surface water body. The *Standard Industrial Classification (SIC)* groups generally, but not always, associated with these activities are listed in Table 1.

Table 1: Activities Requiring Permit Coverage and the Associated SIC Code Groups

Industrial Activities	SIC Code
Metal Mining	10xx
Coal Mining	12xx
Oil and Gas Extraction	13xx
Mining and Quarrying of Nonmetallic Minerals, except Fuels (except facilities in SIC Codes 1411, 1422, 1423, 1429, 1442, 1446, 1445, 1459, and 1499; these facilities are covered under the Sand and Gravel General Permit)	14xx
Food and Kindred Products	20xx
Tobacco Products	21xx
Textile Mill Products	22xx
Apparel and Other Finished Products Made from Fabrics and Similar Material	23xx
Lumber and Wood Products	24xx
Furniture and Fixtures	25xx
Paper and Allied Products	26xx
Printing, Publishing and Allied Industries	27xx
Chemicals and Allied Products	28xx
Petroleum Refining and Related Industries (Except facilities in SIC 2951; these facilities are covered under the Sand and Gravel General Permit)	29xx
Rubber and Miscellaneous Products	30xx
Leather and Leather Products	31xx
Stone, Clay, Glass, and Concrete Products (Except facilities in SIC 3272-3273; these	32xx

Industrial Activities	SIC Code
facilities are covered under the Sand and Gravel General Permit)	
Primary Metal Industries	33xx
Fabricated Metal Products	34xx
Industrial and Commercial Machinery and Computer Equipment	35xx
Electronic and Other Electrical Equipment and Components	36xx
Transportation Equipment	37xx
Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks	38xx
Miscellaneous Manufacturing Industries	39xx
Farm Product Storage	4221
Refrigerated Storage	4222
General Storage	4225
Recycling facilities involved in the recycling of materials, including but not limited to, metal scrap yards, battery reclaimers, salvage yards, auto recyclers, and automobile junkyards.	5015 and 5093
Steam Electric Power Generation	N/A
Active *landfills*, including, but not limited to, wood waste and inert *landfills*, transfer stations, open dumps, compost facilities, and *land application sites*, except as described in S1.C.6 or C.7.	4953
Hazardous waste treatment, storage, and disposal (TSD) facilities, and recycling facilities regulated under Chapter 173-303 WAC.	N/A
Treatment works treating domestic sewage, or any other sewage sludge, or wastewater treatment device or system, used in the storage, recycling, and reclamation of municipal or domestic sewage (including land dedicated to the disposal of sewage sludge that are located within the confines of the *facility*) with the design flow capacity of 1 million gallons per day (MGD) or more, or required to have a pretreatment program under *40 CFR* §403.	4952
Transportation facilities which have *vehicle maintenance* activity, equipment cleaning operations, or airport deicing operations: • Railroad Transportation • Local and Suburban Transit and Interurban Highway Passenger Transportation • Motor Freight Transportation (except SIC 4221–25) • United States Postal Service • Water Transportation • Air Transportation • Petroleum Bulk Stations and Terminals	 40xx 41xx 42xx 43xx 44xx 45xx 5171

2. Any *facility* that has an existing *National Pollutant Discharge Elimination System (NPDES)* permit which does not address all *stormwater discharges associated with industrial activity* [*40 CFR* Subpart 122.26(b)(14)] shall obtain permit coverage.

3. Any *inactive facility* which is listed under *40 CFR* Subpart 122.26(b)(14) where *significant materials* remain onsite and are exposed to *stormwater* shall obtain permit coverage.

B. Significant Contributors of Pollutants

Ecology may require a *facility* to obtain coverage under this permit if *Ecology* determines the *facility*:

1. Is a *significant contributor of pollutants* to *waters of the state*, including *ground water*;

2. May reasonably be expected to cause a violation of any *water quality standard*; or

3. Conducts *industrial activity*, or has a SIC code, with *stormwater* characteristics similar to any *industrial activity* or SIC code listed in Table 1 in S1.A1.

C. Facilities Not Required to Obtain Coverage

Ecology does not require the types of facilities listed below to obtain coverage under this permit, unless determined to be a *significant contributor of pollutants*.

1. Industrial facilities that submit an *application* and qualify for a Conditional "No Exposure" Exemption. (Condition S1.F)

2. Industrial facilities that *discharge stormwater* only to a municipal *combined sewer* or *sanitary sewer. Discharge* of stormwater to sanitary or *combined sewers* shall only occur as authorized by the municipal sewage authority.

3. Industrial facilities that *discharge stormwater* only to groundwater (e.g., on-site infiltration) with no *discharge* to *surface waters of the state* under any condition.

4. Office buildings and/or administrative parking lots from which *stormwater* does not commingle with stormwater from areas associated with *industrial activity*.

5. Any part of a *facility* with a *discharge* that is in compliance with the instructions of an On-Scene-Coordinator pursuant to *40 CFR* part 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances), in accordance with *40 CFR* 122.3(d).

6. Any *land application site* used for the beneficial use of industrial or municipal wastewater for agricultural activities or when applied for landscaping purposes at agronomic rates.

7. Any farmland, domestic garden, or land used for sludge management where domestic sewage sludge (biosolids) is beneficially reused (nutrient builder or soil conditioner) and which is not physically located in the confines of domestic sewage treatment

works, or areas that are in compliance with Section 405 (Disposal of Sewage Sludge) of the *Clean Water Act (CWA)*.

8. Any inactive coal mining operation if:

   a. The performance bond issued to the *facility* by the appropriate Surface Mining Control and Reclamation Act (SMCRA) authority has been released from applicable state or federal reclamation requirements after December 17, 1990.

   b. The mine does not have a *discharge* of *stormwater* that comes in contact with any overburden, raw material, intermediate products, finished products, byproducts, or waste products located on the site of the *facility*.

9. Inactive mining, inactive oil and gas operations, or inactive *landfill*s where neither an owner nor an operator can be identified.

10. Closed *landfills* that are capped and stabilized, in compliance with Chapter 173-304 WAC, and in which no *significant materials* or industrial *pollutant*s remain exposed to *stormwater*. Permittee's with existing coverage may submit a *Notice of Termination* in accordance with Special Condition S13.A.1.

D. Facilities Excluded from Coverage

Ecology will not cover the following facilities or activities under this permit:

1. Any part of a *facility* that has a *stormwater discharge* subject to *stormwater* Effluent Limitations Guidelines, New Source Performance Standards (NSPS) Under *40 CFR* Subchapter N, or Toxic Pollutant Effluent Standards under *40 CFR* Subchapter D Part 129; these facilities must apply for NPDES permit coverage in an individual or industry-specific *general permit* for those *stormwater discharge*s.

   Below is a list of categories of industries specified in *40 CFR* Subchapter N for which at least one subpart includes *stormwater* effluent limitations guidelines or NSPS. Industries included in this list should review the Subchapter N guidelines to determine if they are subject to a *stormwater* effluent limitation guideline for activities which they perform at their site.

40 CFR 411 Cement manufacturing	40 CFR 423 Steam electric power generating
40 CFR 412 Feedlots	40 CFR 434 Coal mining
40 CFR 418 Fertilizer manufacturing	40 CFR 436 Mineral mining and processing
40 CFR 419 Petroleum refining	40 CFR 440 Ore mining and dressing
40 CFR 422 Phosphate manufacturing	40 CFR 443 Paving and roofing materials (tars & asphalt)

   Facilities discharging any of the following toxic *pollutant*s, which are limited by effluent standards in *40 CFR* Subchapter D Part 129: Aldrin/Dieldrin; DDT; Endrin; Toxaphene; Benzidine; or Polychlorinated Biphenyls (PCBs); these facilities shall obtain coverage under an individual NPDES permit.

2. Nonpoint source silvicultural activities with natural *runoff* that are excluded in *40 CFR* Subpart 122.27.

3. Industrial activities operated by any department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government of the United States, or another entity, such as a private contractor, performing industrial activity for any such department, agency, or instrumentality.
4. Facilities located on Tribal lands or facilities that *discharge stormwater* to receiving waters subject to *water quality standards* of Indian Tribes, including portions of the Puyallup River and other waters on trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians Reservation.
5. Any *facility* authorized to *discharge stormwater* associated with *industrial activity* under an existing NPDES individual or other *general permit.*
6. All *construction activities*. Operators of these construction activities shall seek coverage under the Construction Stormwater General Permit or an individual NPDES permit for *stormwater* associated with *construction activity*.
7. Facilities that *discharge* to a water body with a *control plan*, unless this *general permit* adequately provides the level of protection required by the *control plan*.
8. *New dischargers* to a water body listed pursuant to Section 303(d) of the CWA, unless the Permittee meets the requirements of Condition S6.B.
9. Hazardous waste *landfill*s subject to *40 CFR* Part 445, Subpart A.

E. Discharges to Ground

1. For sites that *discharge* to both surface water and *ground water*, the terms and conditions of this permit shall apply to all *ground water discharge*s.
2. Facilities that *discharge* to *ground water* through an *underground injection control well* shall comply with any applicable requirements of the Underground Injection Control (UIC) regulations, Chapter 173-218 WAC.

F. Conditional "No Exposure" Exemption

1. Any *industrial activity* identified for coverage under Condition S1.A. that is eligible for a "No Exposure" exemption from the permit under *40 CFR* 122.26 (g), may submit a No Exposure Certification Form to *Ecology*, either in writing or electronically.
    a. A Permittee is automatically granted a No Exposure exemption 90 days from *Ecology*'s receipt of a complete and accurate No Exposure Certification Form, unless *Ecology* informs the applicant in writing or electronically within 90 days that it has denied or approved the request.
    b. *Ecology* will automatically terminate permit coverage when it grants the No Exposure exemption to a permitted *facility*.
    c. Facilities which are granted a No Exposure exemption must submit a No Exposure Certification Form to *Ecology* once every five years, or by October 1, 2013, whichever is earlier.

d. No Exposure exemptions are conditional. If there is a change at the *facility* that results in the exposure of industrial activities or materials to *stormwater*, the *facility* is required to immediately apply for and obtain a permit.

S2. APPLICATION FOR COVERAGE

A. Obtaining Permit Coverage

1. Permitted Facilities

   Permittees with coverage under the existing industrial *stormwater general permit* (effective date Nov 15, 2008) are automatically covered under this permit unless otherwise notified by *Ecology*.

2. Unpermitted Facilities

   Unpermitted facilities that require coverage under this permit shall submit a complete and accurate permit *application* to *Ecology* as follows:

   a. Existing Facilities

      i. Unpermitted existing facilities that require coverage under this permit shall submit a complete and accurate permit *application* to *Ecology*.

      ii. Existing facilities are facilities in operation prior to the effective date of this permit, January 1, 2010.

   b. New Facilities

      New facilities are facilities that begin operation on or after the effective date of this permit, January 1, 2010. All unpermitted new facilities shall:

      i. Submit a complete and accurate permit *application* to *Ecology* at least 60 days before the commencement of *stormwater discharge* from the *facility*.

      ii. The *application* shall include certification that the *facility* has met the applicable public notice and *State Environmental Policy Act (SEPA)* requirements in WAC 173-226-200(f).

B. Modification of Permit Coverage

A Permittee anticipating a *significant process change*, or otherwise requesting a modification of permit coverage, shall submit a complete Modification of Coverage Form to *Ecology*. The Permittee shall:

1. Apply for modification of coverage at least 60 days before implementing a *significant process change*; or by May15th prior to a Corrective Action deadline, if requesting a Level 2 or 3 time extension or waiver request per Condition S8.B-D.

2. Complete the public notice requirements in WAC 173-226-130(5) as part of a complete *application* for modification of coverage.

3. Comply with SEPA as part of a complete *application* for modification of coverage if undergoing a *significant process change*.

C. Permit Coverage Timeline

1. If the applicant does not receive notification from *Ecology*, permit coverage automatically commences on whichever of the following dates occurs last:
   a. The 31st day following receipt by *Ecology* of a completed *application* for coverage .
   b. The 31st day following the end of a 30-day public comment period.
   c. The effective date of the *general permit*.
2. *Ecology* may need additional time to review the *application*:
   a. If the *application* is incomplete.
   b. If it requires additional site-specific information.
   c. If the public requests a public hearing.
   d. If members of the public file comments.
   e. When more information is necessary to determine whether coverage under the *general permit* is appropriate.
3. When *Ecology* needs additional time:
   a. *Ecology* will notify the applicant in writing within 30 days and identify the issues that the applicant must resolve before a decision can be reached.
   b. *Ecology* will submit the final decision to the applicant in writing. If *Ecology* approves the *application* for coverage, coverage begins the 31st day following approval, or the date the approval letter is issued, whichever is later.

D. Transfer of Permit Coverage

Coverage under this *general permit* shall automatically transfer to a *new discharger*, if all of the following conditions are met:

1. The Permittee (existing *discharger*) and *new discharger* submit to *Ecology* a complete, written, signed agreement (Transfer of Coverage Form) containing a specific date for transfer of permit responsibility, coverage, and liability.
2. The type of industrial activities and practices remain substantially unchanged.
3. *Ecology* does not notify the Permittee of the need to submit a new *application* for coverage under the *general permit* or for an individual permit pursuant to Chapters 173-216, 173-220, and 173-226 WAC.
4. *Ecology* does not notify the existing *discharger* and *new discharger* of its intent to revoke coverage under the *general permit*. The transfer is effective on the date specified in the written agreement unless *Ecology* gives this notice.

S3. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General Requirements

1. All Permittees and applicants for coverage under this permit shall develop and implement a SWPPP for the permitted *facility* as follows:
2. The SWPPP shall specify the *Best Management Practices* (BMPs) necessary to:
   a. Provide *all known, available, and reasonable methods of prevention, control, and treatment (AKART)* of *stormwater pollution*.
   b. Ensure the *discharge* does not cause or contribute to a violation of the *Water Quality Standards.*
   c. Comply with applicable federal technology-based treatment requirements under *40 CFR* 125.3.
3. Proper Selection and Use of *Stormwater Management Manuals (SWMM)*:

   BMPs shall be consistent with:

   a. *Stormwater Management Manual* for Western Washington (*2005* edition), for sites west of the crest of the Cascade Mountains.
   b. *Stormwater Management Manual* for Eastern Washington (*2004* edition), for sites east of the crest of the Cascade Mountains.
   c. Revisions to the manuals in S3.A.3. a & b., or other *stormwater* management guidance documents or manuals which provide an equivalent level of *pollution* prevention, that are approved by *Ecology* and incorporated into this permit in accordance with the permit modification requirements of WAC 173-220-190. For purposes of this section, the documents listed in Appendix 10 of the Phase I Municipal Stormwater Permit are hereby incorporated into this permit.
   d. Documentation in the SWPPP that the BMPs selected are *demonstrably equivalent* to practices contained in stormwater technical manuals approved by *Ecology*, including the proper selection, implementation, and maintenance of all applicable and appropriate *best management practices* for on-site *pollution* control.
4. Update of the SWPPP
   a. The Permittee shall modify the SWPPP if the owner/operator or the applicable local or state regulatory authority determines during inspections or investigations that the SWPPP is, or would be, ineffective in eliminating or significantly minimizing *pollutant*s in *stormwater* discharges from the site. The Permittee shall modify the SWPPP:
      i. As necessary to include additional or modified BMPs designed to correct problems identified.
      ii. To correct the deficiencies identified in writing from *Ecology* within 30 days of notice.

b. The Permittee shall modify the SWPPP whenever there is a change in design, construction, operation, or maintenance at the *facility* that significantly changes the nature of *pollutant*s discharged in *stormwater* from the *facility*, or significantly increases the quantity of pollutants discharged.

5. Other *Pollution Control Plans*

The Permittee may incorporate by reference applicable portions of plans prepared for other purposes at their *facility*. Plans or portions of plans incorporated by reference into a SWPPP become enforceable requirements of this permit and must be available along with the SWPPP as required in S9.F. A *Pollution* Prevention Plan prepared under the Hazardous Waste Reduction Act, Chapter 70.95C RCW, is an example of such a plan.

6. Signatory Requirements

The Permittee shall sign and certify all SWPPPs in accordance with General Condition G2, each time it revises or modifies a SWPPP to comply with Conditions S3.A.4 (Update of the SWPPP), S7 (Inspections) or S8 (Corrective Actions). A SWPPP Certification Form is contained in Appendix 3 of this permit.

B. Specific SWPPP Requirements

The SWPPP shall contain a site map, a detailed assessment of the *facility*, a detailed description of the BMPs, Spill Prevention and Emergency Cleanup Plan, and a sampling plan. The Permittee shall identify any parts of the SWPPP which the *facility* wants to claim as Confidential Business Information.

1. The site map shall identify:
   a. The scale or include relative distances between significant structures and drainage systems.
   b. Significant features.
   c. The *stormwater* drainage and *discharge* structures and identify, by name, any other party other than the Permittee that owns any *stormwater* drainage or discharge structures.
   d. The *stormwater* drainage areas for each *stormwater discharge* point off-site (including discharges to *ground water*) and assign a unique identifying number for each discharge point.
   e. Each sampling location by unique identifying number.
   f. Paved areas and buildings.
   g. Areas of *pollutant* contact (actual or potential) associated with specific industrial activities.
   h. Conditionally approved non-*stormwater* discharges (Condition S5.D).
   i. Surface water locations (including wetlands and drainage ditches).
   j. Areas of existing and potential soil *erosion* (in a *significant amount*).

k. *Vehicle maintenance* areas.

l. Lands and waters adjacent to the site that may be helpful in identifying *discharge* points or drainage routes.

2. The *facility* assessment shall include a description of the *facility*; an inventory of *facility* activities and equipment that contribute to or have the potential to contribute any *pollutant*s to *stormwater*; and, an inventory of materials that contribute to or have the potential to contribute pollutants to *stormwater*.

   a. The *facility* description shall describe:

      i. The industrial activities conducted at the site.

      ii. *Regular business hours* and seasonal variations in business hours or industrial activities.

      iii. The general layout of the *facility* including buildings and storage of raw materials, and the flow of goods and materials through the *facility*.

   b. The inventory of industrial activities shall identify all areas associated with industrial activities (see Table 1) that have been or may potentially be sources of *pollutant*s, including, but not limited to, the following:

      i. Loading and unloading of dry bulk materials or liquids.

      ii. Outdoor storage of materials or products.

      iii. Outdoor manufacturing and processing.

      iv. On-site dust or particulate generating processes.

      v. On-site waste treatment, storage, or disposal.

      vi. *Vehicle* and equipment fueling, maintenance, and/or cleaning (includes washing).

      vii. Roofs or other surfaces exposed to *air emissions* from a manufacturing building or a process area.

      viii. Roofs or other surfaces composed of materials that may be mobilized by *stormwater* (e.g., galvanized roofs, galvanized fences, etc.).

   c. The inventory of materials shall list:

      i. The types of materials handled at the site that potentially may be exposed to precipitation or *runoff* and could result in *stormwater pollution*.

      ii. A short narrative for each material describing the potential of the *pollutant* to be present in *stormwater* discharges. The Permittee shall update this narrative when data become available to verify the presence or absence of these pollutants.

      iii. A narrative description of any potential sources of *pollutant*s from past activities, materials and spills that were previously handled, treated, stored, or disposed of in a manner to allow ongoing exposure to *stormwater*. Include the

method and location of on-site storage or disposal. List significant spills and significant leaks of toxic or hazardous pollutants.

3. The SWPPP shall identify specific individuals by name or by title within the organization (*pollution* prevention team) whose responsibilities include: SWPPP development, implementation, maintenance, and modification.

4. *Best Management Practices* (BMPs)

   a. General BMP Requirements

      The Permittee shall describe each BMP selected to eliminate or reduce the potential to contaminate *stormwater* and prevent violations of *water quality standards*.

   b. No later than July 1, 2010, the Permittee shall include each of the following mandatory BMPs in the SWPPP and implement the BMPs. The Permittee may omit individual BMPs if site conditions render the BMP unnecessary, infeasible, or the Permittee provides alternative and equally effective BMPs; if the Permittee clearly justifies each BMP omission in the SWPPP. Prior to July 1, 2010, the Permittee shall implement the BMP requirements of the previous Industrial *Stormwater General Permit*, or Condition S3.B.4 of this permit.

      i. Operational *Source Control BMPs*

         1) The SWPPP shall include the *Operational Source Control BMPs* listed as "applicable" in *Ecology*'s SWMMs, or other guidance documents or manuals approved in accordance with S3.A.3.c.

         2) Good Housekeeping: The SWPPP shall include BMPs that define ongoing maintenance and cleanup, as appropriate, of areas which may contribute *pollutant*s to *stormwater* discharges. The SWPPP shall include the schedule/frequency for completing each housekeeping task, based upon *industrial activity*, sampling results and observations made during inspections. The Permittee shall:

            a) Vacuum paved surfaces with a vacuum sweeper (or a sweeper with a vacuum attachment) to remove accumulated *pollutant*s a minimum of once per quarter.

            b) Identify and control all on-site sources of dust to minimize *stormwater* contamination from the deposition of dust on areas exposed to precipitation.

            c) Inspect and maintain bag houses monthly to prevent the escape of dust from the system. Immediately remove any accumulated dust at the base of exterior bag houses.

            d) Keep all dumpsters under cover or fit with a lid that must remain closed when not in use.

3) Preventive Maintenance: The SWPPP shall include BMPs to inspect and maintain the *stormwater* drainage, source controls, treatment systems (if any), and plant equipment and systems that could fail and result in contamination of *stormwater*. The SWPPP shall include the schedule/frequency for completing each maintenance task. The Permittee must:

   a) Clean catch basins when the depth of debris reaches 60% of the sump depth. In addition, the Permittee must keep the debris surface at least 6 inches below the outlet pipe.

   b) Inspect all equipment and vehicles during monthly site inspections for leaking fluids such as oil, antifreeze, etc. Take leaking equipment and *vehicles* out of service or prevent leaks from spilling on the ground until repaired.

   c) Immediately clean up spills and leaks (e.g., using absorbents, vacuuming, etc.) to prevent the *discharge* of *pollutant*s.

4) Spill Prevention and Emergency Cleanup Plan (SPECP): The SWPPP shall include a SPECP that includes BMPs to prevent spills that can contaminate *stormwater*. The SPECP shall specify BMPs for *material handling* procedures, storage requirements, cleanup equipment and procedures, and spill logs, as appropriate. The Permittee shall:

   a) Store all chemical liquids, fluids, and petroleum products, on an impervious surface that is surrounded with a containment berm or dike that is capable of containing 10% of the total enclosed tank volume or 110% of the volume contained in the largest tank, whichever is greater.

   b) Prevent precipitation from accumulating in containment areas with a roof or equivalent structure or include a plan on how it will manage and dispose of accumulated water if a containment area cover is not practical.

   c) Locate spill kits within 25 feet of all stationary fueling stations, fuel transfer stations, and mobile fueling units. At a minimum, spill kits shall include:

      i) Oil absorbents capable of absorbing 15 gallons of fuel.

      ii) A storm drain plug or cover kit.

      iii) A non-water containment boom, a minimum of 10 feet in length with a 12 gallon absorbent capacity.

      iv) A non-metallic shovel.

      v) Two five-gallon buckets with lids.

d) Not lock shut-off fueling nozzles in the open position. Do not "top-off" tanks being refueled.

e) Block, plug or cover storm drains that receive *runoff* from areas where fueling, during fueling.

f) Use drip pans or equivalent containment measures during all petroleum transfer operations.

g) Locate materials, equipment, and activities so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone *vehicle*s and equipment awaiting maintenance to protected areas).

h) Use drip pans and absorbents under or around leaky *vehicles* and equipment or store indoors where feasible. Drain fluids from equipment and *vehicles* prior to on-site storage or disposal.

i) Maintain a spill log that includes the following information for chemical and petroleum spills: date, time, amount, location, and reason for spill; date/time clean-up completed, notifications made and staff involved.

5) Employee Training: The SWPPP shall include BMPs to provide SWPPP training for employees who have duties in areas of industrial activities subject to this permit. At a minimum, the training plan shall include:

a) The content of the training,

i) An overview of what is in the SWPPP.

ii) How employees make a difference in complying with the SWPPP and preventing contamination of *stormwater*.

iii) Spill response procedures, good housekeeping, maintenance requirements, and material management practices.

b) How the Permittee will conduct training.

c) The frequency/schedule of training. The Permittee shall train employees annually, at a minimum.

d) A log of the dates on which specific employees received training.

6) Inspections and Recordkeeping: The SWPPP shall include documentation of procedures to ensure compliance with permit requirements for inspections and recordkeeping. At a minimum, the SWPPP shall:

a) Identify *facility* personnel who will inspect designated equipment and *facility* areas as required in Condition S7.

b) Contain a visual inspection report or check list that includes all items required by Condition S7.C.

c) Provide a tracking or follow-up procedure to ensure that a report is prepared and any appropriate action taken in response to visual inspections.

d) Define how the Permittee will comply with signature requirements and records retention identified in Special Condition S9, Reporting and Recordkeeping Requirements.

e) Include a certification of compliance with the SWPPP and permit for each inspection using the language in S7.C.1.c.

7) <u>*Illicit Discharges*</u>: The SWPPP shall include measures to identify and eliminate the *discharge* of *process wastewater*, *domestic wastewater*, *noncontact cooling water*, and other *illicit discharges*, to *stormwater* sewers, or to surface waters and *ground waters of the state*. The Permittee can find BMPs to identify and eliminate *illicit discharges* in Volume IV of *Ecology*'s SWMM for Western Washington and Chapter 8 of the SWMM for Eastern Washington.

Water from washing *vehicles* or equipment, steam cleaning and/or pressure washing is considered *process wastewater*. The Permittee must not allow this process wastewater to comingle with *stormwater* or enter storm drains; and must collect in a tank for off-site disposal, or *discharge* it to a *sanitary sewer*, with written approval from the local sewage authority.

ii. Structural *Source Control BMPs*

1) The SWPPP shall include the *Structural Source Control BMPs* listed as "applicable" in *Ecology*'s SWMMs, or other guidance documents or manuals approved in accordance with S3.A.3.c.

2) The SWPPP shall include BMPs to minimize the exposure of manufacturing, processing, and material storage areas (including loading and unloading, storage, disposal, cleaning, maintenance, and fueling operations) to rain, snow, snowmelt, and *runoff* by either locating these industrial materials and activities inside or protecting them with storm resistant coverings.

Permittees shall:

a) Use grading, berming, or curbing to prevent *runoff* of contaminated flows and divert run-on away from these areas.

b) Perform all cleaning operations indoors, under cover, or in bermed areas that prevent *stormwater runoff* and run-on and also that capture any overspray.

c) Ensure that all washwater drains to a collection system that directs the washwater to further treatment or storage and not to the *stormwater drainage system*.

iii. *Treatment BMP*s

The Permittee shall:

1) Use *Treatment BMPs* consistent with the applicable documents referenced in Condition S3.A.3.

2) Employ oil/water separators, booms, skimmers or other methods to eliminate or minimize oil and grease contamination of *stormwater* discharges.

3) Obtain *Ecology* approval before beginning construction/installation of all *treatment BMP*s that include the addition of chemicals to provide treatment.

iv. *Stormwater* Peak *Runoff* Rate and Volume Control BMPs

Facilities with *new development* or *redevelopment* shall evaluate whether flow control BMPs are necessary to satisfy the state's AKART requirements, and prevent violations of water quality standards. If flow control BMPs are required, they shall be selected according to S3.A.3.

v. *Erosion and Sediment Control BMPs*

The SWPPP shall describe the BMPs necessary to prevent the *erosion* of soils and other earthen materials (crushed rock/gravel, etc.) and prevent off-site *sedimentation* and violations of *water quality standards.* The Permittee shall implement and maintain:

1) *Sediment* control BMPs such as *detention* or retention ponds or traps, vegetated filter strips, bioswales, or other permanent *sediment* control BMPs to minimize *sediment* loads in *stormwater* discharges.

2) Filtration BMPs to remove solids from catch basins, sumps or other *stormwater* collection and conveyance system components (filter socks, modular canisters, sand filtration, centrifugal separators, etc.).

5. Sampling Plan

The SWPPP shall include a sampling plan. The plan shall:

a. Identify points of *discharge* to surface water, *storm sewers*, or discrete *ground water* infiltration locations, such as dry wells or *detention* ponds.

b. Include documentation of why each *discharge* point is not sampled per S4.B.2.c (if applicable):

i. Location of which *discharge* points the Permittee does not sample because the *pollutant* concentrations are substantially identical to a discharge point being sampled.

ii. General industrial activities conducted in the drainage area of each *discharge* point.

iii. *Best Management Practices* conducted in the drainage area of each outfall.

iv. Exposed materials located in the drainage area of each *discharge* point that are likely to be significant contributors of *pollutant*s to *stormwater discharges*.

v. Impervious surfaces in the drainage area that could affect the percolation of *stormwater runoff* into the ground (e.g., asphalt, crushed rock, grass, etc.).

vi. Reasons why the Permittee expects the *discharge* points to discharge substantially identical effluents.

c. Identify each sampling location by its unique identifying number such as A1, A2, etc.

d. Identify staff responsible for conducting *stormwater* sampling.

e. Specify procedures for sample collection and handling.

f. Specify procedures for sending samples to a laboratory.

g. Identify parameters for analysis, holding times and preservatives, laboratory *quantitation levels,* and analytical methods.

h. Specify the procedure for submitting results to *Ecology*.

S4. GENERAL SAMPLING REQUIREMENTS

A. General Requirements

The Permittee shall conduct sampling of *stormwater* in accordance with this permit and the SWPPP.

B. Sampling Requirements

1. Sample Timing and Frequency

a. The Permittee shall sample the *discharge* from each designated location at least once per quarter:

1st Quarter = January, February, and March

2nd Quarter = April, May, and June

3rd Quarter = July, August, and September

4th Quarter = October, November, and December

b. Permittees shall sample the *stormwater discharge* from the first fall storm event each year. "First fall storm event" means the first time after October 1st of each year that precipitation occurs and results in a *stormwater discharge* from a *facility*.

c. Permittees shall collect samples within the first 12 hours of *stormwater discharge* events. If it is not possible to collect a sample within the first 12 hours of a *stormwater* discharge event, the Permittee must collect the sample as soon as practicable after the first 12 hours, and keep documentation with the sampling records (Condition S4.B.3) explaining why they could not collect samples within the first 12

hours; or if it is unknown (e.g., discharge was occurring during start of regular business hours).

d. The Permittee shall obtain *representative samples*, which may be a single grab sample, a time-proportional sample, or a flow-proportional sample.

e. Permittees need not sample outside of *regular business hours*, during unsafe conditions, or during quarters where there is no discharge, but shall submit a Discharge Monitoring Report each reporting period (Condition S9.A).

2. Sample Location(s)

a. The Permittee shall designate sampling location(s) at the point(s) where it discharges *stormwater* associated with *industrial activity* off-site.

b. The Permittee is not required to sample on-site discharges to ground (e.g., infiltration, etc.) or *sanitary sewer* discharges, unless specifically required by *Ecology* (Condition G12).

c. The Permittee shall sample each distinct point of *discharge* off-site except as otherwise exempt from monitoring as a "substantially identical outfall" per S3.B.5.b. The Permittee is required to monitor only one of the "substantially identical outfalls" if two or more outfalls discharge substantially identical effluents (based on similar industrial activities and site conditions).

d. The exception to sampling each point of *discharge* in S4.B.2.c does not apply to any point of discharge subject to numeric effluent limitations (Conditions S5.C, S6.C & S6.D).

3. Sample Documentation

For each *stormwater* sample taken, the Permittee shall record the following information and retain it on-site for *Ecology* review:

a. Sample date.

b. Sample time.

c. A notation describing if the Permittee collected the sample within the first 12 hours of *stormwater* discharge events; or, if it is unknown (e.g., discharge was occurring during start of regular business hours).

d. An explanation of why it could not collect a sample within the first 12 hours of a *stormwater discharge* event, if it was not possible. Or, if it is unknown, an explanation of why it doesn't know if a sample was collected within or outside the first 12 hours of stormwater discharge.

e. Sample location (using SWPPP identifying number).

f. Method of sampling, and method of sample preservation, if applicable.

g. Individual who performed the sampling.

4. Laboratory Documentation

The Permittee shall retain laboratory reports on-site for *Ecology* review and shall ensure that all laboratory reports providing data for all parameters include the following information:

a. Date of analysis.

b. Parameter name.

c. CAS number, if applicable.

d. Analytical method(s).

e. Individual who performed the analysis.

f. Method detection limit (MDL).

g. Laboratory *quantitation level* (QL) achieved by the laboratory.

h. Reporting units.

i. Sample result.

j. Quality assurance/quality control data.

5. The Permittee shall maintain the original records onsite and make them available to *Ecology* upon request.

6. The Permittee may suspend sampling for one or more parameters (other than "visible oil sheen") based on consistent attainment of *benchmark* values when:

   a. Eight consecutive quarterly samples, collected after the effective date of this permit, demonstrate a reported value equal to or less than the *benchmark* value; or for pH, within the range of 5.0 – 9.0.

   b. For purposes of tallying "consecutive quarterly samples":

      i. Do not include any quarters in which the Permittee did not collect a sample, but should have (e.g., discharge(s) occurred during normal working hours, and during safe conditions; but no sample was collected during the entire quarter). If this occurs, the tally of consecutive quarterly samples is reset to zero.

      ii. Do not include any quarters in which the Permittee did not collect a sample because there was no *discharge* during the quarter (or the discharges during the quarter occurred outside normal working hours or during unsafe conditions). These quarters are not included in the calculation of eight consecutive quarters, but do not cause the tally to be reset; i.e., they are skipped over.

      iii. Permittees who suspended sampling based on consistent attainment of benchmarks prior to July 1, 2012 must resume/continue sampling until a total of eight consecutive quarterly samples demonstrate consistent attainment.

   c. Permittees monitoring more than once per quarter shall average all of the monitoring results for each parameter (except pH and "visible oil sheen") and compare the average value to the *benchmark* value.

7. A Permittee who has a *significant process change* shall not use previous sampling results to demonstrate consistent attainment.

8. Suspension of sampling based on consistent attainment *does not* apply to *pollutant* parameters subject to numeric effluent limits based on federal Effluent Limitation Guidelines (Condition S5.C) or Section 303(d) of the *Clean Water Act* (Condition S6).

C. Analytical Procedures for Sampling Requirements

The Permittee shall ensure that analytical methods used to meet the sampling requirements specified in this permit conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in *40 CFR* Part 136.

D. Laboratory Accreditation

1. The Permittee shall ensure that all analytical data required by *Ecology* is prepared by a laboratory registered or accredited under the provisions of, Accreditation of Environmental Laboratories, Chapter 173-50 WAC.

2. *Turbidity* and pH are exempt from this requirement, unless the laboratory must be registered or accredited for any other parameter.

S5. BENCHMARKS, EFFLUENT LIMITATIONS AND SPECIFIC SAMPLING REQUIREMENTS

A. Benchmarks and Sampling Requirements

1. Permittees shall sample their *stormwater discharges* as specified in Condition S4 and as specified in Table 2.

2. Additional sampling and/or requirements apply to specific industrial categories (S5.B), and facilities subject to effluent limitation guidelines (S5.C), and certain discharges to impaired waterbodies (S6).

3. If a Permittee's discharge exceeds a *benchmark* listed in Table 2, the Permittee shall take the actions specified in Condition S8. Permittees sampling more than once per quarter shall average the sample results for each parameter (except pH and "visible oil sheen") and compare the average value to the *benchmark* to determine if the discharge has exceeded a *benchmark* value.

Table 2: Benchmarks and Sampling Requirements Applicable to All Facilities

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency [b]
Turbidity	NTU	25	EPA 180.1 Meter	0.5	1/quarter
pH	Standard Units	Between 5.0 and 9.0	Meter/Paper [c]	±0.5	1/quarter
Oil Sheen	Yes/No	No Visible Oil Sheen	N/A	N/A	1/quarter
Copper, Total	µg/L	Western WA: 14 Eastern WA: 32	EPA 200.8	2.0	1/quarter
Zinc, Total	µg/L	117	EPA 200.8	2.5	1/quarter

[a] The Permittee shall ensure laboratory results comply with the *quantitation level* specified in the table. However, if a Permittee knows that an alternate, less sensitive method (higher detection level and *quantitation level*) from *40 CFR* Part 136 is sufficient to produce measurable results in its effluent, it may use that method for analysis.

[b.] 1/quarter means 1 sample taken each quarter, year-round.

[c.] Permittees shall use either a calibrated pH meter or narrow-range pH indicator paper with a resolution not greater than ± 0.5 SU.

B. Additional Sampling Requirements for Specific Industrial Groups

1. In addition to the requirements in Table 2, all Permittees identified by an *industrial activity* in Table 3 shall sample *stormwater* discharges as specified in Condition S4 and in Table 3.
2. If a *discharge* exceeds a *benchmark* listed in Table 3, the Permittee shall take the actions specified in Condition S8. Permittees sampling more than once per quarter shall average the sample results for each parameter and compare the average value to the *benchmark* to determine if it the discharge has exceeded a *benchmark*.

Table 3: Additional Benchmarks and Sampling Requirements Applicable to Specific Industries

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency [b]
1. Chemical and Allied Products (28xx), Food and Kindred Products (20xx)					
BOD_5	mg/L	30	EPA 405.1 or SM 5210B	2	1/quarter
Nitrate/Nitrite, as Nitrogen	mg/L	0.68	EPA 353.1	0.10	1/quarter
Phosphorus, Total	mg/L	2.0	EPA 365.1	0.10	1/quarter
2. Primary Metals(33xx), Metals Mining (10xx), Automobile Salvage and Scrap Recycling (5015 and 5093), Metals Fabricating (34xx)					
Lead, Total	µg/L	81.6	EPA 200.8	0.5	1/quarter
Total Petroleum Hydrocarbons (TPH)	mg/L	10	NWTPH-Dx	0.1	1/quarter
3. Hazardous Waste Treatment, Storage and Disposal Facilities and Dangerous Waste Recyclers subject to the provisions of Resource Conservation and Recovery Act (RCRA) Subtitle C					
Chemical Oxygen Demand (COD)	mg/L	120	SM5220-D	10	1/quarter
Ammonia, Total, as N	mg/L	2.1	SM4500-NH3- GH	0.3	1/quarter
TSS	mg/L	100	SM2540-D	5	1/quarter
Arsenic, Total	µg/L	150	EPA 200.8	0.5	1/quarter
Cadmium, Total	µg/L	2.1	EPA 200.8	0.25	1/quarter
Cyanide, Total	µg/L	22	SM 4500-CN I	10	1/quarter
Lead, Total	µg/L	81.6	EPA 200.8	0.5	1/quarter
Magnesium, Total	µg/L	64	EPA 200.7	80	1/quarter
Mercury, Total	µg/L	1.4	EPA 1631E	0.0005	1/quarter
Selenium, Total	µg/L	5.0	EPA 200.8	1.0	1/quarter
Silver, Total	µg/L	3.8	EPA 200.8	0.2	1/quarter
Total Petroleum Hydrocarbons (TPH)	mg/L	10	NWTPH-Dx	0.1	1/quarter
4. Air Transportation[c] (45xx)					
Ammonia	mg/L	2.1	SM4500-NH3- GH	0.3	1/quarter
BOD_5	mg/L	30	EPA 405.1 or SM 5210B	2	1/quarter
COD	mg/L	120	EPA 410.2	5	1/quarter
Nitrate/Nitrite, as N	mg/L	0.68	EPA 4500-NO3-E/F/H	0.10	1/quarter

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency [b]
5. Timber Product Industry (24xx), Paper and Allied Products (26xx)					
COD	mg/L	120	SM5220-D	10	1/quarter
TSS	mg/L	100	SM2540-D	5	1/quarter

[a] The Permittee shall ensure laboratory results comply with the *quantitation level* specified in the table. However, if a Permittee knows that an alternate, less sensitive method (higher detection level and *quantitation level*) from *40 CFR* Part 136 is sufficient to produce measurable results in their effluent, that method may be used for analysis.

[b.] 1/quarter means 1 sample taken each quarter, year-round.

[c.] For airports where a single permittee, or a combination of permitted facilities use more than 100,000 gallons of glycol-based deicing chemicals and/or 100 tons or more of urea on an average annual basis, monitor these additional four parameters in those outfalls that collect *runoff* from areas where deicing activities occur (SIC 4512-4581).

C. Stormwater Discharges Subject to Effluent Limitation Guidelines

1. Permittees with discharges from the following activities shall comply with the effluent limits and monitor as specified in Condition S4 and Tables 4 and 5.
2. The *discharge* of the *pollutant*s at a level more than that identified and authorized by this permit for these activities shall constitute a violation of the terms and conditions of this permit.
3. Permittees operating non-hazardous waste *landfill*s subject to the provisions of *40 CFR* Part 445 Subpart B shall not exceed the effluent limits[3] listed in Table 4.

[3] As set forth in *40 CFR* Part 445 Subpart B, these numeric effluent limits apply to contaminated *stormwater* discharges from Municipal Solid Waste Landfills that have not been closed in accordance with *40 CFR* 258.60, and to contaminated *stormwater* discharges from those landfills that are subject to the provisions of *40 CFR* Part 257 except for discharges from any of the following facilities:
(a) landfills operated in conjunction with other industrial or commercial operations, when the landfill receives only wastes generated by the industrial or commercial operation directly associated with the landfill;
(b) landfills operated in conjunction with other industrial or commercial operations, when the landfill receives wastes generated by the industrial or commercial operation directly associated with the landfill and also receives other wastes, provided that the other wastes received for disposal are generated by a facility that is subject to the same provisions in *40 CFR* Subchapter N as the industrial or commercial operation, or that the other wastes received are of similar nature to the wastes generated by the industrial or commercial operation;
(c) landfills operated in conjunction with CWT facilities subject to *40 CFR* Part 437, so long as the CWT facility commingles the landfill wastewater with other non-landfill wastewater for discharge. A landfill directly associated with a CWT facility is subject to this part if the CWT facility discharges landfill wastewater separately from other CWT wastewater or commingles the wastewater from its landfill only with wastewater from other landfills; or
(d) landfills operated in conjunction with other industrial or commercial operations when the landfill receives wastes from public service activities, so long as the company owning the landfill does not receive a fee or other remuneration for the disposal service.

Table 4: Effluent Limits Applicable to Non-Hazardous Waste Landfills Subject to 40 CFR Part 445 Subpart B

Parameter	Units	Average Monthly [a]	Maximum Daily [b]	Analytical Method [c]	Laboratory Quantitation Level [d]	Minimum Sampling Frequency [e]
BOD_5	mg/L	37	140	EPA 405.1 or SM 5210B	2	1/quarter
TSS	mg/L	27	88	SM2540-D	5	1/quarter
Ammonia (total as N)	mg/L	4.9	10	SM4500-NH3-GH.	0.3	1/quarter
Alpha Terpineol	µg/L	16	33	EPA 625	5	1/quarter
Benzoic Acid	µg/L	71	120	EPA 625	50	1/quarter
p-Cresol (4-methylphenol)	µg/L	14	25	EPA 8270D	10 ug/L	1/quarter
Phenol	µg/L	15	26	EPA 625	4.0	1/quarter
Zinc, Total	µg/L	110	200	EPA 200.8	2.5	1/quarter
pH	SU	Between 6.0 and 9.0		Meter/Paper[e]	±0.1	1/quarter

a. Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the *discharge* value to compare to the limit, you add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. If only one sample is taken during the calendar month, the average monthly effluent limitation applies to that sample. If only one sample is taken during the reporting period, the average monthly effluent limitation applies to that sample.

b. Maximum daily effluent limit means the highest allowable daily discharge. The daily *discharge* means the *discharge of a pollutant* measured during a calendar day. The daily discharge is the average measurement of the *pollutant* over the day; this does not apply to pH.

c. Or other equivalent EPA-approved method with the same or lower *quantitation level*.

d. The Permittee shall ensure laboratory results comply with the *quantitation level* specified in the table. However, if a Permittee knows that an alternate, less sensitive (higher detection level and *quantitation level*) from *40 CFR* Part 136 method will provide measurable results in its effluent, it may use that method for analysis.

e 1/quarter means 1 sample taken each quarter, year-round.

D. Conditionally Authorized Non-Stormwater Discharges

1. The categories and sources of non-*stormwater* discharges identified in Condition S5. D.2, below, are conditionally authorized, provided:

   a. The *discharge* is otherwise consistent with the terms and conditions of this permit, including Condition S5, S6 and S10.

b. The Permittee conducts the following assessment for each non-*stormwater discharge* (except for S5.D.2.a & f) and documents the assessment in the SWPPP, consistent with Condition S3.B.2. The Permittee shall:

i. Identify each source.

ii. Identify the location of the discharge into the *stormwater* collection system.

iii. Characterize the discharge including estimated flows or flow volume, and likely *pollutant*s which may be present.

iv. Evaluate and implement available and reasonable *source control BMPs* to reduce or eliminate the discharge.

v. Evaluate compliance of the *discharge* with the state *water quality standards*.

vi. Identify appropriate BMPs for each discharge to control *pollutant*s and or flow volumes.

2. Conditionally authorized non-*stormwater* discharges include:

a. Discharges from fire fighting activities.

b. Fire protection system flushing, testing, and maintenance.

c. Discharges of potable water including water line flushing, provided that water line flushing must be de-chlorinated prior to discharge.

d. Uncontaminated air conditioning or compressor condensate.

e. Landscape watering and irrigation drainage.

f. Uncontaminated *ground water* or spring water.

g. Discharges associated with dewatering of foundations, footing drains, or utility vaults where flows are not contaminated with process materials such as solvents.

h. Incidental windblown mist from cooling towers that collects on rooftops or areas adjacent to the cooling tower. This does not include intentional discharges from cooling towers such as piped cooling tower blow down or drains.

E. Prohibited Discharges

Unless authorized by a separate NPDES or state waste *discharge* permit, the following discharges are prohibited:

1. The discharge of *process wastewater* is not authorized. *Stormwater* that commingles with *process wastewater* is considered *process wastewater*.

2. *Illicit discharges* are not authorized by this permit. Conditionally authorized non-*stormwater* discharges in compliance with Condition S5.D are not *illicit discharges*.

F. General Prohibitions

Permittees shall manage *stormwater* to prevent the *discharge* of:

1. Synthetic, natural or processed oil or oil-containing products as identified by an oil sheen, and
2. Trash and floating debris.

S6. DISCHARGES TO 303(D)-LISTED OR TMDL WATERS

A. General Requirements for Discharges to 303(d)-listed Waters

Permittees with coverage under this permit that *discharge* to a *303(d)-listed water body* shall conduct sampling and inspections in accordance with Conditions S4, S6, and S7.

B. Limits on Coverage for New Discharges to TMDL or 303(d)-listed Waters

Facilities that meet the definition of "*new discharger*" and *discharge* to a *303(d) listed waterbody* are not eligible for coverage under this permit unless the *facility*:

1. Prevents all exposure to *stormwater* of the *pollutant*(s) for which the waterbody is impaired, and retains documentation of procedures taken to prevent exposure onsite with its SWPPP; or
2. Documents that the *pollutant*(s) for which the waterbody is impaired is not present at the *facility*, and retains documentation of this finding with the SWPPP; or
3. Provides *Ecology* with data to support a showing that the *discharge* is not expected to cause or contribute to an exceedance of a water quality standard, and retain such data onsite with its SWPPP. The *facility* must provide data and other technical information to *Ecology* sufficient to demonstrate:
    a. For discharges to waters without an *EPA* approved or established *TMDL*, that the *discharge* of the *pollutant* for which the water is impaired will meet in-stream water quality criteria at the point of discharge to the waterbody; or
    b. For discharges to waters with an *EPA* approved or established *TMDL*, that there are sufficient remaining *wasteload allocations* in an *EPA* approved or established *TMDL* to allow industrial *stormwater discharge* and that existing *dischargers* to the waterbody are subject to compliance schedules designed to bring the waterbody into attainment with *water quality standards*.

Facilities are eligible for coverage under this permit if *Ecology* issues permit coverage based upon an affirmative determination that the *discharge* will not cause or contribute to the existing impairment.

C. Additional Sampling Requirements and Effluent Limits for Discharges to Certain 303(d)-listed Waters

1. Beginning July 1, 2010, Permittees discharging to a *303(d)-listed water body* that does not have an EPA-approved *total maximum daily load (TMDL)* shall comply with the applicable sampling requirements and effluent limits in Table 5, unless a compliance schedule is requested and granted in accordance with S6.C.1.b&c.

a. Facilities subject to these limits include, but may not be limited to, facilities listed in Appendix 4.

b. For purposes of this condition, "applicable sampling requirements and effluent limits" means the sampling and effluent limits in Table 5 that correspond to the specific parameter(s) the receiving water is *303(d)-listed* for at the time of permit coverage, or Total Suspended Solids (TSS) if the waterbody is *303(d)-listed* for any *sediment* quality parameter at the time of permit coverage.

c. Permittees may request a compliance schedule for relief from the July 1, 2010 deadline to comply with an applicable effluent limit in Condition S6.C. Permittees shall submit requests for compliance schedules in writing to *Ecology* no later than January 31, 2010 and shall include the company name, *facility* location, industrial *stormwater* permit number, and the reason for requesting a compliance schedule.

d. *Ecology* will consider all compliance schedule requests submitted by January 31, 2010. If *Ecology* determines that a Permittee is unable to comply with the applicable effluent limits by July 1, 2010, *Ecology* will establish a compliance schedule to require compliance as soon as possible, and no later than twenty-four months, or two complete wet seasons, after the effective date of this permit. *Ecology* will send its decision regarding the request for compliance schedule to the Permittee no sooner than April 1, 2010.

e. For purposes of this condition, "wet season" means Oct 1st through June 30th.

Table 5: Sampling and Effluent Limits Applicable to Discharges to 303(d)-listed Waters

Parameter	Units	Effluent Limit		Analytical Method [a]	Laboratory Quantitation Level [b]	Sampling Frequency
		Fresh Water	Marine			
Turbidity	NTUs	25	25	EPA 180.1 Meter	0.5	1/quarter [c]
pH	SU	[i]	Between 7.0 and 8.5	Meter [d]	±0.5	1/quarter [c]
Fecal Coliform Bacteria	# colonies/ 100 mL	[h]	[h]	SM 9222D	20 CFU/ 100 mL	1/quarter [c]
TSS [e]	mg/L	30	30	SM2540-D	5	1/quarter [c]
Phosphorus, Total	mg/L	[f]	[f]	EPA 365.1	0.01	1/quarter [c]
Ammonia, total as N	mg/L	[f]	[f]	SM 4500 NH^3-GH	0.3	1/quarter [c]
Copper, Total	µg/L	[f]	[f]	EPA 200.8	2.0	1/quarter [c]
Lead, Total	µg/L	[f]	[f]	EPA 200.8	0.5	1/quarter [c]
Mercury, Total	µg/L	2.1	1.8	EPA1631E	0.0005	1/quarter [c]
Zinc, Total	µg/L	[f]	[f]	EPA 200.8	2.5	1/quarter [c]
Pentachlorophenol	µg/L	9[g]	[f]	EPA 625	1.0	1/quarter [c]

[a] Or other equivalent method with the same reporting level.

[b.] The Permittee shall ensure laboratory results comply with the *quantitation level* specified in the table.

[c] 1/quarter means 1 sample taken each quarter, e.g., Q1 = Jan 1 – March 31st , Q2 = April 1 – June 30th, etc.

[d.] Permittees shall use either a calibrated pH meter consistent with *EPA* 9040 or an approved state method.

[e] A Permittee who discharges to a water body *303(d)-listed* for any *sediment* quality parameter shall sample the *discharge* for TSS.

[f.] Site-specific effluent limitation will be assigned at the time of permit coverage.

[g.] Based on a pH of 7.0.

[h.] A numeric effluent limit does not apply, but permittees must sample according to Table 5. In addition, the following mandatory BMPs shall be incorporated into the SWPPP and implemented:

1) Use all known, available and reasonable methods to prevent rodents, birds, and other animals from feeding/nesting/roosting at the facility. Nothing in this section shall be construed as allowing violations of any applicable federal, state or local statutes, ordinances, or regulations including the Migratory Bird Treaty Act.

2) perform at least one annual dry weather inspection of the stormwater system to identify and eliminate sanitary sewer cross-connections;

3) Install structural source control BMPs to address on-site activities and sources that could cause bacterial contamination (e.g., dumpsters, compost piles, food waste, animal products, etc.):

4) Implement operational source control BMPs to prevent bacterial contamination from any known sources of fecal coliform bacteria (e.g., animal waste, etc.);

5) Additional bacteria-related sampling and/or BMPs, if ordered by Ecology on a case-by-case basis.

[i.] The effluent limit for a Permittee who discharges to a fresh water body *303(d)-listed* for pH is: Between 6.0 and 8.5, if the 303(d)-listing is for high pH only; Between 6.5 and 9.0, if the 303(d)-listing is for low pH only; and Between 6.5 and 8.5 if the 303(d)-listing is for both low and high pH. All pH effluent limits are applied end-of-pipe.

D. Requirements for Discharges to Waters with Applicable TMDLs

1. The Permittee shall comply with *applicable TMDL* determinations. *Applicable TMDLs* or *TMDL* determinations are *TMDL*s which have been completed by the issuance date of this permit, or which have been completed prior to the date that the Permittee's *application* is received by *Ecology*, whichever is later. *Ecology* will list the Permittee's requirements to comply with this condition on the letter of permit coverage.
2. *TMDL* requirements associated with *TMDL*s completed after the issuance date of this permit only become effective if they are imposed through an administrative order issued by *Ecology*.
3. Where *Ecology* has established a *TMDL wasteload allocation* and sampling requirements for the Permittee's discharge, the Permittee shall comply with all requirements of the *TMDL* as listed in Appendix 5.
4. Where *Ecology* has established a *TMDL* general *wasteload allocation* for industrial *stormwater* discharges for a parameter present in the Permittee's discharge, but has not identified specific requirements, *Ecology* will assume the Permittee's compliance with the terms and conditions of the permit complies with the approved *TMDL*.
5. Where *Ecology* has not established a *TMDL wasteload allocation* for industrial *stormwater* discharges for a parameter present in the Permittee's discharge, but has not excluded these discharges, *Ecology* will assume the Permittee's compliance with the terms and conditions of this permit complies with the approved *TMDL*.
6. Where a *TMDL* for a parameter present in the Permittee's *discharge* specifically precludes or prohibits discharges of *stormwater* associated with *industrial activity*, the Permittee is not eligible for coverage under this permit.

S7. INSPECTIONS

A. Inspection Frequency and Personnel

1. The Permittee shall conduct and document visual inspections of the site each month.
2. The Permittee shall ensure that inspections are conducted by *qualified personnel*.

B. Inspection Components

Each inspection shall include:

1. Observations made at *stormwater* sampling locations and areas where *stormwater* associated with *industrial activity* is discharged off-site; or discharged to *waters of the state*, or to a *storm sewer* system that drains to *waters of the state*.
2. Observations for the presence of floating materials, visible oil sheen, discoloration, *turbidity*, odor, etc. in the *stormwater* discharge(s).
3. Observations for the presence of *illicit discharges* such as *domestic wastewater*, *noncontact cooling water*, or *process wastewater* (including *leachate*).

a. If an *illicit discharge* is discovered, the Permittee shall notify *Ecology* within seven days.

b. The Permittee shall eliminate the *illicit discharge* within 30 days.

4. A verification that the descriptions of potential *pollutant* sources required under this permit are accurate.

5. A verification that the site map in the SWPPP reflects current conditions.

6. An assessment of all BMPs that have been implemented, noting all of the following:

   a. Effectiveness of BMPs inspected.

   b. Locations of BMPs that need maintenance.

   c. Reason maintenance is needed and a schedule for maintenance.

   d. Locations where additional or different BMPs are needed and the rationale for the additional or different BMPs.

C. Inspection Results

1. The Permittee shall record the results of each inspection in an inspection report or checklist and keep the records on-site for *Ecology* review. The Permittee shall ensure each inspection report documents the observations, verifications and assessments required in S7.B and includes:

   a. Time and date of the inspection.

   b. Locations inspected.

   c. Statements that, in the judgment of 1) the person conducting the site inspection, and 2) the person described in Condition G2., the site is either in compliance or out of compliance with the terms and conditions of the SWPPP and this permit.

   d. A summary report and a schedule of implementation of the remedial actions that the Permittee plans to take if the site inspection indicates that the site is out of compliance. The remedial actions taken must meet the requirements of the SWPPP and the permit.

   e. Name, title, and signature of the person conducting site inspection; and the following statement: "I certify that this report is true, accurate, and complete, to the best of my knowledge and belief."

   f. Certification and signature of the person described in Condition G2.A, or a duly authorized representative of the *facility*, in accordance with Condition G.2.B.

D. Reports of Non-Compliance

The Permittee shall prepare reports of non-compliance identified during an inspection in accordance with the requirements of Condition S9.E.

S8. CORRECTIVE ACTIONS

A. Implementation of Source Control and Treatment BMPs from Previous Permit

In addition to the Corrective Action Requirements of S8.B-D, Permittees shall implement any applicable Level 1, 2 or 3 Responses required by the previous Industrial Stormwater *General Permit*(s). Permittees shall continue to operate and/or maintain any source control or *treatment BMP*s related to Level 1, 2 or 3 Responses implemented prior to the effective date of this permit.

B. Level One Corrective Actions – Operational Source Control BMPs

Permittees that exceed any applicable *benchmark* value(s) in Table 2 or Table 3, shall complete a Level 1 Corrective Action for each parameter exceeded in accordance with the following:

1. Within 14 days of receipt of sampling results that indicate a benchmark exceedance:
    a. Conduct an inspection to investigate the cause.
    b. Review the SWPPP and ensure that it fully complies with Permit Condition S3, and contains the correct BMPs from the applicable *Stormwater Management Manual*.
    c. Make appropriate revisions to the SWPPP to include additional *Operational Source Control BMPs* with the goal of achieving the applicable *benchmark* value(s) in future discharges. The Permittee shall sign and certify the revised SWPPP in accordance with S3.A.6.
2. Summarize the Level 1 Corrective Actions in the Annual Report (Condition S9.B)
3. **Level One Deadline:** The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than the DMR due date for the quarter the *benchmark* was exceeded.

C. Level Two Corrective Actions – Structural Source Control BMPs

Permittees that exceed an applicable *benchmark* value (for a single parameter) for any two quarters during a calendar year shall complete a Level 2 Corrective Action in accordance with S8.C. Alternatively, the permittee may skip Level 2 and complete a Level 3 Corrective Action in accordance with Condition S8.D.

1. Review the SWPPP and ensure that it fully complies with Permit Condition S3.
2. Make appropriate revisions to the SWPPP to include additional *Structural Source Control BMPs* with the goal of achieving the applicable *benchmark* value(s) in future discharges. The Permittee shall sign and certify the revised SWPPP in accordance with S3.A.6.
3. Summarize the Level 2 Corrective Actions (planned or taken) in the Annual Report (Condition S9.B).

4. **Level 2 Deadline:** The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than August 31st the following year[4].

    a. If installation of necessary *Structural Source Control BMPs* is not feasible by August 31st the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.

    b. If installation of *Structural Source Control BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* may waive the requirement for additional *Structural Source Control BMPs* by approving a *Modification of Permit Coverage*.

    c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Coverage* form to *Ecology* in accordance with Condition S2.B, by May 15th prior to Level 2 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

    d. For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

D. Level Three Corrective Actions – Treatment BMPs

Permittees that exceed an applicable *benchmark* value (for a single parameter) for any three quarters during a calendar year shall complete a Level 3 Corrective Action in accordance with S8.D. A Level 2 Corrective Action is not required.

1. Review the SWPPP and ensure that it fully complies with Permit Condition S3.
2. Make appropriate revisions to the SWPPP to include additional *Treatment BMPs* with the goal of achieving the applicable *benchmark* value(s) in future discharges. Revisions shall include additional operational and/or structural source control BMPs if necessary for proper performance and maintenance of *Treatment BMPs*.

    a. The Permittee shall sign and certify the revised SWPPP in accordance with S3.A.6.

    b. A licensed professional engineer, geologist, hydrogeologist, or Certified Professional in Storm Water Quality (CPSWQ) shall design and stamp the portion of the SWPPP that addresses *stormwater* treatment structures or processes.

        i. *Ecology* may waive the requirement for a licensed or certified professional upon request of the Permittee and demonstration that the Permittee or treatment device vendor can properly design and install the treatment device; or the treatment BMP doesn't require site-specific design or sizing (e.g., off-the-shelf filtration units, etc.).

        ii. *Ecology* will not waive the Level 3 requirement for a licensed or certified professional more than one time during the permit cycle.

[4] For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012.

3. Before installing treatment BMPs that require the site-specific design or sizing of structures, equipment, or processes to collect, convey, treat, reclaim, or dispose of industrial stormwater, the Permittee shall submit an engineering report, plans and specifications, and an operations and maintenance (O&M) manual to Ecology for review in accordance with Chapter 173-240 WAC.

   a. The engineering report shall be submitted no later than the May 15th prior to the Level 3 deadline, unless an alternate due date is specified in an order.

   b. The plans and specifications and O&M Manual shall be submitted at least 30 days before construction/installation, unless an alternate date is specified in an order. Upon request of the Permittee, Ecology may allow final conceptual drawings to be substituted for plans and specifications.

4. Summarize the Level 3 Corrective Actions (planned or taken) in the Annual Report (Condition S9.B). Include information on how monitoring, assessment or evaluation information was (or will be) used to determine whether existing treatment BMPs will be modified/enhanced, or if new/additional treatment BMPs will be installed.

5. **Level 3 Deadline**: The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than September 30th the following year.

   a. If installation of necessary *Treatment BMPs* is not feasible by the Level 3 Deadline; *Ecology* may approve additional time by approving a *Modification of Permit Coverage*.

   b. If installation of *Treatment BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to violation of a water quality standard, *Ecology* may waive the requirement for *Treatment BMPs* by approving a *Modification of Permit Coverage*.

   c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a Modification of Coverage form to *Ecology* in accordance with Condition S2.B, by May 15th prior to the Level 3 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

   d. For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

S9. REPORTING AND RECORDKEEPING

A. Discharge Monitoring Reports

1. The Permittee shall submit sampling data obtained during each reporting period on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by *Ecology*.

2. The Permittee shall submit sampling results within 45 days of the end of each reporting period.
3. The first reporting period shall begin on the effective date of permit coverage.
4. Upon permit coverage, the Permittee shall ensure that DMRs are postmarked or received by *Ecology* by the DMR Due Dates below:

Table 7: Reporting Dates and DMR Due Dates

Reporting Period	Months	DMR Due Date
1st	January-March	May 15
2nd	April-June	August 14
3rd	July-Sept	November 14
4th	October-December	February 14

5. DMRs shall be submitted using *Ecology*'s WAWebDMR system or by mail to the following address:

   Department of Ecology
   Water Quality Program – Industrial Stormwater
   PO Box 47696
   Olympia, Washington 98504-7696

6. Upon permit coverage, the Permittee shall submit a DMR each reporting period, whether or not the *facility* has discharged *stormwater* from the site.
   a. If no *stormwater* sample was obtained from the site during a given reporting period, the Permittee shall submit the DMR form indicating "no sample obtained", or "no discharge during the quarter", as applicable.
   b. If a Permittee has suspended sampling for a parameter due to consistent attainment, the Permittee shall submit a DMR and indicate that it has achieved Consistent Attainment for that parameter(s).

B. Annual Reports

1. The Permittee shall submit a complete and accurate Annual Report to the Department of *Ecology* no later than May 15th of each year (except 2010) using a form provided by or otherwise approved by *Ecology*.
2. The annual report shall include corrective action documentation as required in S8.B-D. If corrective action is not yet completed at the time of submission of this annual report, the Permittee must describe the status of any outstanding corrective action(s).
3. Permittees shall include the following information with each annual report. The Permittee shall:
   a. Identify the condition triggering the need for corrective action review.
   b. Describe the problem(s) and identify the dates they were discovered.
   c. Summarize any Level 1, 2 or 3 corrective actions completed during the previous calendar year and include the dates it completed the corrective actions.

d. Describe the status of any Level 2 or 3 corrective actions triggered during the previous calendar year, and identify the date it expects to complete corrective actions.

4. Permittees shall retain a copy of all annual reports onsite for *Ecology* review.

C. Records Retention

1. The Permittee shall retain the following documents onsite for a minimum of five years:
   a. A copy of this permit.
   b. A copy of the permit coverage letter.
   c. Records of all sampling information specified in Condition S4.B.3.
   d. Inspection reports including documentation specified in Condition S7.
   e. Any other documentation of compliance with permit requirements.
   f. All equipment calibration records.
   g. All BMP maintenance records.
   h. All original recordings for continuous sampling instrumentation.
   i. Copies of all laboratory reports as described in Condition S3.B.4.
   j. Copies of all reports required by this permit.
   k. Records of all data used to complete the *application* for this permit.
2. The Permittee shall extend the period of records retention during the course of any unresolved litigation regarding the *discharge* of *pollutant*s by the Permittee, or when requested by *Ecology*.
3. The Permittee shall make all plans, documents and records required by this permit immediately available to *Ecology* or the local jurisdiction upon request; or within 14 days of a written request from *Ecology*.

D. Additional Sampling by the Permittee

If the Permittee samples any *pollutant* at a designated sampling point more frequently than required by this permit, then the Permittee shall include the results in the calculation and reporting of the data submitted in the Permittee's DMR.

E. Reporting Permit Violations

1. In the event the Permittee is unable to comply with any of the terms and conditions of this permit which may endanger human health or the environment, or the facility experiences any *bypass* or upset which causes an exceedance of any effluent limitation in the permit, the Permittee shall:
   a. Immediately take action to minimize potential *pollution* or otherwise stop the noncompliance and correct the problem.

b. Immediately notify the appropriate *Ecology* regional office of the failure to comply.

c. Submit a detailed written report to *Ecology* within 30 days unless *Ecology* requests an earlier submission. The Permittee's report shall contain:

i. A description of the noncompliance, including exact dates and times.

ii. Whether the noncompliance has been corrected and, if not, when the noncompliance will be corrected.

iii. The steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. Compliance with the requirements of this section does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

F. Public Access to SWPPP

The Permittee shall provide access to, or a copy of, the SWPPP to the public when requested in writing. Upon receiving a written request from the public for the SWPPP, the Permittee shall:

1. Provide a copy of the SWPPP to the requestor within 14 days of receipt of the written request; or

2. Notify the requestor within 10 days of receipt of the written request of the location and times within normal business hours when the requestor may view the SWPPP , and provide access to the SWPPP within 14 days of receipt of the written request; or

3. Provide a copy of the plans and records to *Ecology*, where the requestor may view the records, within 14 days of a request; or may arrange with the requestor for an alternative, mutually agreed upon location for viewing and/or copying of the plans and records. If access to the plans and records is provided at a location other than at an *Ecology* office, the Permittee will provide reasonable access to copying services for which it may charge a reasonable fee.

S10. COMPLIANCE WITH STANDARDS

A. Discharges shall not cause or contribute to a violation of *Surface Water Quality Standards* (Chapter 173-201A WAC), Ground Water Quality Standards (Chapter 173-200 WAC), Sediment Management Standards (Chapter 173-204 WAC), and human health-based criteria in the National Toxics Rule (*40 CFR* 131.36). Discharges that are not in compliance with these standards are prohibited.

B. *Ecology* will presume compliance with *water quality standards*, unless *discharge* monitoring data or other site specific information demonstrates that a discharge causes or contributes to violation of *water quality standards*, when the Permittee is:

1. In full compliance with all permit conditions, including planning, sampling, monitoring, reporting, and recordkeeping conditions.
2. Fully implementing storm water *best management practices* contained in storm water technical manuals approved by the department, or practices that are *demonstrably equivalent* to practices contained in storm water technical manuals approved by *Ecology*, including the proper selection, implementation, and maintenance of all applicable and appropriate *best management practices* for on-site *pollution* control.

C. Prior to the *discharge* of *stormwater* and non-stormwater to *waters of the state*, the Permittee shall apply all known and reasonable methods of prevention, control, and treatment (*AKART*). To comply with this condition, the Permittee shall prepare and implement an adequate SWPPP, with all applicable and appropriate BMPs, including the BMPs necessary to meet the standards identified in Condition S10.A, and shall install and maintain the BMPs in accordance with the SWPPP, applicable SWMMs, and the terms and conditions of this permit.

S11. PERMIT FEES

A. The Permittee shall pay permit fees assessed by *Ecology* and established in Chapter 173-224 WAC.

B. *Ecology* will continue to assess permit fees until it terminates a permit in accordance with Special Condition S13 or revoked in accordance with General Condition G5.

S12. SOLID AND LIQUID WASTE MANAGEMENT

The Permittee shall not allow solid waste material or *leachate* to cause violations of the State Surface *Water Quality Standards* (Chapter 173-201A WAC), the *Ground Water Quality Standards* (Chapter 173-200 WAC) or the Sediment Management Standards (Chapter 173-204 WAC).

S13. NOTICE OF TERMINATION (NOT)

A. Conditions for a NOT

Ecology may approve a *Notice of Termination* (NOT) request when the Permittee meets one or more of the following conditions:

1. All permitted *stormwater* discharges associated with *industrial activity* that are authorized by this permit cease because the *industrial activity* has ceased, and no *significant materials* or industrial *pollutant*s remain exposed to *stormwater*.
2. The party that is responsible for permit coverage (signatory to *application*) sells or otherwise legally transfers responsibility for the *industrial activity*.
3. All *stormwater* discharges associated with *industrial activity* are prevented because the *stormwater* is redirected to a *sanitary sewer*, or discharged to ground (e.g., infiltration, etc.).

B. Procedure for Obtaining Termination

1. The Permittee shall apply for a NOT on a form specified by *Ecology* (NOT Form).
2. The Permittee seeking permit coverage termination shall sign the NOT in accordance with Condition G2. of this permit.
3. The Permittee shall submit the completed NOT form to *Ecology* at the address in Condition S9.A.5.

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this *general permit* shall be consistent with the terms and conditions of this *general permit*. Any *discharge* of any *pollutant* more frequently than, or at a level in excess of that identified and authorized by the *general permit*, shall constitute a violation of the terms and conditions of this permit.

G2. SIGNATORY REQUIREMENTS

A. All permit *applications* shall be signed:

1. In the case of corporations, by a responsible corporate officer of at least the level of vice president of a corporation.
2. In the case of a partnership, by a general partner of a partnership.
3. In the case of sole proprietorship, by the proprietor.
4. In the case of a municipal, state, or other public *facility*, by either a principal executive officer or ranking elected official.

B. All reports required by this permit and other information requested by *Ecology* shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to the *Ecology*.
2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated *facility*, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

C. Changes to authorization. If an authorization under paragraph G2.B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the *facility*, a new authorization satisfying the requirements of paragraph G2.B.2 above shall be submitted to *Ecology* prior to, or together with, any reports, information, or *applications* to be signed by an authorized representative.

D. Certification. Any person signing a document under this section shall make the following certification:

> "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that *qualified personnel* properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there

are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G3. RIGHT OF INSPECTION AND ENTRY

The Permittee shall allow an authorized representative of *Ecology*, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a *discharge* is located or where any records shall be kept under the terms and conditions of this permit.

B. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.

C. To inspect, at reasonable times, any facilities, equipment (including sampling and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the *Clean Water Act*.

G4. GENERAL PERMIT MODIFICATION AND REVOCATION

This permit may be modified, revoked and reissued, or terminated in accordance with the provisions of Chapter 173-226 WAC. Grounds for modification, revocation and reissuance, or termination include, but are not limited to, the following:

A. When a change which occurs in the technology or practices for control or abatement of *pollutant*s applicable to the category of *dischargers* covered under this permit.

B. When effluent limitation guidelines or standards are promulgated pursuant to the CWA or Chapter 90.48 RCW, for the category of *dischargers* covered under this permit.

C. When a water quality management plan containing requirements applicable to the category of *dischargers* covered under this permit is approved.

D. When information is obtained which indicates that cumulative effects on the environment from *dischargers* covered under this permit are unacceptable.

G5. REVOCATION OF COVERAGE UNDER THE PERMIT

A. Pursuant with Chapter 43.21B RCW and Chapter 173-226 WAC, *Ecology* may terminate coverage for any *discharger* under this permit for cause. Cases where coverage may be terminated include, but are not limited to, the following:

1. Violation of any term or condition of this permit.

2. Obtaining coverage under this permit by misrepresentation or failure to disclose fully all relevant facts.

3. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

4. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.
5. A determination that the permitted activity endangers human health or the environment, or contributes to *water quality standards* violations.
6. Nonpayment of permit fees or penalties assessed pursuant to RCW 90.48.465 and Chapter 173-224 WAC.
7. Failure of the Permittee to satisfy the public notice requirements of WAC 173-226-130(5), when applicable.

B. *Ecology* may require any *discharger* under this permit to apply for and obtain coverage under an individual permit or another more specific *general permit*.

C. Permittees who have their coverage revoked for cause according to WAC 173-226-240 may request temporary coverage under this permit during the time an individual permit is being developed, provided the request is made within 90 days from the time of revocation and is submitted along with a complete individual permit *application* form.

G6. REPORTING A CAUSE FOR MODIFICATION

The Permittee shall submit a new *application*, or a supplement to the previous *application*, whenever a material change to the *industrial activity* or in the quantity or type of *discharge* is anticipated which is not specifically authorized by this permit. This *application* shall be submitted at least 60 days prior to any proposed changes. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not relieve the Permittee of the duty to comply with the existing permit until it is modified or reissued.

G7. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit shall be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G8. DUTY TO REAPPLY

The Permittee shall apply for permit renewal at least 180 days prior to the expiration date of this permit.

G9. REMOVED SUBSTANCES

Collected screenings, grit, solids, sludges, filter backwash, or other *pollutant*s removed in the course of treatment or control of *stormwater* shall not be resuspended or reintroduced to the final effluent stream for *discharge* to state waters.

G10. DUTY TO PROVIDE INFORMATION

The Permittee shall submit to *Ecology*, within a reasonable time, all information which *Ecology* may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also submit to *Ecology*, upon request, copies of records required to be kept by this permit [*40 CFR* 122.41(h)].

G11. OTHER REQUIREMENTS OF 40 CFR

All other requirements of *40 CFR* 122.41 and 122.42 are incorporated in this permit by reference.

G12. ADDITIONAL SAMPLING

Ecology may establish specific sampling requirements in addition to those contained in this permit by administrative order or permit modification.

G13. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to $10,000 and costs of prosecution, or by imprisonment at the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of this permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to $10,000 for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G14. UPSET

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted *facility* was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in condition S9.E; and 4) the Permittee complied with any remedial measures required under this permit.

In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G15. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G16. DUTY TO COMPLY

The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the *Clean Water Act* and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal *application*.

G17. TOXIC POLLUTANTS

The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the *Clean Water Act* for toxic *pollutant*s within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G18. PENALTIES FOR TAMPERING

The *Clean Water Act* provides that any person who falsifies, tampers with, or knowingly renders inaccurate any sampling device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this Condition, punishment shall be a fine of not more than $20,000 per day of violation, or imprisonment of not more than four years, or both.

G19. REPORTING PLANNED CHANGES

The Permittee shall, as soon as possible, give notice to *Ecology* of planned physical alterations, modifications or additions to the permitted *industrial activity*, which will result in:

A. The permitted *facility* being determined to be a new source pursuant to *40 CFR* 122.29(b).

B. A *significant process change*, as defined in the glossary of this permit.

C. A change in the location of *industrial activity* that affects the Permittee's sampling requirements in Conditions S3, S4, S5, and S6.

Following such notice, permit coverage may be modified, or revoked and reissued pursuant to *40 CFR* 122.62(a) to specify and limit any *pollutant*s not previously limited. Until such modification is effective, any new or increased *discharge* in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G20. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit *application*, or submitted incorrect information in a permit *application* or in any report to *Ecology*, it shall promptly submit such facts or information.

G21. REPORTING ANTICIPATED NON-COMPLIANCE

The Permittee shall give advance notice to *Ecology* by submission of a new *application*, or supplement to the existing *application*, at least 45 days prior to commencement of such discharges, of any *facility* expansions, production increases, or other planned changes, such as process modifications, in the permitted *facility* or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during non-critical water quality periods and carried out in a manner approved by *Ecology*.

G22. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER THE PERMIT

A. Any *discharger* authorized by this permit may request to be excluded from coverage under the *general permit* by applying for an individual permit.

B. The *discharger* shall submit to *Ecology* an *application* as described in WAC 173-220-040 or WAC 173-216-070, whichever is applicable, with reasons supporting the request. These reasons shall fully document how an individual permit will apply to the applicant in a way that the *general permit* cannot.

C. *Ecology* may make specific requests for information to support the request. *Ecology* shall either issue an individual permit or deny the request with a statement explaining the reason for the denial.

D. When an individual permit is issued to a *discharger* otherwise subject to the industrial *stormwater general permit*, the applicability of the industrial *stormwater general permit* to that Permittee is automatically terminated on the effective date of the individual permit.

G23. APPEALS

A. The terms and conditions of this *general permit*, as they apply to the appropriate class of *dischargers*, are subject to appeal by any person within 30 days of issuance of this *general permit*, in accordance with Chapter 43.21B RCW, and Chapter 173-226 WAC.

B. The terms and conditions of this *general permit*, as they apply to an individual *discharger*, are appealable in accordance with Chapter 43.21B RCW within 30 days of the effective date of coverage of that *discharger*. Consideration of an appeal of *general permit* coverage of an individual *discharger* is limited to the *general permit*'s applicability or nonapplicability to that individual *discharger*.

C. The appeal of *general permit* coverage of an individual *discharger* does not affect any other *discharger*s covered under this *general permit*. If the terms and conditions of this *general permit* are found to be inapplicable to any individual *discharger*(s), the matter shall be remanded to *Ecology* for consideration of issuance of an individual permit or permits.

G24. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or *application* of any provision of this permit to any circumstance, is held invalid, the *application* of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

G25. BYPASS PROHIBITED

Bypass, which is the intentional diversion of waste streams from any portion of a treatment *facility*, is prohibited, and *Ecology* may take enforcement action against a Permittee for *bypass* unless one of the following circumstances (A, B, or C) is applicable.

A. <u>*Bypass* for Essential Maintenance without the Potential to Cause Violation of Permit Limits or Conditions</u>

Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health as determined by *Ecology* prior to the *bypass*. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the *bypass*.

B. <u>*Bypass* Which is Unavoidable, Unanticipated, and Results in Noncompliance of this Permit</u>

This *bypass* is permitted only if:

1. *Bypass* is unavoidable to prevent loss of life, personal injury, or *severe property damage*. "*Severe property damage*" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a *bypass*.

2. There are no feasible alternatives to the *bypass*, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a *bypass* which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment *facility*.
3. *Ecology* is properly notified of the *bypass* as required in condition S9E of this permit.

C. *Bypass* which is Anticipated and has the Potential to Result in Noncompliance of this Permit

The Permittee must notify *Ecology* at least thirty (30) days before the planned date of *bypass*. The notice must contain (1) a description of the *bypass* and its cause; (2) an analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing; (3) a cost-effectiveness analysis of alternatives including comparative resource damage assessment; (4) the minimum and maximum duration of *bypass* under each alternative; (5) a recommendation as to the preferred alternative for conducting the *bypass*; (6) the projected date of *bypass* initiation; (7) a statement of compliance with SEPA; (8) a request for modification of *water quality standards* as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated; and (9) steps taken or planned to reduce, eliminate, and prevent reoccurrence of the *bypass*.

For probable construction bypasses, the need to *bypass* is to be identified as early in the planning process as possible. The analysis required above must be considered during preparation of the engineering report or facilities plan and plans and specifications and must be included to the extent practical. In cases where the probable need to *bypass* is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the *bypass*.

Ecology will consider the following prior to issuing an administrative order for this type *bypass*:

1. If the *bypass* is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
2. If there are feasible alternatives to *bypass*, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment *facility*.
3. If the *bypass* is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed *bypass* and any other relevant factors, *Ecology* will approve or deny the request. The public must be notified and given an opportunity to comment on *bypass* incidents of significant duration, to the extent feasible. Approval of a request to *bypass* will be by administrative order issued by *Ecology* under RCW 90.48.120.

APPENDIX 1 - ACRONYMS

BMP	Best Management Practice
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWA	Centralized Waste Treatment
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
FWPCA	Federal Water Pollution Control Act
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
SARA	Superfund Amendment and Reauthorization Act
SEPA	State Environmental Policy Act
SIC	Standard Industrial Classification
SMCRA	Surface Mining Control and Reclamation Act
SWMM	Stormwater Management Manual
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
USC	United States Code
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WQ	Water Quality

APPENDIX 2 - DEFINITIONS

40 CFR means Title 40 of the Code of Federal Regulations, which is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

303(d)-listed water body means waterbodies as listed as Category 5 on Washington State's Water Quality Assessment.

Air Emission means a release of air contaminants into the ambient air.

AKART is an acronym for "all known, available, and reasonable methods of prevention, control, and treatment." AKART represents the most current methodology that can be reasonably required for preventing, controlling, or abating the *pollutant*s and controlling *pollution* associated with a discharge.

Applicable TMDL means any *TMDL* which has been completed either before the issuance date of this permit or the date the permittee first obtains coverage under this permit, whichever is later.

Application means a request for coverage under this *general permit* pursuant to WAC 173-226-200. Also called a *Notice of Intent (NOI)*.

Best Management Practices (*BMPs* - general definition) means schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the *pollution* of *waters of the state*. BMPs include treatment systems, operating procedures, and practices to control: plant site *runoff*, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In this permit BMPs are further categorized as operational source control, structural source control, *erosion* and *sediment* control, and *treatment BMP*s.

Benchmark means a *pollutant* concentration used as a permit threshold, below which a pollutant is considered unlikely to cause a water quality violation, and above which it may. When pollutant concentrations exceed benchmarks, corrective action requirements take effect. Benchmark values are not *water quality standards* and are not numeric effluent limitations; they are indicator values.

Bypass means the intentional diversion of waste streams from any portion of a treatment *facility*.

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, and 97-117; USC 1251 et seq.

Combined Sewer means a sewer which has been designed to serve as a *sanitary sewer* and a *storm sewer*, and into which inflow is allowed by local ordinance.

Construction Activity means clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, industrial buildings, and demolition activity.

Control Plan means a *total maximum daily load (TMDL)* determination, restrictions for the protection of endangered species, a *ground water* management plan, or other limitations that regulate or set limits on discharges to a specific water body or *ground water* recharge area.

Demonstrably Equivalent means that the technical basis for the selection of all storm water *best management practices* are documented within a storm water *pollution* prevention plan. The storm water *pollution* prevention plan must document: 1) The method and reasons for choosing the storm water *best management practices* selected; 2) The *pollutant* removal performance expected from the practices selected; 3) The technical basis supporting the performance claims for the practices selected, including any available existing data concerning field performance of the practices selected; 4) An assessment of how the selected practices will comply with state *water quality standards*; and 5) An assessment of how the selected practices will satisfy both applicable federal technology-based treatment requirements and state requirements to use all known, available, and reasonable methods of prevention, control, and treatment.

Detention means the temporary storage of *stormwater* to improve quality and/or to reduce the mass flow rate of discharge.

Discharge [of a pollutant] means any addition of any *pollutant* or combination of pollutants to waters of the United States from any point source. This definition includes additions of pollutants into waters of the United States from: surface *runoff* which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, *municipality*, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

Discharger means an owner or operator of any *facility* or activity subject to regulation under Chapter 90.48 RCW or the Federal *Clean Water Act*.

Domestic Wastewater means water carrying human wastes, including kitchen, bath, and laundry wastes from residences, buildings, industrial establishments, or other places, together with such *ground water* infiltration or surface waters as may be present.

Ecology means the Washington State Department of *Ecology*.

EPA means the United States Environmental Protection Agency.

Equivalent BMPs means operational, source control, treatment, or innovative BMPs which result in equal or better quality of *stormwater discharge* to surface water or to *ground water* than BMPs selected from the SWMM.

Erosion means the wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Erosion and Sediment Control BMPs means BMPs that are intended to prevent *erosion* and sedimentation, such as preserving natural vegetation, seeding, mulching and matting, plastic covering, filter fences, and *sediment* traps and ponds.

Existing Facility means a *facility* that was in operation prior to the effective date of this permit. It also includes any *facility* that is not categorically included for coverage but is in operation when identified by *Ecology* as a *significant contributor of pollutants*.

Facility means any NPDES "point source" (including land or appurtenances thereto) that is subject to regulation under the NPDES program. See *40 CFR* 122.2.

General Permit means a permit which covers multiple *dischargers* of a point source category within a designated geographical area, in lieu of individual permits being issued to each *discharger*.

Ground Water means water in a saturated zone or stratum beneath the land surface or a surface water body.

Illicit Discharge means any *discharge* that is not composed entirely of *stormwater* except (1) discharges authorized pursuant to a separate NPDES permit, or (2) conditionally authorized non-*stormwater* discharges identified in Condition S5.D.

Inactive Facility means a *facility* that no longer engages in business, production, providing services, or any auxiliary operation.

Industrial Activity means (1) the 11 categories of industrial activities identified in *40 CFR* 122.26(b)(14)(i-xi) that must apply for either coverage under this permit or no exposure certification, (2) any *facility* conducting any activities described in Table 1, and (3) identified by *Ecology* as a *significant contributor of pollutants*. Table 1 lists the 11 categories of industrial activities identified in *40 CFR* 122.26(b)(14)(i-xi) in a different format.

Landfill means an area of land or an excavation in which wastes are placed for permanent disposal, and which is not a *land application site*, surface impoundment, injection well, or waste pile.

Land Application Site means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

Leachate means water or other liquid that has percolated through raw material, product or waste and contains substances in solution or suspension as a result of the contact with these materials.

Local Government means any county, city, or town having its own government for local affairs.

Material Handling means storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product.

Municipality means a political unit such as a city, town or county; incorporated for local self-government.

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking, and reissuing, terminating, and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal *Clean Water Act*, for the *discharge* of *pollutant*s to *surface waters of the state* from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington Department of *Ecology*.

New Development means land disturbing activities, including Class IV -general forest practices that are conversions from timber land to other uses; structural development, including construction or installation of a building or other structure; creation of impervious surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development.

New Discharge(r) means a *facility* from which there is a discharge, that did not commence the *discharge* at a particular site prior to August 13, 1979, which is not a new source, and which has never received a finally effective NPDES permit for discharges at that site. See *40 CFR* 122.2.

New Facility means a *facility* that begins activities that result in a *discharge* or a potential discharge to *waters of the state* on or after the effective date of this *general permit*.

Noncontact Cooling Water means water used for cooling which does not come into direct contact with any raw material, intermediate product, waste product, or finished product.

Notice of Termination (NOT) means a request for termination of coverage under this *general permit* as specified by Special Condition S13 of this permit.

Operational Source Control BMPs means schedule of activities, prohibition of practices, maintenance procedures, employee training, good housekeeping, and other managerial practices to prevent or reduce the *pollution* of *waters of the state*. Not included are BMPs that require construction of *pollution* control devices.

Pollutant means the *discharge* of any of the following to *waters of the state*: dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, domestic sewage sludge (biosolids), munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste. This term does not include sewage from vessels within the meaning of section 312 of the FWPCA nor does it include dredged or fill material discharged in accordance with a permit issued under section 404 of the FWPCA.

Pollution means contamination or other alteration of the physical, chemical, or biological properties of *waters of the state*; including change in temperature, taste, color, *turbidity*, or odor of the waters; or such *discharge* of any liquid, gaseous, solid, radioactive or other substance into any *waters of the state* as will or is likely to create a nuisance or render such waters harmful,

detrimental or injurious to the public health, safety or welfare; or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or to livestock, wild animals, birds, fish, or other aquatic life.

Process Wastewater means any water which, during manufacturing or processing, comes into direct contact or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Qualified Personnel means those who possess the knowledge and skills to assess conditions and activities that could impact *stormwater* quality at the *facility*, and evaluate the effectiveness of *best management practices* required by this permit.

Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) means the lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

Reasonable Potential means the likely probability for *pollutant*s in the *discharge* to exceed the applicable water quality criteria in the receiving water body.

Redevelopment means on a site that is already substantially developed (i.e., has 35% or more of existing impervious surface coverage), the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities.

Regular Business Hours means those time frames when the *facility* is engaged in its primary production process, but does not include additional shifts or weekends when partial staffing is at the site primarily for maintenance and incidental production activities. *Regular business hours* do not include periods of time that the *facility* is inactive and *unstaffed*.

Representative [sample] means a sample of the *discharge* that accurately characterizes *stormwater runoff* generated in the designated drainage area of the *facility*.

Runoff means that portion of rainfall or snowmelt water not absorbed into the ground that becomes surface flow.

Sanitary Sewer means a sewer which is designed to convey *domestic wastewater*.

Sediment means the fragmented material that originates from the weathering and *erosion* of rocks, unconsolidated deposits, or unpaved yards, and is transported by, suspended in, or deposited by water.

Severe Property Damage means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a *bypass*. *Severe property damage* does not mean economic loss caused by delays in production.

Significant Amount means an amount of a *pollutant* in a *discharge* that is amenable to available and reasonable methods of prevention, control, or treatment; or an amount of a *pollutant* that has a *reasonable potential* to cause a violation of surface or *ground water quality standards* or *sediment* management standards.

Significant Contributor of Pollutant(s) means a *facility* determined by *Ecology* to be a contributor of a *significant amount*(s) of a *pollutant*(s) to *waters of the state*.

Significant Materials includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the *facility* is required to report pursuant to section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with *stormwater* discharges.

Significant Process Change means any modification of the *facility* that would result in any of the following:

1. Add different *pollutants* in a *significant amount* to the discharge.
2. Increase the *pollutants* in the *stormwater discharge* by a *significant amount*.
3. Add a new *industrial activity* (SIC) that was not previously covered.
4. Add additional impervious surface or acreage such that *stormwater* discharge would be increased by 25% or more.

Source Control BMPs means structures or operations that are intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants. This permit separates source control into two types: *structural source control BMPs* and *operational source control BMPs*.

Standard Industrial Classification (SIC) is the statistical classification standard underlying all establishment-based federal economic statistics classified by industry as reported in the 1987 SIC Manual by the Office of Management and Budget.

State Environmental Policy Act (SEPA) means the Washington State Law, RCW 43.21C.020, intended to prevent or eliminate damage to the environment.

Storm Sewer means a sewer that is specifically designed to carry *stormwater*. Also called a storm drain.

Stormwater means that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a *stormwater drainage system* into a defined surface water body, or a constructed infiltration *facility*.

Stormwater Discharge Associated with Industrial Activity means the *discharge* from any conveyance that is used for collecting and conveying *stormwater* and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant (see *40 CFR* 122(b)(14)).

Stormwater Drainage System means constructed and natural features which function together as a system to collect, convey, channel, hold, inhibit, retain, detain, infiltrate or divert *stormwater*.

Stormwater Management Manual (SWMM) or Manual means the technical manuals prepared by *Ecology* for *stormwater* management in western and eastern Washington.

Stormwater Pollution Prevention Plan (SWPPP) means a documented plan to implement measures to identify, prevent, and control the contamination of point source discharges of *stormwater*.

Structural Source Control BMPs means physical, structural, or mechanical devices or facilities that are intended to prevent *pollutant*s from entering *stormwater*.

Surface Waters of the State includes lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state.

Total Maximum Daily Load (TMDL) means a calculation of the maximum amount of a *pollutant* that a water body can receive and still meet state *water quality standards*. Percentages of the *total maximum daily load* are allocated to the various *pollutant* sources. A *TMDL* is the sum of the allowable loads of a single *pollutant* from all contributing point and nonpoint sources. The *TMDL* calculations include a "margin of safety" to ensure that the water body can be protected in case there are unforeseen events or unknown sources of the *pollutant*. The calculation also accounts for seasonable variation in water quality.

Treatment BMPs means BMPs that are intended to remove *pollutant*s from *stormwater*.

Turbidity means the clarity of water expressed as nephelometric *turbidity* units (NTU) and measured with a calibrated turbidimeter.

Underground Injection Control Well means a well that is used to *discharge* fluids into the subsurface. An *underground injection control well* is one of the following:

1. A bored, drilled, or driven shaft,
2. An improved sinkhole, or
3. A subsurface fluid distribution system. (WAC 173-218-030)

Unstaffed means the *facility* has no assigned staff. A site may be "*unstaffed*" even when security personnel are present, provided that *pollutant* generating activities are not included in their duties.

Vehicle means a motor-driven conveyance that transports people or freight, such as an automobile, truck, train, or airplane.

Vehicle Maintenance means the rehabilitation, mechanical repairing, painting, fueling, and/or lubricating of a motor-driven conveyance that transports people or freight, such as an automobile, truck, train, or airplane.

Wasteload Allocation (WLA) means the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of *pollution*. WLAs constitute a type of water quality based effluent limitation (*40 CFR* 130.2(h)).

Water Quality Standards means the Water Quality Standards for *Surface Waters of the State* of Washington, Chapter 173-201A WAC, Ground Water Quality Standards (Chapter 173-200 WAC), Sediment Management Standards (Chapter 173-204 WAC), and human health-based criteria in the National Toxics Rule (*40 CFR* 131.36).

Waters of the State includes those waters defined as "waters of the United States" in *40 CFR* Subpart 122.2 within the geographic boundaries of Washington State. State statute defines "*waters of the state*" to include lakes, rivers, ponds, streams, wetlands, inland waters, under*ground water*s, salt waters and all other surface waters and water courses within the jurisdiction of the state of Washington (Chapter 90.48 RCW).

APPENDIX 3 - SWPPP CERTIFICATION FORM

The Permittee shall use this form to sign and certify that the Stormwater Pollution Prevention Plan (SWPPP) is complete, accurate and in compliance with Conditions S3 and S8 of the Industrial Stormwater General Permit.

- A SWPPP certification form needs to be completed and attached to all SWPPPs.
- Each time a Level 1, 2, or 3 Corrective Action is required, this form needs to be re-signed and re-certified by the Permittee, and attached to the SWPPP.

Is this SWPPP certification in response to a Level 1, 2 or 3 Corrective Action? ☐Yes ☐No

If Yes:

- Type of Corrective Action?: ☐Level 1 ☐Level 2 ☐Level 3
- Date SWPPP update/revision completed:_____.

"I certify under penalty of law that this SWPPP and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate information to determine compliance with the Industrial Stormwater General Permit. Based on my inquiry of the person or persons who are responsible for stormwater management at my facility, this SWPPP is, to the best of my knowledge and belief, true, accurate, and complete, and in full compliance with Permit Conditions S3 and S8, including the correct Best Management Practices from the applicable Stormwater Management Manual. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Operator's Printed Name *	Title
Operator's Signature *	Date

***** Federal regulations require this document to be signed as follows:
For a corporation, by a principal executive officer of at least the level of vice president;
For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
For a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.

This document shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to the Ecology.
2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Changes to authorization. If an authorization under number 2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of number 2 above shall be submitted to Ecology prior to, or together with, any reports, information, or applications to be signed by an authorized representative.

APPENDIX 4 - EXISTING DISCHARGERS TO IMPAIRED WATER BODIES

This appendix has a link below to a website list of existing Permittees that *discharge pollutant*s of concern to impaired water bodies.

http://www.ecy.wa.gov/programs/wq/stormwater/industrial/permitdocs/iswgpapp4.pdf

This list is based on the best information available to *Ecology*. There will be changes and updates to this list based on new, more accurate information. If changes or updates are made, *Ecology* will notify the affected permittees directly. Such changes or updates will not become effective until 30 days after the affected *dischargers* are notified.

This list is generated by comparing the *discharge* point of each individual *discharger* permitted under the Industrial *Stormwater General Permit* with the 2008 list of Category 5 impaired waters (the *303(d) list*), approved by US *EPA* on January 29, 2009.

APPENDIX 5 - DISCHARGERS SUBJECT TO TMDL REQUIREMENTS

The list of *dischargers* identified as discharging to water bodies which have completed water quality clean-up plans or *TMDL*s and associated monitoring requirements can be viewed on *Ecology*'s website at: http://www.ecy.wa.gov/programs/wq/stormwater/industrial/index.html

The most current list can also be obtained by contacting Ecology at:

Industrial Stormwater General Permit
Washington State Department of Ecology
P.O. Box 47696
Olympia, WA 98504-7600

This list is based on the best information available to *Ecology*. There will be changes and updates to this list based on new, more accurate information. If changes or updates are made, *Ecology* will notify the affected permittees directly. Such changes or updates will not become effective until 30 days after the affected *dischargers* are notified.

Industrial Stormwater General Permit Modification

Addendum to Fact Sheet: Appendix E

Response to Public Comments on the Draft Permit Modification

May 16, 2012

Ecology received 68 public comments on the draft Industrial Stormwater General Permit (ISGP) modification that was released for public comment on February 1, 2012. These comments were submitted by 20 interested parties, prior to the close of the public comment period on March 16, 2012. Copies of all comment letters, emails, and oral testimony were posted on Ecology's Industrial Stormwater General Permit website:
http://www.ecy.wa.gov/programs/wq/stormwater/industrial/index.html

Ecology has assembled excerpts from comments into this document, and organized them by topic and/or permit condition. Ecology has provided a written response to each comment, and indicated where changes were made based on public comments. Underlined language is used to indicate new language compared to the original 2010 ISGP.

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General Comments

Association of Washington Business

1.

AWB and member companies who own and operate facilities permitted under the ISGP have spent considerable time and energy working with Ecology on the current ISGP. The current round of revisions highlights the ongoing need for a permit that is both stable and understandable. While AWB appreciates the immediate need for some of the modifications in the draft, our members have expressed a concern that ongoing litigation will continue to create more uncertainty and additional changes to the ISGP may be required in the future. Any modifications made to the ISGP should be changes that are not likely to be revised again within the next few months pending the outcome of current litigation.

Additionally, AWB and its member companies continue to express concerns about the ongoing costs of complying with environmental regulations, including the ISGP. While those who own and operate facilities permitted under the ISGP are committed to staying in compliance with their permit obligations, the costs of compliance are significant. Ecology must consider modifications that provide a reasonable and certain pathway for compliance. Permit modifications that reference the use of BMPs without specifically defining critical terms are likely to create additional costs and another round of permit revisions or litigation (see Section II for specific examples). Ultimately, Ecology should use this opportunity to modify the ISGP to provide greater clarity on the use of adaptive management (as directed by the Pollution Control Hearings Board) to the regulated community, which serves Ecology's objective to protect water quality and the regulated community's objective to confidently comply with the obligations of the ISGP.

Response: Ecology agrees that the ongoing litigation will continue to create uncertainty, but Ecology has decided to fully address the PCHB ruling now, rather than to wait for the litigation to be resolved.

BNSF

2.

Additional Matters Ecology Should Address at this Time

Other than formal amendments to the permit, Ecology lacks a clear, consistent and reliable means of communicating its policy decisions to the regulated community. It issued a "Frequently Asked Questions" (FAQs) document in mid-March 2011 and, when challenged, it issued a qualification to the FAQ that left the regulated community uncertain as to its continued application. Ecology has previously stated that permittees may call or email Ecology for guidance, but that guidance can be inconsistent. One notable example applicable to transportation facilities is the effect of stand-alone mobile fueling on the obligation to seek permit coverage. In a November 2009 email exchange (see Attachment 1), prior to issuing the current ISGP, Ross Dunning of Kennedy Jenks Consultants asked Ecology two specific questions on this point: "If a facility does not require permit coverage because the[y] don't have a vehicle maintenance shop ... then fueling that is performed onsite does NOT trigger the requirement to apply for permit coverage" and "So it would seem that a transportation facility that performs vehicle maintenance (including fueling) but does not have a vehicle maintenance

shop is not required to apply for permit coverage. Can you confirm?" Ecology emailed back confirming the accuracy of these statements. After it finalized the ISGP effective January 1, 2010, Ecology completely changed its position on these points. The FAQs now state that anywhere a maintenance or fueling activity takes place constitutes a"shop," and therefore mobile fueling from a vendor's truck triggers the obligation to secure coverage.
Ecology should take this opportunity to clearly state its policy decisions via permit amendments rather than continue its *ad hoc* and sometimes inconsistent practice of issuing informal guidance. Therefore, Ecology should further amend the ISGP and address the following issues: [See other BNSF comments]

Response: Ecology has clarified the secondary triggers for transportation facilities include vehicle maintenance activity, rather than vehicle maintenance shops. This is consistent with Ecology's original intent. The word "shops" has been deleted, and it has been replaced with "activity". Ecology is also finalizing the proposal to delete "material handling facilities", because it was incorrectly included in the 2009 permit.

Revision to S1.A.1 Table 1:

Transportation facilities which have *vehicle maintenance* ~~shops~~ activity, ~~material handling facilities,~~ equipment cleaning operations, or airport deicing operations:

- Railroad Transportation
- Local and Suburban Transit and Interurban Highway Passenger Transportation
- Motor Freight Transportation (except SIC 4221–25)
- United States Postal Service
- Water Transportation
- Air Transportation
- Petroleum Bulk Stations and Terminals

Washington Refuse and Recycling Association

3.

Lastly, we appreciated the opportunity to hear directly from you at the Vancouver Workshop. Your thorough explanation and your overall approach to working with facility owners was both enlightening and encouraging.

Response: Thank you – Ecology appreciates your attendance and questions at the workshop.

Bob Yoder, Redmond Neighborhood Blog

4.

http://redmondcity.blogspot.com/2012/01/opinion-citizen-potests-city-approval.html
Dear WDOE: Please click on this link to my report on industrial storm water run-off at All Wood Recyling (AWR) of SE Redmond, WA. This storm water and sewer pollution has been ongoing and the City is undergoing a retroactive permitting process to correct actions taken by AWR. This industrial site stormwater pollution was first reported by me in 2006. WDOE and other regulatory agencies visited the site, but nothing has been done until now - and actions are only now being attempted. What is wrong with our regulatory process?

AWR has proposed in their SEPA checklist only one vault and one stormwater pond.
The site encompasses both sides of Evans Creek, a class I stream with wild, endangered Chinook salmon runs (?).
THIS INDUSTRIAL SITE SITS OVER A CITY AQUIFER - SIX FEET UNDER IN SOME PLACES.
I can't make the town meeting. But, please review this link to my blog story.

Response: City of Redmond and Ecology staff recognizes this site has potential for ground water pollution. Ecology, EPA, Redmond and King County Health staff worked with regulating the facility activities in 2008-09. Corrections focused on restricting the type of material processed on site and better pollution prevention practices. Since this facility does not discharge stormwater to surface waters, it is not covered under Ecology's Industrial Stormwater General Permit. The facility is currently regulated under Ecology's Underground Injection Control (UIC) rules, which are intended to protect groundwater quality. Ecology also required the facility to apply for and obtain a state waste discharge (individual) permit and develop an engineering plan to cease the injection well use. Site options for stormwater treatment are limited because they are in the shoreline management area up against a salmon-bearing stream. All Wood's consultant proposed connecting the worst of the runoff to the sewer as part of their permit application and engineering report in 2010. The City of Redmond required additional alternative evaluation before issuing permits for the proposed site improvements.

Economic Impact Analysis

Auto Recyclers of Washington

5.

WAC 173-226-120 requires an economic analysis of any proposed water-quality general permit to serve the following purposes. The analysis must provide:
• A brief description of the compliance requirements of the general permit.
• The estimated costs for complying with the permit, based upon existing data for facilities intended to be covered under the general permit.
A comparison, to the greatest extent possible, of the cost of compliance for small businesses with the cost of compliance for the largest ten percent of the facilities intended to be covered under the general permit.

• A summary of how the permit provides mitigation to reduce the effect on small businesses (if a disproportionate impact is expected), without compromising the mandated intent of the permit. A small business is defined as any business entity, including a sole proprietorship, corporation, partnership, or other legal entity, that is owned and operated independently from all other businesses, and that has 50 or fewer employees.
As we point out below, several of the proposed revisions to the ISWSGP will have a significantly disproportionate impact on small businesses. The failure of the Department to issue the Economic Analysis as required by WAC 173-226-120 is a gross failure of this proposal and is reason enough for the Department to not adopt these proposed revisions and for the Department to engage in a stakeholder process to eliminate or minimize any disproportionate impacts on small businesses from these proposed revisions.

Response: Ecology completed an Economic Impact Analysis when the 2009 Industrial Stormwater Permit was issued, and it concluded "*the general permit has a disproportionate impact on small businesses."* The analysis states that it is difficult to avoid disproportionate costs for smaller businesses, as small businesses will always be disproportionately impacted, relative to large businesses. For the permit modifications intended to address the PCHB ruling, Ecology is not able to offer mitigation without violating requirements of the state or federal water pollution control laws.

Auto Recyclers of Washington

6.

Before adopting the provision identified above, the WA Department of Ecology must provide appropriate mechanisms and assistance to mitigate the small business economic impacts of these proposed permit revisions in accordance with RCW 34.05.

Response: See response to comment # 5 above.

Condition S1. Permit Coverage

BNSF

7.

Transportation Facilities and Point-source Discharges from Regulated Activities

The permit is presently unclear whether a transportation facility triggers ISGP coverage if it does not have a point source discharge from the triggering activities identified by 40 C.P.R. § 122.26(b)(14)(viii): a vehicle maintenance shop, equipment cleaning, and airplane deicing. The 2010 ISGP defines "facility" in a circular manner as "any NPDES 'point source' (including land or appurtenances thereto) that is subject to regulation under the NPDES program." ISGP, at p. 53 (emphasis added). From this definition, it is unclear whether storm water discharges from areas of a facility on which no industrial activity takes place require permit coverage if stormwater from areas of industrial activity do not discharge to surface waters. BNSF proposes that Ecology revise ConditionS 1.A as follows:

1. Facilities engaged in any industrial activities in Table 1 shall apply for coverage if *stormwater* from the *facility discharges* to a surface water body, or to a *storm sewer* system that *discharges* to a surface water body.

(Where federal regulations onlv require coverage if certain "industrial activities" trigger coverage, e.g., 40 C.F.R. *§* 122.26(b)(14)(viii), a facility is only required to apply for coverage if there is a point source discharge from an area of triggering industrial activities.) The *Standard Industrial Classification (SIC)* groups generally, but not always, associated with these activities are listed in Table 1.

Ecology should also revise the portion of Table 1 that is directly affected by this change: Transportation facilities which have a point source discharge of stormwater associated with vehicle maintenance shops, material handling facilities, equipment cleaning operations, or airport deicing operations:

• Railroad Transportation 40xx

• Local and Suburban Transit and Interurban Highway Passenger Transportation 41 xx
• Motor Freight Transportation (except SIC 4221-25) 42xx
• United States Postal Service 43xx
• Water Transportation 44xx
• Air Transportation 45xx
• Petroleum Bulk Stations and Terminals 5171

Response: EPA has defined "stormwater associated with industrial activity" as a point source subject to regulation under the NPDES program. Ecology considers it unnecessary to add "point source discharge" to the secondary triggers for transportation facilities.

Ecology has clarified the secondary triggers for transportation facilities include vehicle maintenance activity, rather than vehicle maintenance shops. This is consistent with Ecology's original intent. The word "shops" has been deleted, and it has been replaced with "activity". Ecology is also finalizing the proposal to delete "material handling facilities", because it was incorrectly included in the 2009 permit.

Revision to S1.A.1 Table 1:

Transportation facilities which have *vehicle maintenance* ~~shops~~ activity, ~~material handling facilities,~~ equipment cleaning operations, or airport deicing operations:

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- Petroleum Bulk Stations and Terminals

BNSF

8.

Owner and Operator

Missing entirely are definitions of "owner" and "operator," which are relevant for permitting purposes because federal regulations impose permitting responsibility on the operator of a facility rather than the owner. 40 C.P.R.§ 122.21(b). Previous iterations of the ISGP (e.g., the 2002 ISGP) contained definitions to help facilities determine which entities needed coverage. The ISGP also does not answer whether it is possible for different entities to hold ISGP coverage in discrete areas of a large facility. BNSF suggests that Ecology insert, prior to the existing Condition S1.A, the following section (with the existing S1.A becoming S1.B and so forth):

S1. PERMIT COVERAGE

A. Who Is the Permittee?

The Permittee must have day-to-day operational control to assure compliance and the power or capacity to make timely discovery of discharges and direct the activities of persons who control the mechanisms causing the pollution.

The owner is the Permittee if they are also the operator of the industrial facility. If the owner and the operator (or tenant) of an industrial facility are not the same, the operator is typically the Permittee and the owner may choose to be a co-Permittee.

B. Facilities Required to Seek Coverage Under This General Permit

C. Facilities Not Required to Obtain Coverage

Response: Ecology has decided against making the change suggested. Under section 301(a) of the Clean Water Act, 33 USC section 1311(a), "the discharge of any pollutant by any person shall be unlawful" unless the discharge is authorized by an NPDES permit. This prohibition suggests that both the owner and the operator need to be permitted since both are "persons" who will be discharging pollutants. However, under 40 CFR section 122.21(b), when a facility is owned by one person but operated by another, it is the operator's duty to obtain a permit. Ecology considers the permitting requirements to be fulfilled if the operator has sole permit coverage at a facility. Nothing in the permit precludes multiple entities from holding permit coverage at a facility. If that is necessary, each entity should submit a separate notice of intent (NOI) to apply for permit coverage.

City of Longview

9.

Under the Conditional No Exposure exemption in S1.F, the words "or material" in the second sentence should be removed or further clarified, such as suggested below:

> If there is a change at the *facility* that results in the exposure of industrial activities and associated materials to *stormwater*, the *facility* is required to immediately apply for and obtain a permit.

Response: Ecology reviewed the "Conditional No Exposure" language in EPA's Phase II Stormwater rule, and verified that EPA uses the same terminology ("industrial activity and materials") as the ISGP. Specifically, page 68785 of Federal Register /Vol. 64, No. 235 /Wednesday, December 8, 1999 /Rules and Regulations, states "*EPA expects that most facility changes can be anticipated, therefore dischargers should apply for and obtain NPDES permit coverage in advance of changes that result in exposure to industrial activities or materials.*" Ecology has decided to not to remove or further clarify the language in Condition S1.F, to remain consistent with the Phase II Stormwater Rule.

United States Environmental Protection Agency – Region 10

10.

The U.S. Environmental Protection Agency Region 10 appreciates the opportunity to review and comment on the proposed modification to the WA ISGP. The purpose of the modification is to respond to the Apri125, 2011 Pollution Control Hearings Board ruling. We hope you will consider the EPA's comment as you finalize this important permit.

As you may be aware, there has been some confusion in the past over the definition of *federal facility*. The Washington Department of Ecology has written storm water general permits that contain the same definition *of federal facility* that the EPA's permits contain. The EPA would like to bring to your attention the fact that the EPA intends to adjust the definition *of federal*

facility in its storm water genenil permits as they are reissued. To ensure consistency and clarity for the regulated community, the EPA encourages Ecology to adjust the *federal facility* language in Ecology's storm water general permits as well.

The EPA has revised the definition of *federal facility* in the recently reissued Construction Storm Water General Permit (CGP) and plans on malting the same revision at the time the EPA's Multi Sector Storm Water General Permit (MSGP) is reissued. Specifically, the definition of *federal facility* has been replaced with the term, *federal operator* which has been defined as an entity that meets the definition of "Operator" in the permit and is any department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government of the United States, or another entity, such as a private contractor, perforrping a construction activity for any such department, agency, or instrumentality. (See also, Page 5, Appendix A of the EPA CGP @ *http://www.epa.gov/npdes/pubs/cgp2012_appendixa.pdf)*

The purpose of this change is to clarify who needs to obtain coverage under a storm water general permit in a situation where the State does not have permitting authority for federal facilities. The revised definition makes clear that where the operator is a department, agency or instrumentality of the Federal government (a "federal entity") or another party engaging in a construction activity for any such federal entity, the operator is a *federal operator* that must obtain coverage under the EPA permit. For example:

- Where a federal entity is conducting a construction activity, whether on land owned or leased by the federal government or otherwise, and that federal entity meets the definition of an "operator," the federal entity is *a federal operator* and must obtain permit coverage under the EPA permit.
- Where a federal entity has hired a contractor to complete the day-to-day activity on a construction site, but retains control over the project(e.g., site design/specifications, construction, oversight) the federal entity is a *federal operator* and must obtain coverage under the EPA permit. The contractor should determine whether it meets the definition of "Operator" under this permit and, if it does, should obtain permit coverage.
- Where a federal entity has hired a contractor to complete the day-to-day activity on a construction site and does not retain control over the project, the contractor should determine whether it meets the definition of "Operator" under this permit and, if it does, should obtain state permit coverage. The federal entity in this case must determine whether it meets the definition of *federal operator* under the EPA permit and, if it doe~, should obtain permit coverage.
- Where a private party is independently conducting a construction activity on federal land or property (e.g., developing an oil and gas lease, grazing lease, or ski resort lease) the private party should determine whether it meets the definition of "operator" under the corresponding state construction general permit and, if it does, should obtain coverage under the state construction general permit.

The EPA encourages Ecology to modify the WA ISGP such that it will be consistent with the revised definitions of *federal facility* and *federal operator.* If you have any questions regarding this comment, please feel free to contact Margaret McCauley of my staff at (206) 553-1772.

Response: Ecology agrees with the suggestion, and will revise ISGP Condition S1.D.3 to be consistent with EPA's EPA's usage and definition of *federal operator*:

S1.D Facilities Excluded from Coverage

Ecology will not cover the following facilities or activities under this permit:

3. Industrial activities operated by any department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government of the United States, or another entity, such as a private contractor, performing industrial activity for any such department, agency, or instrumentality.

Condition S2. Application For Coverage

Association of Washington Business

11.

S2.B.l Modification of Permit Coverage: The submittal dates for the Annual Report and any Modification of Permit Coverage requesting a Level 2 or 3 time extension should be coordinated. While April 1st is fine for the Corrective Action time extension, it is at this time that permittees are likely to confirm their status, announce decisions on Corrective Actions, and determine if a time extension should be requested. Ecology should consider advancing the Annual Report date from May 15th to April 1st.

Response: Ecology agrees that the annual report and modification of coverage deadlines should be coordinated. Ecology has considered public comments and the pros and cons associated with various deadlines and scheduling constraints, and has decided make the Modification of Coverage deadline (for Level 2/3 waiver or extension requests) consistent with the current Annual Report due date: May 15th. This is also the due date for the 1st quarter DMR, and there are administrative efficiencies gained by making these all due on the same date.

Condition S2.B.1 will be revised as follows:

Apply for modification of coverage at least 60 days before implementing a *significant process change*; or by May15th ~~June 1st~~ prior to a Corrective Action deadline, if requesting a Level 2 or 3 time extension or waiver request per Condition S8.B-D.

Auto Recyclers of Washington

12.

Ecology proposes to shorten the deadline to request a Level 2 or 3 Corrective Action waiver or extension by two months. This proposal will impose disproportionate economic impacts on small businesses. It will impose unreasonable deadlines on small business permittees and jeopardize the very survival of their businesses and the jobs of their workers. This draft revision is incredibly ill-conceived as it appears that the Department believes that small business operators have nothing more to do but to manage their ISWGP. That clearly is not the case and for that reason alone, this proposed revised provision should not be adopted.

Response: Ecology has considered public comments and the pros and cons associated with various deadlines and scheduling constraints, and has decided make the Modification of Coverage deadline (for Level 2/3 waiver or extension requests) consistent with the current

Annual Report due date: May 15th. This is also the due date for the 1st quarter DMR, and there are administrative efficiencies gained by making these all due on the same date.

Association of Washington Business

13.

S2.C Permit Coverage Timeline: Ecology proposes to remove the applicability of automatic commencement of applications for modification of coverage, including applications for waivers and extensions under Condition S8. The permit should retain an automatic commencement process.

Response: Ecology disagrees with the suggestion, and has decided to make the permit consistent with WAC 173-226, which provides for the automatic approvals of new applications (NOIs), but not for modifications of coverage.

BNSF

14.

Proposed Changes to Condition S2.C

In its effort to eliminate confusion regarding the applicable timeline for consideration of a Level2/Level 3 modification (waiver or extension), Ecology has introduced other unintentional confusion into the timelines. The PCHB held that the more specific 60-day timeline for review set out in Condition S8 applied to Level 2/Level 3 modifications (extension/waiver) and not the general 30-day deadline set out in Condition S2. In consideration of this decision and the potential confusion, Ecology's proposed changes simply eliminate the word "modification" from Condition S2. This, however, leaves no deadline for Ecology's review of permit modifications other than Level 2/Level 3 waivers or extensions.

In order to avoid the inadvertent elimination of any kind of time line for the review of other permit modifications, Ecology should instead amend Condition S2 as follows:

A. Permit Coverage or Permit Modification Timeline

1. If the applicant does not receive notification from *Ecology,* permit coverage or modification of coverage automatically commences on whichever of the following dates occurs last:

a. The 31st day following receipt by *Ecology* of a completed *application* for coverage or modification of coverage form"""; or

b. The 31st day following the end of a 30-day public comment period"""; or

c. The effective date of the *general permit""";* or

d. For modifications of coverage related to waivers ofLevel2 or Level3 corrective actions governed by Condition S8, the 61 st day following receipt bv Ecology of a completed modification of coverage form.

2. *Ecology* may need additional time to review the *application:*

a. If the *application* is incomplete.

b. If it requires additional site-specific information.

c. If the public requests a public hearing.

d. If members of the public file comments.

e. When more information is necessary to determine whether coverage under the *genera/permit* is appropriate.

3. When *Ecology* needs additional time:
a. *Ecology* will notify the applicant in writing within 30 days and identify the issues that the applicant must resolve before a decision can be reached.
b. *Ecology* will submit the final decision to the applicant in writing. If *Ecology* approves the *application* for coverage/coverage, coverage begins the 31st day following approval, or the date the approval letter is issued, whichever is later.

Response: Ecology disagrees with the suggestion, and has decided to make the permit consistent with WAC 173-226, which provides for the automatic approvals of new applications (NOIs), but not for modifications of coverage.

Boeing

15.

Condition S2. Applications for Coverage or Modification of Coverage
Ecology proposes to modify Condition S2.C by removing the applicability of automatic commencement of applications for modification of coverage, including applications for waivers and extensions under Condition S8. The permit should retain an automatic commencement process in order to provide regulatory certainty that would otherwise be lost under the proposed modification. The availability of some process to modify permit corrective action deadlines to address site specific conditions is essential. The waiver and extension process will be illusory unless there is allowance for automatic commencement of permit modifications that authorize waivers and extension. In 2011 the department was unable to process the majority of waiver and extension requests. Without automatic commencement, many facilities that are entitled to waiver and extension would be forced to comply with inappropriate deadlines and they will have no recourse to avoid being in noncompliance with the permit. Retaining the automatic commencement provision also will allow for orderly permit implementation. In the event there is automatic commencement of a waiver and extension, Ecology would retain the authority to modify that result through administrative orders and do so in a way that allows facilities to remain in compliance with the permit. Boeing thus objects to the removal of the provision concerning the applicability of automatic commencement of applications for modification of coverage including applications for waivers and extensions under Condition S8. It is neither fair nor necessary to pull a provision providing certainty in this already excessively complex permit under these circumstances.

Ecology should add clarifying language that public notice does not have to be completed by the April 1st deadline for applications for waivers and extensions under Condition S8. The draft modification already imposes a significantly shorter deadline for Condition S8 applications and there is no reason for Ecology to delay considering the applications pending documentation that public notice has been completed.

Boeing recommends that Ecology retain the approval process in S8 by providing the permittee with more specific instructions and examples. The Department should embrace its duty to make at least a reasonable effort in education and outreach prior to removing a valuable tool for permittee compliance created by “confusion”, as noted in the Fact Sheet (page 10, para 2).

Boeing has the following questions regarding the proposed modifications to Condition S2:

Q1: Will applications be deemed automatically denied if Ecology does not approve the applications within 60 days of filing with the department?
Q2: At what point, if any, in the application process should a facility determine whether its application has been automatically denied?
Q3: How do the permittee deadlines change if the department requires clarification or holds public hearings that go beyond the permit deadlines to implement corrective action?

Response: Ecology disagrees with the suggestion, and has decided to make the permit consistent with WAC 173-226, which provides for the automatic approvals of new applications (NOIs), but not for modifications of coverage.

Response Q1: No, applications will not be automatically denied if Ecology does not approve the applications within 60 days. All applications will either be approve or denied in writing.

Response Q2: See Response Q1.

Response Q3: If Ecology requires clarification, or additional information, the issue will be resolved prior to the applicable Level 2/3 deadline. Public hearings are highly unlikely (Ecology has no record of a public hearing ever being conducted on a modification request), but in the event a public hearing is requested and Ecology agrees to hold one, Ecology will attempt get it held it in advance of the applicable Level 2/3 deadline.

Ecology has considered public comments and the pros and cons associated with various deadlines and scheduling constraints, and has decided make the Modification of Coverage deadline (for Level 2/3 waiver or extension requests) consistent with the current Annual Report due date: May 15th. This is also the due date for the 1st quarter DMR, and there are administrative efficiencies gained by making these all due on the same date.

Port of Tacoma

16.

S2. Application for Coverage
B.1. Apply for modification of coverage at least 60 days before implementing a significant process change; or by ~~June~~ April 1st prior to a Corrective Action deadline, if requesting a Level 2 or 3 time extension or waiver request per Condition S8.B-D.

Comment:
This proposed change for the due date of the modification will inhibit the ability of the permittee to complete an appropriate analysis of potential source control Best Management Practices (BMPs). Ecology's *Modification of Permit Coverage Form* requires the Level 2/ Level 3 extensions requests provide a "technical basis for extension" and include "proposed timeline for completion and describe issues that affect completion date; for example, state/local permits, study, design, financing, professional services and contracting, etc."

Reducing the submission schedule does not allow enough time to provide all of the **technical** information that is needed for selecting BMPs that will solve the problem, provide source control and improve water quality.

The Port suggests that Ecology not change the application due date to ensure there is adequate time for facilities to investigate/analyze the problem, select appropriate source control BMPs and support the intent of this permit, which is to improve water quality stormwater discharges at industrial facilities.

Response: Ecology has considered public comments and the pros and cons associated with various deadlines and scheduling constraints, and has decided make the Modification of Coverage deadline (for Level 2/3 waiver or extension requests) consistent with the current Annual Report due date: May 15th. This is also the due date for the 1st quarter DMR, and there are administrative efficiencies gained by making these all due on the same date.

Ecology wants to clarify that a permittee requesting a Level 2/3 time extension is not required to submit complete information on the specific BMPs that will be implemented to address the corrective action; often the permittee hasn't selected the BMPs at this stage in the process. However, the permittee is likely aware of the project management issues that can affect the completion date. Therefore the permittee's "technical basis for extension" (modification application) must include as much detail as possible regarding the proposed timeline for completion and describe issues that affect completion date; for example, state/local permits, study, design, financing, professional services and contracting, etc.

Condition S2.B.1 will be revised as follows:

Apply for modification of coverage at least 60 days before implementing a *significant process change*; or by <u>May15th</u> ~~June 1st~~ prior to a Corrective Action deadline, if requesting a Level 2 or 3 time extension or waiver request per Condition S8.B-D.

Puget Soundkeeper, Columbia Riverkeeper, Waste Action Project

17.

Conditions S2.B. and C.
The commenters support the proposed modifications to S2.B. and C. to clarify the process for modification of permit coverage.

Response: Thank you.

Weyerhaeuser

18.

S2.B.1. Modification of Permit Coverage –
It would make sense to coordinate the submittal dates for the Annual Report and any Modification of Permit Coverage requesting a Level 2 or 3 time extension. This point in time is logically when a permittee will confirm their status, announce decisions on Corrective Actions,

and determine if a time extension should be requested. April 1st is fine for the Corrective Action time extension. Ecology should consider advancing the Annual Report date from May 15th to April 1st.

Response: Ecology agrees that the annual report and modification of coverage deadline should be coordinated. Ecology has considered public comments and the pros and cons associated with various deadlines and scheduling constraints, and has decided make the Modification of Coverage deadline (for Level 2/3 waiver or extension requests) consistent with the current Annual Report due date: May 15th. This is also the due date for the 1st quarter DMR, and there are administrative efficiencies gained by making these all due on the same date.

S3. Stormwater Pollution Prevention Plan (SWPPP)

Association of Washington Business

19.

S3.A General Requirements:
NEW SECTION REQUESTED-Ecology needs an unambiguous statement to define "all known, available, and reasonable methods of prevention, control, and treatment (AKART) for stormwater pollution." While S3.A.2.a references AKART under the general requirements of a SWPPP, permittees and Ecology staff should be able to discern what constitutes AKART.

Response: As stated in the Stormwater Management Manual for Western Washington (Volume I, Section 1.6) and Stormwater Management Manual for Eastern Washington (Chapter 1, Section 1.1.1), stormwater management techniques applied in accordance with [the Stormwater Management Manuals] are presumed to meet the technology-based treatment requirement of State law to provide all known available and reasonable methods of treatment, prevention and control (AKART; RCW 90.52.040 and RCW 90.48.010). However, at any given facility there may be different or additional requirements in order to satisfy the state AKART requirements due to site-specific conditions.

Wafertech

20.

Illicit Discharges:
WaferTech is requesting clarification regarding pressure washing using water only. There are situations where our facility will request to be able to pressure wash, using city water only, with no chemicals or added cleaning agents, to clean the side of a building, sidewalk, etc. The temperature of the water is ambient. The purpose of the cleaning would be to remove mold or moss, etc. WaferTech does not believe that this activity negatively impacts stormwater; and in the past request to our DOE inspector for approval for this activity, he has agreed. If some language could be added to the revised permit to allow for this, then it would alleviate WaferTech from requesting approval from DOE for each pressure wash event, as described above.

Response: No, the ISGP does not categorically authorize the discharge of pressure washing water, regardless of the temperature or soap content. The federal NPDES regulations include

requirements to eliminate non-stormwater discharges, such as process wastewater (e.g., pressure washing water). Pressure washing water may contain elevated levels of turbidity, metals and other pollutants regulated under the ISGP (depending on the surface, contamination, location, etc.), and can cause violations of the water quality standards. Continue working with your inspector on site specific activities and BMPs.

Weyerhaeuser

21.

S3.A.7. – New Section – Ecology should include a new subsection which says AKART a. The identification, application/installation, and maintenance of applicable Best Management Practices from appropriate Stormwater Management Manuals constitutes the provision of "*all known, available, and reasonable methods of prevention, control, and treatment (AKART) for stormwater pollution".*

Support for Request – An unambiguous statement defining AKART is important. Permittees and Ecology staff should be able to discern, with confidence, what constitutes AKART. The ISGWP requires AKART, but the only permit section which references this legal requirement appears to be in S3.A[1].

Response: As stated in the Stormwater Management Manual for Western Washington (Volume I, Section 1.6) and Stormwater Management Manual for Eastern Washington (Chapter 1, Section 1.1.1), stormwater management techniques applied in accordance with [the Stormwater Management Manuals] are presumed to meet the technology-based treatment requirement of State law to provide all known available and reasonable methods of treatment, prevention and control (AKART; RCW 90.52.040 and RCW 90.48.010). However, at any given facility there may be different or additional requirements in order to satisfy the state AKART requirements due to site-specific conditions.

S4. General Sampling Requirements

Association of Washington Business

22.

S4.B.3 Sampling Documentation: The stormwater sampling documentation change from 30 minutes to 12 hours is greatly appreciated. The modified time frame is a more attainable requirement. Taking a stormwater sample within 30 minutes of the commencement of discharge is extremely difficult due to the complexity of staffing, tasking, calibrating equipment, gathering sampling necessities (even if they are set aside), donning the proper protective wear, and maintaining safety in the storm environment.

Response: Thank you.

1

S3.A. is defining the needed content of the SWPPP and includes a listing of AKART, federal technology-based requirements, and identifying the obligation for sufficient BMPs to allow for achievement of water quality standards.

Association of Washington Business

23.

S4.B.6 Sampling Requirements: The stormwater sampling change suspension from four consecutive quarters to eight consecutive quarters seems excessive. Implementing the *draft* change would mean that if a permit holder had two "dry" quarters (normally during the summer), a permit owner would end up sampling for two and a half years. If a permit holder has a proven track record, why would eight consecutive quarters be necessary? Assuming that Ecology's proposed revision of the "consistent attainment" parameter is driven by the PCHB decision in Copper Development, et.al. v. Washington Department of Ecology (PCHB Nos. 09-135 through 09-141), Ecology should simply accept the PCHB's direction that seven consecutive quarterly sample results attaining benchmark values is a demonstration of continuous attainment.

Response: The Pollution Control Hearings Board rejected the reduction from 8 quarters to 4 quarters and ordered Ecology to require "at least seven quarters of meeting benchmark values". Ecology has decided to return to the previous (2002-2009) permit requirement that required a total of 8 consecutive quarterly samples to demonstrate consistent attainment. Ecology has also refined the language that allow permittees that already suspended sampling to count those quarters towards the eight required. Ecology believes that, for the facilities that suspended sampling based on four quarters, requiring 4 more samples would better represent the full range of climatic and seasonal variation compared to only 3.

Condition S4.B.6 will be revised as follows:

iii. <u>Permittees who suspended sampling based on consistent attainment of benchmarks prior to July 1, 2012 must resume/continue sampling until a total of eight consecutive quarterly samples demonstrate consistent attainment.</u>

Example: If a permittee suspended sampling Zinc on January 1, 2012 based upon 4 consecutive quarterly samples collected in 2011, the permittee must resume sampling Zinc on July 1, 2012 until four more consecutive quarterly samples (for a total of 8) are equal to or less than the Zinc *benchmark.*

BNSF

24.

Proposed revision to Condition S4.B.6

In its April 21, 2011 Findings, Conclusion, and Order in *Copper Development v. Ecology,* 09-131 *et seq* (Order), the Pollution Control Hearings Board (PCHB) criticized Ecology's lack of evidence as to the sufficiency of four quarters of sampling to demonstrate "consistent attainment." The PCHB specifically cited to an internal briefing paper stating that seven quarters are adequate. Order, pp. 65-66. Ecology now proposes to require that facilities successfully sample for eight consecutive quarters to prove consistent attainment. Ecology's Fact Sheet accompanying the draft permit amendments presents no new information or science supporting the increase to eight quarters, the same flaw for which the PCHB criticized Ecology when it set the number at four quarters. Further, the PCHB gave Ecology the discretion to continue with the present four quarters of sampling to demonstrate consistent attainment if sampling resumed

within two to three years, rather than the full five-year permit cycle. Ecology does not explain whether or not it considered this alternative and, if so, why it rejected it.

Response: The Pollution Control Hearings Board rejected the reduction from 8 quarters to 4 quarters and ordered Ecology to require "at least seven quarters of meeting benchmark values". Ecology has decided to return to the previous (2002-2009) permit requirement that required a total of 8 consecutive quarterly samples to demonstrate consistent attainment. Ecology has also refined the language that allow permittees that already suspended sampling to count those quarters towards the eight required. Ecology believes that, for the facilities that suspended sampling based on four quarters, requiring 4 more samples would better represent the full range of climatic and seasonal variation compared to only 3.

Ecology considered the PCHB decision that gave Ecology the discretion to continue with the present four quarters of sampling to demonstrate consistent attainment if sampling resumed within 2-3 years. Ecology rejected this alternative because it would introduce tracking and compliance issues, since the resumption of sampling would be different for different facilities, and different outfalls, based upon the 2-3 year anniversary date of the 4th consecutive quarter.

BNSF

25.

Off-site storm water run-on

Ecology's proposed permit amendments for facilities that discharge to 303(d)-listed water bodies raises an issue common to a wide variety of industrial facilities. BNSF applauds Ecology for recognizing the difficult position of Permittees whose facilities exceed benchmarks due to influences outside the Permittees' control, but believes that Ecology should provide a broader solution to address this problem at all Washington facilities, not just those that discharge to a 303(d)-listed water body. As currently written, the 2010 ISGP makes Permittees responsible for the pollution that runs onto their property. At some of its facilities, there are sources outside BNSF's control (e.g., public highways and non-point source runoff) that may be the cause of exceedances at some of its facilities, but which are not themselves currently subject to effluent limits for stormwater runoff. There are a variety of reasons why it may be ineffective to negotiate with neighboring landowners (e.g., where there is no existing legal obligation for that neighbor to reduce contaminants in stormwater runoff or the source cannot be identified). Moreover, revising a facility's sampling plan is difficult where, for instance, it is sheet flow from various parts of a neighboring property or non-point source pollution that runs on to the facility from a road that commingles with the stormwater exposed to the Permittee's activities.

In such situations, Ecology should provide a mechanism so that facilities are not unfairly burdened by the (potentially unregulated) discharges of their neighbors. One option would be allowing Permittees to take upstream samples that show that the facility's exceedances are caused by storm water runoff from neighboring properties or from non-point source runoff. Ecology should revise Condition S4.B.2 to allow Permittees to report the results of sequential samples - one on the source property immediately before the stormwater runs on to the Permittee's property and one on the Permittee's property- that estimate the discharges actually caused by the Permittee. More accurate sample results would help a Permittee expeditiously determine whether its facility is the cause of the benchmark exceedances and, if not, would alleviate the significant

cost of preparing a waiver application and/or installing structural or treatment measures to address pollution caused by a neighbor. This information would also help Ecology set its regulatory priorities to address major sources of pollution. BNSF proposes the following language:

S4. GENERAL SAMPLING REQUIREMENTS

A. General Requirements

The Permittee shall conduct sampling of *stormwater* in accordance with this permit and the SWPPP.

B. Sampling Requirements

1. Sample Timing and Frequency

a. The Permittee shall sample the *discharge* from each designated location at least once per quarter:

1st Quarter= January, February, and March

2nd Quarter= April, May, and June

3rd Quarter= July, August, and September

4th Quarter= October, November, and December

b. Permittees shall sample the *stormwater discharge* from the first fall storm event each year. "First fall storm event" means the first time after October 1st of each year that precipitation occurs and results in a *stormwater discharge* from *a facility.*

c. Permittees shall collect samples within the first 12 hours of *stormwater discharge* events. If it is not possible to collect a sample within the first 12 hours of a *stormwater* discharge event, the Permittee must collect the sample as soon as practicable after the first 12 hours, and keep documentation with the sampling records (Condition S4.B.3) explaining why they could not collect samples within the first 12 hours.

d. The Permittee shall obtain *representative samples,* which may be a single grab sample, a time-proportional sample, or a flow-proportional sample. e. Permittees need not sample outside of *regular business hours,* during unsafe conditions, or during quarters where there is no discharge, but shall submit a Discharge Monitoring Report each reporting period (Condition S9.A).

2. Sample Location(s)

a. The Permittee shall designate sampling location(s) at the point(s) where it discharges *stormwater* associated with *industrial activity* off-site.

b. The Permittee is not required to sample on-site discharges to ground (e.g., infiltration, etc.) or *sanitary sewer* discharges, unless specifically required by *Ecology* (Condition G 12).

c. The Permittee shall sample each distinct point of *discharge* off-site except as otherwise exempt from monitoring as a "substantially identical outfall" per S3.B.5.b. The Permittee is required to monitor only one of the "substantially identical outfalls" if two or more outfalls discharge substantially identical effluents (based on similar industrial activities and site conditions).

d. The exception to sampling each point of *discharge* in S4.B.2.c does not apply to any point of discharge subject to numeric effluent limitations (Conditions S5.C, S6.C & S6.D).

e. Where *stormwater* from adjacent properties discharges to a Permittee's *facilitv* and commingles with *stormwater* associated with *industrial activity* at the Permittee's *facility,* the Pennittee may conduct sequential sampling and report the sampling results for the

difference in pollutant concentration in the DMR for stormwater associated with *industrial activity* at the Permittee's *facility.*

Response: Ecology has considered the comment and suggested revision, but has decided to have permittees sample and report stormwater discharge quality, even if that stormwater has been affected by off-site activity or run-on. State and federal laws and rules, and case law, for NPDES permitting does not excuse dischargers from the pollutant contributions that originate from off-site activity and/or sources, including run on that co-mingles with stormwater associated with industrial activity. No change made in response to this comment.

Dawson Consulting LLC

26.

S4. General Sampling Requirements [Consistent Attainment]

We support the modification that allows permittees that suspended sampling based on consistent attainment of four consecutive samples to use those samples toward their new total of eight samples. At the Seattle workshop, Ecology noted that a permittee with six consecutive samples need only meet the benchmark in an additional two consecutive samples. This doesn't appear to be allowed pursuant to the proposed revision at S4.B.6., and should be allowed. Perhaps the requirement could be modified to state that permittees who suspended sampling based on consistent attainment prior to [the modification effective date] must resume/continue sampling until a total of eight samples demonstrate compliance.

Response: Ecology agrees with the suggestion, as it is consistent with the PCHB order and Ecology's intent. Condition S4.B.6 will be revised as follows:

<u>Permittees who suspended sampling based on consistent attainment of benchmarks prior to July 1, 2012 must resume/continue sampling until a total of eight consecutive quarterly samples demonstrate consistent attainment.</u>

Example: If a permittee suspended sampling Zinc on January 1, 2012 based upon 4 consecutive quarterly samples collected in 2011, the permittee must resume sampling Zinc on July 1, 2012 until four more consecutive quarterly samples (for a total of 8) are equal to or less than the Zinc *benchmark.*

Nisqually Environmental Sampling and Consulting

27.

The provisions in the permit requiring notation assuring that the sample was obtained during the first 12 hours of discharge or noting why the sample was obtained outside of the 12 hour window is difficult to implement. Specifically, for a company that operates on a single shift, 8 hour day, a person upon entering the premises during a rain event, would check the discharge location and if there was discharge, would not be able to sample because he or she would not know when the discharge occurred and therefore would not be able to select the two choices offered by ecology (within 12 hours or outside 12 hours). Only discharge that occurred during a rain event that started during the 8 hours of operation would be able to be sampled, assuming that there was

discharge during this 8 hours. We prefer that this provision be stricken from the permit as the data is not collected by Ecology (it is not noted on the DMR or the eDMR system, however realize that this may not be possible and secondarily suggest that a third option be allowed, "Unknown, discharge was occurring during start of business".

Response: Ecology agrees that there may be circumstances that prevent a permittee from knowing if the discharge was collected within the first 12 hours, or outside the first 12 hours of a discharge. For example, if a permittee arrives at the facility at the start of regular working hours and the discharge was already occurring, and he/she doesn't know how many hours had elapsed since the discharge began. Is such situations, the permittee can't certify if it was within 12 hours, or outside of 12 hours of the discharge beginning, so the permit conditions S4.B.1.c and S4.B.3.c&d have been revised:

S4.B.1.c
Permittees shall collect samples within the first 12 hours of *stormwater discharge* events. If it is not possible to collect a sample within the first 12 hours of a *stormwater* discharge event, the Permittee must collect the sample as soon as practicable after the first 12 hours, and keep documentation with the sampling records (Condition S4.B.3) explaining why they could not collect samples within the first 12 hours; or if it is unknown (e.g., discharge was occurring during start of regular business hours).

S4.B.3.c
A notation describing if the Permittee collected the sample within the first 12 hours of *stormwater* discharge events; or, if it is unknown (e.g., discharge was occurring during start of *regular business hours*).

S4.B.3.d
An explanation of why it could not collect a sample within the first 12 hours of a *stormwater discharge* event, if it was not possible. Or, if it is unknown, an explanation of why it doesn't know if a sample was collected within or outside the first 12 hours of *stormwater* discharge.

Port of Tacoma

28.

S4. General Sampling Requirements
B.6.b.iii Permittees who suspended sampling based on consistent attainment of benchmarks for four consecutive quarterly samples must resume/continue sampling until four more consecutive quarterly samples (for a total of 8) demonstrate consistent attainment of the applicable benchmark.
Comment:
The purpose of this section is to prove the facility meets or exceeds the standard for stormwater discharge. Four quarters equates to an entire year of a five-year permit cycle. If the permitted facility has shown to consistently meet benchmarks over an entire year then that facility should be able to suspend sampling for those parameters. Retroactively requiring resuming sampling for an additional four consecutive quarters in the middle of the permit cycle is onerous for those facilities that have been in consistent attainment.

The Port requests clarification about when sampling needs to resume, since there is no effective date to this change.

Response: The change to Condition S4.B.6.b.iii is driven by a PCHB order. Ecology understands the concerns about sampling resuming in the middle of the permit cycle, but cannot continue to allow the suspension of sampling after 4 quarters (one year) of consistently meeting the benchmark.

The resumption of sampling begins on the effective date of the modification, July 1, 2012 (i.e., sampling needs to resume during the 3rd Quarter of 2012), and continues until the benchmark is attained during 8 consecutive quarters.

Puget Soundkeeper, Columbia Riverkeeper, Waste Action Project

29.

Condition S4.B.6.
The commenters support the change in qualification for the consistent attainment exemption from monitoring requirements to eight consecutive quarters below benchmark.

We suggest, however, that Ecology include language stating that the exemption expires at some particular date, i.e., the ISPG expiration date. There is no guarantee that the ISGP will be timely reissued so that it does not continue in effect beyond its expiration date. Ecology has not reliably reissued general permits upon their expiration. For instance, the Phase I Municipal Stormwater General Permit issued in 2000 was in effect for years after its 2005 expiration date. If this ISGP continues in effect beyond its expiration date, without the inclusion of a set consistent attainment monitoring exemption expiration date, the exemption continues with it. This would be an unacceptable result and Ecology should take the precautionary step of including an exemption termination date in this condition.

Why is there no expiration date for the consistent attainment monitoring exemption?

Response: Ecology considered the suggestion, but has decided against having permit requirements change on the expiration date of the permit. Ecology plans to reissue the ISGP with an effective date of January 1, 2015, and sampling will resume on that date. No change to permit.

Washington Refuse & Recycling Association

30.

The modification to S4.B.6. Consistent Attainment
We believe the requirement for "benchmark attainment" required before sampling is suspended should be 7 samples as opposed to the proposed 8 samples.
Proposed Revisions
l.Pg.4 #6. The permitted may suspend sampling for one or more parameters (other than "visible oil sheen") based on consistent attainment of benchmark values when:
a. Seven consecutive quarterly samples demonstrate a reported value equal to or less than the benchmark value; or for Ph within the range 5.0- 9.0. These quarterly samples can be collected prior to the effective date of this regulation.

Reason: PCHB ruling (p 65-66) states "an internal briefing paper stated that seven samples are adequate." Additionally, there is no reason to delay the sampling for the benchmarks for those that have already reached their consistent attainment, let the sampling continue. There are quarters when no sampling can occur because of "no" rain event so to prolong the sampling has no value.
2.S4.B.6 iii Permittees who suspended their sampling based on their consistent attainment of benchmarks for four quarterly samples must resume/continue sampling until three more consecutive quarterly samples (for a total of seven) demonstrate attainment of the applicable benchmark.

Response:
The Pollution Control Hearings Board rejected the reduction from 8 quarters to 4 quarters and ordered Ecology to require "at least seven quarters of meeting benchmark values". Ecology has decided to return to the previous (2002-2009) permit requirement that required a total of 8 consecutive quarterly samples to demonstrate consistent attainment. Ecology has also refined the language that allow permittees that already suspended sampling to count those quarters towards the eight required. Ecology believes that, for the facilities that suspended sampling based on four quarters, requiring 4 more samples would better represent the full range of climatic and seasonal variation compared to only 3.

Weyerhaeuser

31.

S4.B.6. Sampling Requirements –
Ecology's proposed revision of the "consistent attainment" parameter is driven by the PCHB decision in Copper Development, et.al. vs. Washington Department of Ecology (PCHB Nos. 09-135 through 09-141). In Conclusion of Law 31, the PCHB said "…we conclude that at least seven quarters of meeting benchmark values should be expected prior to a suspension of sampling for the remainder of the permit term."

Why would not Ecology simply accept the PCHB direction that seven consecutive quarterly sample results attaining benchmark values is a demonstration of continuous attainment? The agency should change the proposed permit language from "Eight" to "Seven consecutive quarters...".

Response: The Pollution Control Hearings Board rejected the reduction from 8 quarters to 4 quarters and ordered Ecology to require "at least seven quarters of meeting benchmark values". Ecology has decided to return to the previous (2002-2009) permit requirement that required a total of 8 consecutive quarterly samples to demonstrate consistent attainment. Ecology has also refined the language that allow permittees that already suspended sampling to count those quarters towards the eight required. Ecology believes that, for the facilities that suspended sampling based on four quarters, requiring 4 more samples would better represent the full range of climatic and seasonal variation compared to only 3.

Condition S4.B.6 will be revised as follows:

Permittees who suspended sampling based on consistent attainment of benchmarks prior to July 1, 2012 must resume/continue sampling until a total of eight consecutive quarterly samples demonstrate consistent attainment.

Example: If a permittee suspended sampling Zinc on January 1, 2012 based upon 4 consecutive quarterly samples collected in 2011, the permittee must resume sampling Zinc on July 1, 2012 until four more consecutive quarterly samples (for a total of 8) are equal to or less than the Zinc *benchmark.*

S6. Discharges to 303(d)-Listed or TMDL Waters

Association of Washington Business

32.

S6.Table 5 Sampling and Effluent Limits Applicable to Discharges to 303(d)-Listed Waters: Several of the proposed footnote "h" requirements relating to mandatory BMPs targeting fecal coliform in stormwater are not practical and likely to be misunderstood. The broad language used to define "mandatory BMPs" in h(1) is vague. The proposed narrative limits include requirements to install "effective structural source control BMPs" and "effective source control BMPs to eliminate" known sources of bacteria. What is meant by "effective" and "eliminate"? Further, what are "all known, available and reasonable methods to prevent rodents, birds, and other animals from feeding/nesting/roosting at the facility"? Will Ecology's final version of the Table 5 fecal coliform requirement be the model for other stormwater permittees discharging fecal coliform to 303(d)-listed waters? Will Phase I and Phase II municipal stormwater permits or the WSDOT municipal stormwater permit be subject to the same AKART requirements?

Response: Ecology has considered public comments and has refined the mandatory BMPs:

A numeric effluent limit does not apply, but permittees must sample according to Table 5. In addition, the following mandatory BMPs shall be incorporated into the SWPPP and implemented:

1) Use all known, available and reasonable methods to prevent rodents, birds, and other animals from feeding/nesting/roosting at the facility. Nothing in this section shall be construed as allowing violations of any applicable federal, state or local statutes, ordinances, or regulations including the Migratory Bird Treaty Act.
2) Perform at least one annual dry weather inspection of the stormwater system to identify and eliminate sanitary sewer cross-connections;
3) Install structural source control BMPs to address on-site activities and sources that could cause bacterial contamination (e.g., dumpsters, compost piles, food waste, animal products, etc.):
4) Implement operational source control BMPs to prevent bacterial contamination from any known sources of fecal coliform bacteria (e.g., animal waste, etc.);
5) Additional bacteria-related sampling and/or BMPs, if ordered by Ecology on a case-by-case basis.

Boeing

33.

Condition S6. 303(d) Limits

Ecology proposes to replace numeric effluent limitations for discharges to section 303(d) water bodies listed as impaired for fecal coliform criteria with narrative limits. The proposed narrative limits include requirements to install "effective structural source control BMPs" and "effective source control BMPs to eliminate" known sources of bacteria. Boeing has substantial concern about what is meant by "effective" in the proposed narrative limits. This is an imprecise word that is subject to varying interpretations. Combined with a proposed condition that facilities must "eliminate" known sources of bacteria, the narrative limits are potentially as stringent and likely as impossible to attain as the current numeric limits.

Rather than introducing new and ambiguous terms, Ecology should consider using familiar terminology. For example, the phrase AKART is a generally accepted concept from which to start a discussion on BMP implementation.

Boeing recommends that industrial sites with activities that are not associated bacterial pollution be excluded from the fecal coliform provision in Condition S6 of the ISGP. Ecology concludes in its own report to the legislature[2] and in the 2009 draft ISGP fact sheet that there is no need for any fecal coliform limit to industrial activities that are not associated with bacterial pollution. It is unrealistic for industries not associated with bacterial pollution to attempt to control or eliminate the bacteria associated with animal life, such as birds. The unrealistic nature of such coverage is emphasized by conclusions recently documented in EPA's International Stormwater BMP Database that stormwater treatment systems are likely to act as incubators for animal-introduced bacteria.

Boeing recommends that Ecology work with the permittee to develop a quarterly monitoring program focused on the effectiveness of the BMPs in attaining a sustainable reduction in bacterial pollution. This program would create an adaptive management scheme to apply the preferred BMP approach as conditions change at a facility. The BMP effectiveness approach provides a more objective evaluation of the facility's efforts to use AKART successfully than relying on end-of-pipe measurements, particularly in light of the information discussed in previous paragraph.

Boeing has the following questions regarding the proposed modifications to Condition S6:

Q1: Are the BMPs associated with detection and removal of illicit connections (S3.B.7) sufficient to meet the narrative requirement for ensuring exclusion of human-caused fecal coliform bacteria?

Q2: Ecology's proposed modifications to Condition S6 contain ambiguous terms. Permittees need to have a process by which they can determine how they are to satisfy the conditions imposed by these terms.

Q3: What constitute "effective" structural and operation source control BMPs?

[2] Industrial Stormwater Discharges to Impaired Water Bodies, Options for Numeric Effluent Limitations, Ecology No. 09-10-005 (Dec. 2008).

Q4: What manuals and guidance documents should be consulted in identifying effective BMPs to reduce or eliminate bacterial pollution?
Q5: What BMP(s) does Ecology consider applicable or recommended for eliminating bacterial contamination in industrial stormwater?
Q6: Does Ecology believe that it would be reasonable and lawful to exclude all wildlife including birds from an industrial facility, with particular concern for species protected under the Endangered Species Act, Migratory Bird Treaty Act, or other similar statutes?

Response: Ecology agrees that the current limits are as stringent as the previous numeric effluent limitations, as they are Narrative Water Quality-Based Effluent Limitations, intended to prevent discharges which cause or contribute to violations of the water quality standards for bacteria. Ecology. They are intended to be as stringent as the previous limits, so as to not run afoul of the Anti-backsliding provisions of the Clean Water Act. Ecology disagrees that the mandatory BMPs are impossible to attain. Ecology also disagrees with Boeing's suggestion to use "AKART" because it would imply that the limits are technology-based, which is not the case. Rather, the BMPs are narrative water quality-based limits which, along with Condition S10 – COMPLIANCE WITH STANDARDS, are intended to prevent discharges that could cause or contribute to a violation of water quality standards in waterbodies that are already polluted, and "listed" pursuant to Section 303(d) of the Clean Water Act. No change to permit based on comment. Ecology believes it would be unlawful to following Boeings recommendation to exclude "industrial sites with activities that are not associated with bacterial pollution" from the fecal coliform provision in Condition S6 of the ISGP. RCW 90.48.555(7)(b) doesn't allow for the exclusion suggested by Boeing: "By July 1, 2012, the industrial storm water general permit must require permittees with discharges to water bodies listed as impaired for bacteria to comply with nonnumeric, narrative effluent limitations."

Ecology has considered public comments and has refined the mandatory BMPs:

A numeric effluent limit does not apply, but permittees must sample according to Table 5. In addition, the following mandatory BMPs shall be incorporated into the SWPPP and implemented:

1) Use all known, available and reasonable methods to prevent rodents, birds, and other animals from feeding/nesting/roosting at the facility. Nothing in this section shall be construed as allowing violations of any applicable federal, state or local statutes, ordinances, or regulations including the Migratory Bird Treaty Act.
2) Perform at least one annual dry weather inspection of the stormwater system to identify and eliminate sanitary sewer cross-connections;
3) Install structural source control BMPs to address on-site activities and sources that could cause bacterial contamination (e.g., dumpsters, compost piles, food waste, animal products, etc.):
4) Implement operational source control BMPs to prevent bacterial contamination from any known sources of fecal coliform bacteria (e.g., animal waste, etc.);
5) Additional bacteria-related sampling and/or BMPs, if ordered by Ecology on a case-by-case basis.

City of Everett

34.

My comments do not relate strictly to critical analysis of the permit, but act rather as an appeal for the actions taken in the Legislature and applied to the permit to be considered with regard to municipalities under the Phase I and II NPDES municipal stormwater permits. I am referring to page 11 of the draft fact sheet titled *Revisions Related to Numeric Effluent Limits for Discharges to 303(d) Waters.* As a result of recent legislation, industrial permittees will not longer be subject to numeric effluent limits for fecal coliform. One question I do have, is will this also apply to industries and businesses that have the potential for fecal coliform contamination as a result of their processes? I am referring to businesses involving composting, soils manufacture, and animal handling. If local jurisdictions are still required to inspect these businesses, will it be sufficient to only look at BMPs, and not ask for sampling results (or not sample ourselves if we observe problems)? It seems that these businesses should retain limits.

Jurisdictions also have parking lots and trees that attract birds. We also build stormwater ponds that attract birds and wildlife, and retain natural features such as wetlands, which is a requirement of state and federal law. Part of our TMDL program under the NPDES Phase II permit requires us to visually inspect for flows coming into impaired waterbodies in the dry season. A number of these flows are coming from wetlands inhabited by birds. During these low flow periods, the numbers for fecal coliform can be very high, and yet there is little we can do about these natural discharges with wildlife as a primary cause of bacterial pollution. Once we have done the education efforts, put up the Mutt Mitt stations, developed enforcement strategies for pet waste, and inspection programs for animal handling facilities, it is difficult to see an effective path forward when remaining coliform problems appear to be from wildlife. Microbial Source Tracking has confirmed this in at least one location in Everett.

What I would request is opening a serious dialog between jurisdictions with TMDLs and Ecology to discuss what can be realistically done when fecal coliform exceedances are a result of wildlife. Application of AKART to natural wetlands would put us in violation of laws protecting wildlife. We are all aware that when it rains, stormwater carries fecal coliform from multiple sources to the creeks, so is the state standard realistic? We do recognize that shellfish areas require special effort, and we agree that it is important to protect this resource.

Thank you for your consideration of these comments, and I look forward to further discussion with Ecology.

Response: Ecology has verified that no compost, soil manufacturing, or animal handling facilities under the ISGP discharge to fecal coliform 303(d)-listed waterbodies (Water Quality Assessment Category 5). Therefore, industrial facilities in those sectors were not previously subject to 303(d)-related numeric effluent limits under the ISGP.

Condition S6.D of the ISGP will continue to require compliance with any additional requirements set forth in an EPA-approved Total Maximum Daily Load (TMDL, or Water Clean-up Plan). The Phase I and Phase II Municipal Stormwater Permits (Appendix 2) also specifies additional requirements for certain jurisdictions with TMDLs.

In addition, Ecology may require specific ISGP facilities with elevated risk for fecal coliform contamination to perform appropriate monitoring (per Condition G12 Additional Sampling) or pollution prevention measures. Municipalities are encouraged to work with Ecology on identifying and addressing issues at facilities with materials or processes likely to cause bacteria-related pollution.

Ecology agrees that the issues regarding the fecal coliform standard, municipal stormwater, and TMDLs are complex and in a state of evolution. Local jurisdictions, Ecology, and other stakeholders certainly need to continue discussing the issues and working together on solutions.

City of Longview

35.

Consider adding to sections S1.D.8 and S6.B the exclusion for the fecal parameter when discharging to 303(d) listed waters.

Response: Ecology cannot make changes to the legal requirements for *new* dischargers to 303(d)- listed waterbodies. Ecology's change regarding fecal coliform is based upon RCW 90.48.555(7)(b), which only applies only to *existing* dischargers to 303(d)-listed waterbodies.

Lincoln Loehr

36.

I concur with the ISGP moving away from numeric bacteria limits for stormwater discharges to 303(d) listed waters. The proposed narrative requirements however are probably asking more than is necessary. If a facility isn't likely to have bacterial discharges as a result of industrial or human practices at the site, then there really isn't much to be concerned about. Generally there should be no need for any provision for bacteria for such facilities in the general permit.

Assuming that Ecology will not remove bacteria provisions from the general permit, then the proposed bacteria requirement for S6.C Table 5 footnote h to "1) Use all known, available and reasonable methods to prevent rodents, birds, and other animals from feeding/nesting/roosting at the facility" is excessive. Essentially this is putting AKART style requirements in the permit to prevent wildlife from utilizing the site. This is especially odd since some of the best stormwater management practices actually create habitat that is attractive to wildlife, particularly aquatic birds. This should be viewed as an enhancement, and birds as a bacterial concern should not require management, at least in most cases. Perhaps management even of birds is appropriate in some situations, such as adjacent to commercial shellfish operations, but thats about the only reason to go to such an extreme.

The laws pertaining to AKART relate to wastes proposed for discharge (RCW 90.52.040, and RCW 90.54.020) or to toxics (RCW 90.48.520). Bacteria is not a toxic, nor is it a waste that the facilities propose to discharge or expect to result in their discharge from human or process inputs. To the extent that it occurs from inputs of non-domestic wildlife, that should not warrant actions to control. Waterfowl will get to water and will introduce bacteria. Diverting water fowl away will simply result in their bacteria inputs occuring to other nearby water.

Change 1) in proposed footnote "h" to read something like the following:

1) Evaluate whether domestic animals (e.g., horses, cattle, dogs) might have access to stormwater systems such as ponds and take reasonable methods to prevent them from doing so. Ponds, wetlands and swales are expected to attract birds and other wildlife and generally that is OK. This permit does not require actions to discourage birds or other wildife that may be attracted to stormwater systems and property. If the facility lies in a shellfish protection district, there could be wildlife controls imposed through that process.

Response: Ecology disagrees with the suggestion that AKART requirements don't apply to bacteria or other pollutants that are unexpected or not directly related to human or process inputs. However, the mandatory BMPs related to fecal coliform bacteria are water quality-based narrative effluent limits [RCW 90.48.555(7)], rather than technology based (AKART) effluent limits.

Ecology believes that (1) in footnote "h", is properly focused on nuisance animals and birds that would be associated with industrial facilities (e.g., seagulls, pigeons, rats, etc.), and believes that it would be inappropriate to mention domestic animals (e.g., horses, cattle, etc.). Ecology also disagrees with the suggestion for the permit to state that birds and wildlife are "OK". Concentrated populations of Canada geese and other waterfowl can cause damage and water quality problems in stormwater ponds including erosion; invasive species; increased nutrients, bacteria and other pathogens; and increased turbidity from waterfowl sifting through the pond bottom for invertebrates.

Best management practices (e.g., un-mowed pond buffers, etc.), including a range of commercial bird control products (e.g., predator decoys, noise makers, lights, wires, repellants, etc.) are available to upset the behavior of waterfowl and encourage them to move elsewhere.

Puget Soundkeeper, Columbia Riverkeeper, Waste Action Project

37.

Condition S6.C.

The commenters oppose the removal of the numeric fecal coliform effluent limitation for discharges to receiving waters 303(d)-listed for fecal coliform and its replacement with mandatory fecal coliform-specific BMPs. Commenters understand that amendment of RCW 90.48.555 to specifically call for this change is pending, but this modification violates federal law.

The fecal coliform numeric effluent limitations are water quality-based effluent limitations. Where receiving waters do not meet fecal coliform water quality criteria, resulting in their inclusion on the 303(d) list, it is reasonable to conclude that stormwater discharges, or any discharges, that contain a concentration of fecal coliform greater than the water quality criteria contribute to the impairment. Certainly, in such a situation, reasonable potential to cause or contribute to violations of water quality standards (per 40 C.F.R. § 122.44(d)) exists. Under federal law, this reasonable potential means that the permit must include a numeric effluent limitation for fecal coliform, so long as one is feasible. The Pollution Control Hearings Board specifically found that the fecal coliform numeric effluent limitation is appropriately derived. Thus, the fecal coliform numeric effluent limitation is required by federal regulations. There is

no legal or appropriate consideration of Ecology's stated basis for this proposed modification – the "uniqueness of fecal coliform" and that "industrial facilities are not considered a significant source of bacteria in Washington's water bodies" – in light of these legal requirements and the findings of the Board. Furthermore, the substitution of a short list of mandatory BMPs (proposed footnote h. to Table 5) for the fecal coliform numeric effluent limitation conflates water quality-based and technology-based effluent limitations. Because the ISGP must require strict compliance with water quality standards, this is insufficient. *Defenders of Wildlife v. Browner*, 191 F.3d 1159, 1164 (9th Cir. 1999); *see also, Ackels v. U.S. Envtl. Protection Agency*, 7 F.3d 862, 865-66 (9th Cir. 1993) (when it comes to ensuring compliance with water quality standards, "economic and technological constraints are not a valid consideration" in developing NPDES permits).

Does Ecology contend that the proposed mandatory BMPs constitute an acceptable water quality-based effluent limitation for fecal coliform? If so, why?

What information does Ecology have that indicates that implementation of these mandatory BMPs will reduce fecal coliform discharge concentrations to levels low enough to ensure that discharges will not contribute to fecal coliform water quality criteria violations in receiving waters that are 303(d)-listed for fecal coliform?

Does Ecology contend that there is no reasonable potential for ISGP permittees discharging into receiving waters impaired for fecal coliform to cause or contribute to a violation of the fecal coliform water quality criteria? If so, why?

Does Ecology contend that the inclusion of the fecal coliform numeric effluent limitation is infeasible? If so, why?

The deletion of the fecal coliform numeric effluent limitation violates the anti-backsliding prohibition of 33 U.S.C. § 1342(o) because the modified ISGP will have effluent limitations that are less stringent than the comparable effluent limitations in the current permit. None of the exceptions to the anti-backsliding prohibition apply, so the proposed modification is illegal. Does Ecology contend that the removal of the fecal coliform numeric effluent limitation does not constitute backsliding? If so, why?

Does Ecology contend that one or more of the 33 U.S.C. § 1342(o)(2) exceptions to the anti-backsliding prohibition applies? If so, which one(s) and why?

Commenters have been involved in citizen enforcement actions against a number of permittees where there are or have been issues of compliance with the fecal coliform numeric effluent limitations. These cases include ones concerning Meltec (Division of Young Corp.), SSA Terminals LLC, Total Terminals, Inc., and Manke Lumber Co. These cases involved sometimes very elevated fecal coliform stormwater discharge concentrations, sometimes an order of magnitude or two above the applicable numeric effluent limitation. In each case, we suspect that the cause of the elevated fecal coliform was not only birds, but also (as identified by proposed footnote h. para. 3) of the draft modified permit) dumpsters, composting materials, food waste, or animal products. In our monitoring of discharge monitoring reports and other submissions by

these and other permittees, we have certainly seen indications that permittees can indeed control fecal coliform levels in stormwater discharges and bring them below the numeric effluent limitations through the implementation of reasonable measures.
What is the basis for the fact sheet assertion that permittees currently subject to the fecal coliform effluent limitation are or will be unable to comply "due to factors beyond the control of industrial facilities"? Has Ecology evaluated this assertion in light of examples of permittees that have managed to reduce fecal coliform concentration levels? What analysis of permittee monitoring data has Ecology performed to support this assertion?
In addition, the commenters note that the fecal coliform numeric effluent limitation was part of the 2004 legislative bargain resulting in enactment of RCW 90.48.555. The state statutory mandate to include numeric effluent limitations for discharges into 303(d) listed waters was one of the primary concessions obtained by the environmentalist side from Ecology and the regulated entities in the agreement. As parties actively involved in the negotiations that resulted in RCW 90.48.555, commenters are very dismayed by Ecology's efforts to remove this effluent limitation.
If the fecal coliform numeric effluent limitation is removed as proposed, what provisions of the permit ensure that discharges to fecal coliform-impaired (303(d)-listed) waters will not contribute to the impairment? Given the ISGP's treatment of other pollutants of concern (e.g., copper) with stringent benchmarks and corrective actions up to level 3 implementation of treatment BMPs, why is there no benchmark and adaptive management process for fecal coliform?

Response: Ecology considers the mandatory BMPs in Condition S6, along with Condition S10 – Compliance With Standards, "water quality-based narrative effluent limitations" for fecal coliform bacteria and consistent RCW 90.48.555(7). Ecology does not consider the narrative effluent limits less stringent than the previous numeric effluent limitations, and has concluded that the revision does not run afoul of the Anti-backsliding provisions of the federal Clean Water Act. Ecology believes that the mandatory BMPs listed in Table 5 (footnote h) will prevent discharges that could cause or contribute to violations of water quality standards. Ecology agrees that birds are not the only potential source of bacteria at industrial facilities; other on-site sources and activities are sometimes responsible for elevated bacteria levels. Ecology believes that appropriate best management practices can prevent stormwater contamination from dumpsters, composting materials, food waste, or animal products and reduce high fecal coliform levels in stormwater down to the water quality standards for bacteria.

Snoqualmie Tribe

38.

NOTE: The following is a *summary* of Oral Testimony Provided by Matt Bearwold, Water Quality Manager - Snoqualmie Tribe, at March 12, 2012 Public Hearing, South Seattle Community College – Georgetown Campus. Ecology's website contains an .mp3 file with Mr. Bearwold's complete testimony:
http://www.ecy.wa.gov/programs/wq/stormwater/industrial/commentsfeb12/iswgphearingseattle.mp3

My comments are limited to revisions to the numeric effluent limits, for discharges to 303(d) listed water bodies.

It's easy to construe it that you're almost giving up on 303(d) water bodies. When Ecology's rational for the changes is explained, understand you're looking for regulatory flexibility; that may or may not be justified. The 303(d) impaired waterbodies, we're supposed be working harder to protect - concerned the proposed changes can in effect reverse that. Even if not in effect, it's sort of an attitude. (2:43)
If we're doing quarterly monitoring anyway, and we have the numbers/data available, why don't we use that? Leaves too much room for ambiguity. How much is too much? Previous limits, based on state limits, that's easy to justify. Troublesome to adjust them, if they don't concur with the state limits, you [Ecology] need to figure out how to make these mesh.
Concern is that we change rules more in direction of protecting resource, not away from it.

Response: Ecology sincerely appreciates the testimony given at the March 12, 2012 public hearing in Seattle. Ecology considers the mandatory BMPs in Condition S9, along with Condition S10 – Compliance With Standards, "water quality-based narrative effluent limitations" for fecal coliform bacteria and consistent RCW 90.48.555(7). Ecology is certainly not giving up on the waterbodies impaired for bacteria and considers new narrative effluent limits to be no less stringent than the previous numeric effluent limitations. Ecology believes that appropriate best management practices can prevent stormwater contamination from dumpsters, composting materials, food waste, or animal products and reduce previously high fecal coliform levels in stormwater down to the water quality standards for bacteria.

Washington Refuse and Recycling Association

39.

Change requirements for Bacteria "impaired" waterbodies
We agree with the Department of Ecology's proposal to replace numeric effluent limits with BMP's. As we stated in our opening general comments, we believe that Best Management Practices be employed in lieu of strict numeric measurement as the best approach to the unique situation of each facility.

Response: Thank you.

Weyerhaeuser

40.

S6. Table 5 Discharges to 303(d) or TMDL Waters – Several of the proposed footnote "h" requirements relating to mandatory BMPs targeting fecal coliform in stormwater are not practical and/or will be misunderstood, and thus in the end, largely ignored.

First, recognize the scope of the Table 5 requirements is probably significant. There appear to be about 500-600 waterbody segments listed for fecal coliform on the 2008 Section 303(d) Category 5 report. The point here is that there may be 100's of ISWGP permittees who discharge into a Category 5 waterbody segment, and thus subject to the S6. Table 5 proposed requirements.

Second, the broad language used to define "mandatory BMPs" in subsection 1) is problematic. To illustrate, in subsection 1), what exactly are the "all known, available and reasonable methods" which Ecology has in mind? Will it be necessary for permittees to hire hunters/trappers

to kill or divert all animal life that seeks entry to a facility? Is this a 24/7 obligation? Should sound machines or ribbons or netting or an electrified fence be placed around the perimeter of a property? These techniques/equipment (and many others) would certainly be AKART contenders.

A practical approach (and one consistent with the PCHB Conclusion of Law 21 in Copper Development) would substitute this language as the "footnote h":
h) ISWGP dischargers to 303(d) or TMDL waters must:

1) Perform and document a dry weather inspection to identify and eliminate sanitary sewer cross-connections;
2) Install operational and structural source control, and describe in the SWPPP, those BMPs which seek to minimize precipitation/stormwater contact with probable sources of fecal coliform bacteria (e.g., dumpsters, compost piles, exposed food wastes, exposed animal products)
3) Sampling/analysis for fecal coliform would be required if Ecology determines the industrial activity at a Facility is a likely and persistent source of fecal coliform to the stormwater discharge(s).

Finally, should we expect that Ecology's final version of this Table 5 fecal coliform requirement will now be the model for other stormwater permittees discharging to fecal coliform/303(d) waterbodies? For example, will future versions of the Phase I and Phase II municipal stormwater permits, or the WSDOT Municipal stormwater permit, include the same requirements? If not, why not?

Response: Ecology recognizes that there are 500-600 waterbody segments "impaired" for fecal coliform, and approximately 80 facilities are affected by the additional fecal coliform requirements. The ISGP does not require extreme measures like hunting/trapping, but there are known, available and reasonable best management practices (e.g., un-mowed pond buffers, "Don't feed the birds" signs, etc.) and commercial products (e.g., predator decoys, noise makers, lights, wires, repellants, etc.) are available to comply with permit conditions and prevent discharges that violate the water quality standards for bacteria.

Ecology has considered public comments and has refined the mandatory BMPs:

A numeric effluent limit does not apply, but permittees must sample according to Table 5. In addition, the following mandatory BMPs shall be incorporated into the SWPPP and implemented:

1) Use all known, available and reasonable methods to prevent rodents, birds, and other animals from feeding/nesting/roosting at the facility. Nothing in this section shall be construed as allowing violations of any applicable federal, state or local statutes, ordinances, or regulations including the Migratory Bird Treaty Act.
2) Perform at least one annual dry weather inspection of the stormwater system to identify and eliminate sanitary sewer cross-connections;

3) Install structural source control BMPs to address on-site activities and sources that could cause bacterial contamination (e.g., dumpsters, compost piles, food waste, animal products, etc.):
4) Implement operational source control BMPs to prevent bacterial contamination from any known sources of fecal coliform bacteria (e.g., animal waste, etc.);
5) Additional bacteria-related sampling and/or BMPs, if ordered by Ecology on a case-by-case basis.

S8. Corrective Actions

Association of Washington Business

41.

Generally, Ecology should consider deferring any modifications to Condition S8 until the appeal of the ISGP is final. Modifications to Condition S8 are premature, unless Ecology is prepared to adopt permit language or policies that fully implement the statutory presumption of compliance as required by the statute. Ecology's revisions do not meet any reasonable standard of adaptive management for Corrective Actions; rather, the revisions continue the directed management approach that the PCHB noted needed more agency involvement and information, especially at Level 3.

Response: Ecology has decided not to defer modifications to Condition S8, due the nature of the ongoing litigation. Ecology has made significant revisions to the Level 2 and 3 requirements in S8, based on public comments, including more Ecology involvement at Level 3 through the review of engineering reports for treatment systems that involve site specific design or sizing.

The final permit language:

Level Three Corrective Actions – Treatment BMPs

Permittees that exceed an applicable *benchmark* value (for a single parameter) for any three quarters during a calendar year shall complete a Level 3 Corrective Action in accordance with ~~the following~~ S8.D. A Level 2 Corrective Action is not required.

1. Review the SWPPP and ensure that it fully complies with Permit Condition S3.
2. Make appropriate revisions to the SWPPP to include additional *Treatment BMPs* with the goal of achieving the applicable *benchmark* value(s) in future discharges. Revisions shall include additional operational and/or structural source control BMPs if necessary for proper performance and maintenance of *Treatment BMPs*.
    a. The Permittee shall sign and certify the revised SWPPP in accordance with S3.A.6.
    b. A licensed professional engineer, geologist, hydrogeologist, or Certified Professional in Storm Water Quality (CPSWQ) shall design and stamp the portion of the SWPPP that addresses *stormwater* treatment structures or processes.

i. *Ecology* may waive the requirement for a licensed or certified professional upon request of the Permittee and demonstration that the Permittee or treatment device vendor can properly design and install the treatment device; or the treatment BMP doesn't require site-specific design or sizing (e.g., off-the-shelf filtration units, etc.).

ii. *Ecology* will not waive the Level 3 requirement for a licensed or certified professional more than one time during the permit cycle.

3. Before installing treatment BMPs that require the site-specific design or sizing of structures, equipment, or processes to collect, convey, treat, reclaim, or dispose of industrial stormwater, the Permittee shall submit an engineering report, plans and specifications, and an operations and maintenance (O&M) manual to Ecology for review in accordance with Chapter 173-240 WAC.

   a. The engineering report shall be submitted no later than the May 15th prior to the Level 3 deadline, unless an alternate due date is specified in an order.

   b. The plans and specifications and O&M Manual shall be submitted at least 30 days before construction/installation, unless an alternate date is specified in an order. Upon request of the Permittee, Ecology may allow final conceptual drawings to be substituted for plans and specifications.

4. Summarize the Level 3 Corrective Actions (planned or taken) in the Annual Report (Condition S9.B). Include information on how monitoring, assessment or evaluation information was (or will be) used to determine whether existing treatment BMPs will be modified/enhanced, or if new/additional treatment BMPs will be installed.

5. **Level 3 Deadline**: The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than September 30th the following year.

   a. If installation of necessary *Treatment BMPs* is not feasible by the Level 3 Deadline; *Ecology* may approve additional time by approving a *Modification of Permit Coverage*.

   b. If installation of *Treatment BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to violation of a water quality standard, *Ecology* may waive the requirement for *Treatment BMPs* by approving a *Modification of Permit Coverage*.

   c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a Modification of Coverage form to *Ecology* in accordance with Condition S2.B, by ~~June 1st~~ May 15th prior to the Level 3 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

   d. For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Auto Recyclers of Washington

42.

The proposed requirement that a permittee take a corrective action and modify its SWPPP within 14-days of exceeding a benchmark clearly has a disproportionate economic impact on small businesses. Small business operators have over 100,000 requirements imposed on them every day by a large number of federal, state and local government agencies and small businesses do not have a legion of staff with extensive technical expertise available to determine a corrective action, assess its costs and how it will be paid for, locate items to implement it, and how accomplish it and modify its SWPPP within 14 days. This provision is totally unworkable for the hundreds of small businesses covered by the ISWGP and must not be adopted as proposed. At a minimum, small businesses must have more than 14 days to accomplish all of these corrective action tasks, no less than 45-days. The Department must recognize that the two major parties representing the business community in the appeal of the ISWGP were two of the largest corporations in Washington State with relatively infinite resources as compared to an average small business and they were not in a position to understand and represent the needs and concerns of small businesses subject to the ISWGP. In its decision, the Board did not issue any analysis or consider any impact of its decision on small businesses covered by the permit. The new permit provisions cannot make small businesses the innocent collateral causalities of this appeal and these changes.

Response: The PCHB order correctly pointed out that the previous iterations of the ISGP (2002-2009) required permittees to initiate a Level 1 response within two weeks:

> *A Level 1 corrective action is required for any exceedance of the applicable benchmark, and requires the permittee to make appropriate revisions to the SWPPP to include additional Operational Source Control BMPs with the goal of achieving applicable benchmark values in future discharges. The permittee must summarize the Level 1 corrective actions in its annual report to Ecology. The permit establishes a deadline to fully implement the revised SWPPP "as soon as possible, but no later that the DMR due date for the quarter the benchmark was exceeded" (which is forty-five days after the end of the quarter, per Condition S9.A.4.). Condition S8.B. Although Ecology views this Level 1 provision as substantially identical to the previous permit, the 2010 ISGP does not have a specific timeframe by which a permittee must initiate a response to a benchmark exceedence, whereas the previous permit required a facility inspection "as promptly as possible but no later than two weeks after sampling results." Exs. P-5, B-36; Killelea Testimony.*

Ecology believes that the draft permit language is reasonable and workable, based on experience gained during 2002-2009, and it is legally necessary to comply with the PCHB order. As such, no change will be made in response to this comment.

Auto Recyclers of Washington

43.

Ecology proposes that the corrective action plan be completed two months sooner than under the current permit. This will be totally unworkable for many small businesses. Many corrective

actions may require a permit to install, the purchase of new items, and will result in unexpected costs to small business covered by the ISWGP.

Those new costs may require that the business to go find and arrange financing to pay for the corrective action. This requirement will prove unworkable for many small businesses covered by the ISWGP and will have a huge disproportionate economic impact on small businesses and should not be adopted as currently proposed. The timeframe for small businesses cannot realistically be reduced by two months to be fair to small business operators. The proposed reduction of two months must not apply to small businesses.

Response: The concerns about the economic impact of a shortened corrective action timeline were considered, but Ecology has to apply the PCHB ruling to all permittees, including small businesses. Based on public comments, and consideration of 1) wet-weather construction constraints, 2) environmental impacts of working during the wet season (erosion, fish windows, wet weather paving, etc.), and 3) the potential for increased workload from Level 2 extension requests, Ecology has decided to implement the PCHB ruling by shortening the Level 2 deadline from September 30th, to August 30th, and allowing facilities to implement a Level 3 corrective action in lieu of a Level 2 corrective action. Ecology also clarified that a Level 2 corrective action is not *required* if a permittee has triggered a Level 3 corrective action.

Association of Washington Business

44.

S8.C.2 and D.2 Level Two and Level Three Corrective Actions: The current permit language demands that "additional" BMPs be identified and implemented in pursuit of the goal of achieving the applicable benchmark values. This directive is counter to RCW 90.48.555(6) which states that, at all times, "all applicable and appropriate best management practices" be selected, implemented and maintained. Responsible permittees have already been adjusting their SWPPPs with an "adaptive management" approach for quite a number of years. At some point in the Corrective Action process a permittee is likely to conclude that all applicable and appropriate BMPs have been implemented. A demand for serial "addition" of BMPs may be hollow. Ecology would more appropriately reference the "all applicable and appropriate" language.

Response: Ecology disagrees with the suggestion that S8.C.2 and D.2. are counter to RCW 90.48.555(6). Ecology believes Condition S8 contains an “enforceable adaptive management mechanism” that is consistent with the intent and requirements of the PCHB order and applicable state and federal water quality laws and regulations.

Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Association of Washington Business

45.

S8.C.5 and D.S- Additional Corrective Action May Be Required: The subsection heading indicates additional corrective actions "may" be required; the section text says "must." What

permit requirement does Ecology intend? The comment offered above for S8.C.2. and D.2. also applies to C.5. and D.5.

Response: Based on public comments, additional revisions have been made to clarify Ecology's intent that additional Level 2 or 3 corrective actions aren't triggered (accrued) during the calendar year following the calendar year that the permittee triggered a Level 2 or 3 corrective action. However, benchmark exceedances begin counting towards additional Level 2 or 3 corrective actions the year after the Level 2 or 3 deadline. An example is provided below. The final language is:

S8.C.4.d:
<u>For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

S8.D.5.d:
<u>For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

Example:

- Permittee exceeds zinc benchmark during 3 quarters in 2011, therefore a Level 3 corrective action must be completed by September 30, 2012.
- To allow a "time-out" period for the permittee to plan/install/monitor their Level 3 treatment BMPs in 2012, any zinc exceedances in 2012 do not trigger additional Level 2 or 3 corrective actions.
- If the permittee continues to exceed the zinc benchmark in 2013 (calendar year following Level 3 Treatment due date), another Level 3 corrective action is required by September 30, 2014.
- Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Association of Washington Business

46.

S8.D.2 Level Three Corrective Actions - Treatment BMPs: The last sentence demands Level 3 Treatment BMPs or additional BMPs necessary to "meet" the goal of achieving the applicable benchmark value(s). The permit treats benchmark values as if they are numeric effluent limits, but they are just goals. Under the permit, if the goals (effluent limits) are not consistently achieved, additional actions must be taken. With this nuanced approach and outcome, Ecology must be prepared to accept a permittee's judgment on BMP adequacy.

Response: Benchmark values are not *water quality standards* and are not numeric effluent limitations; they are indicator values used in conjunction with Condition S8 to comply with RCW 90.48.555(8)(a).

BNSF

47.

Proposed revision to Condition S8.B

In its Fact Sheet, Ecology again does not present any reason for selecting a 14-day deadline for initiating investigations as part of Level 1 corrective action responses. The PCHB required only a "reasonably short timeline." A strict 14-day deadline does not recognize that many businesses rely on the same environmental consultants to perform this work, and that this limited pool of consultants would have to conduct investigations at facilities all over Washington within a greatly compressed time frame. Thirty days is a more reasonable timeline.

Response: The PCHB order correctly pointed out that the previous iterations of the ISGP (2002-2009) required permittees to initiate a Level 1 response within two weeks:

> *A Level 1 corrective action is required for any exceedance of the applicable benchmark, and requires the permittee to make appropriate revisions to the SWPPP to include additional Operational Source Control BMPs with the goal of achieving applicable benchmark values in future discharges. The permittee must summarize the Level 1 corrective actions in its annual report to Ecology. The permit establishes a deadline to fully implement the revised SWPPP "as soon as possible, but no later that the DMR due date for the quarter the benchmark was exceeded" (which is forty-five days after the end of the quarter, per Condition S9.A.4.). Condition S8.B. Although Ecology views this Level 1 provision as substantially identical to the previous permit, the 2010 ISGP does not have a specific timeframe by which a permittee must initiate a response to a benchmark exceedence, whereas the previous permit required a facility inspection "as promptly as possible but no later than two weeks after sampling results." Exs. P-5, B-36; Killelea Testimony.*

Ecology believes that the draft permit language is reasonable and workable, based on experience gained during 2002-2009, and it is legally necessary to comply with the PCHB order. As such, no change will be made in response to this comment.

BNSF

48.

Proposed revision to Condition S8.C

Ecology proposes to shorten the deadline for Level 2 and Level 3 corrective actions from September 30th of the following year to July 30th of the following year. The PCHB characterized the Level 2 deadline as "excessively long" only in conjunction with footnote 4 and only in the "absence of evidence that structural source control BMPs typically require this long to implement, become effective, and be evaluated." Since Ecology deleted footnote 4, which is part of the basis for the PCHB's disapproval, Ecology should re-evaluate whether the facts justify the current September 30th timeline. For example, most Level2 and Level 3 treatment options require significant construction, and a permittee will need the full summer construction season to complete this kind of work. Ecology should collect evidence on the timeline for major construction activities before making this type of change to the permit.

Response: Ecology did not propose to shorten the deadline for Level 3 corrective actions; the change is limited to Level 2 corrective actions (structural source control BMPs). Ecology agrees that footnote 4 was related to the PCHB's disapproval of the Sept. 30th deadline, but disagrees that the deletion of Footnote 4 would allow Ecology to disregard their order and retain the September 30th Level 2 deadline. This portion of the PCHB order is unambiguous:

> *We also conclude that the deadline for implementation of a Level 2 corrective action (September 30 of the following calendar year) is excessively long and must be shortened. As currently written, the timeframe provides a permittee up to one and one half years of the five year permit cycle to implement a Level 2 corrective action, depending on when during the calendar year the benchmark exceedences occur.*

Based on public comments, and consideration of 1) wet-weather construction constraints, 2) environmental impacts of working during the wet season (erosion, fish windows, wet weather paving, etc.), and 3) the potential for increased workload from Level 2 extension requests, Ecology has decided to implement the PCHB ruling by shortening the Level 2 deadline from September 30th, to August 31st (beginning in 2013). This deadline may be extended on a case by case basis by submitting a Modification of Coverage request by May 15th prior to the Level 2 deadline. The problem with "Footnote 4" has been resolved with new language in S8.C.4.d.

The final language is:

> **Level 2 Deadline:** The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than <u>August 31st</u> the following year[4].
>
> a. If installation of necessary *Structural Source Control BMPs* is not feasible by August 31st the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.
>
> b. If installation of *Structural Source Control BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* may waive the requirement for additional *Structural Source Control BMPs* by approving a *Modification of Permit Coverage*.
>
> c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Coverage* form to *Ecology* in accordance with Condition S2.B, by <u>May 15th</u> prior to Level 2 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.
>
> d. <u>For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

[4] <u>For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012</u>.

BNSF

49.

Ecology should revise the ISGP to explicitly allow Permittees to obtain a waiver from Level 2 and 3 requirements where the facility has established that the primary cause of the exceedances triggering structural/treatment BMPs is run-on from a neighboring property. The current ISGP requires that a facility demonstrate that structural/treatment BMPs are (1) not feasible; or (2) not necessary to prevent discharges that may cause or contribute to violation of a water quality standard. BNSF suggests that Ecology revise Condition S8.C.4.b and S8.D.4.b as follows:
If installation of *[Structural Source Control BMPs* or *Treatment BMPs]* is not feasible, or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, or where the exceedances requiring the construction of *[Structural Source Control BMPs* or *Treatment BMPs]* are due to stormwater run-on from adjacent properties, *Ecology* may waive the requirement for additional *[Structural Source Control BMPs* or *Treatment BMPs]* by approving a *Modification of Permit Coverage.*

Response: Ecology considered the suggestion, but has determined that disregarding the requirements for discharges affected by off-site sources (run-on from adjacent properties, aerial deposition, fugitive dust, etc.) would not be consistent with applicable laws, regulations and case law. In some cases, the existing ISGP criteria for waivers (i.e., not feasible/not necessary) may apply to a discharge affected by run-on from adjacent properties.

Boeing

50.

Condition S8. Corrective Actions

1. ***Ecology should defer any modifications to Condition S8 until Boeing's appeal of the ISGP finally has been resolved.*** The Court of Appeals has accepted direct review of PCHB rulings on the legality of the ISGP. (*See e.g., Copper Development Association v. Ecology*, PCHB No 09-135 Findings of Fact, Conclusions of Law and Order (Apr. 25, 2011) (hereinafter, "PCHB Final Order"). One of the issues in that appeal is whether Condition S8 is consistent with the statutory presumption of compliance in RCW 90.48.555. Modification of Condition S8 prior to a decision from the Court of Appeals would be premature, unless Ecology is prepared to adopt permit language or policies that fully implement the statutory presumption of compliance contained in the statute. Modification of Condition S8 corrective actions prematurely could subject permittees to a whip saw of permit changes, not only in response to the Court of Appeals' decision on Boeing's ISGP appeal, but also to the Thurston County Superior Court's ruling on Boeing's administrative appeal of Ecology's ISGP "Frequently Asked Questions" document. Moreover, as discussed below, the proposed modifications to the permit are inconsistent with a key aspect of the PCHB ruling addressing implementation of adaptive management. Withdrawing the proposed Condition S8 corrective action modifications will ensure that permittees are subjected to the least disruption and can best protect the environment. Boeing is open, as noted above, to revised permit language that addresses the Board's intent by incorporating an effective, efficient and enforceable adaptive management process into the permit that recognizes presumption of compliance with a narrative standard. Boeing provides some suggestions below on how this outcome feasibly could be achieved.

2. ***The proposed additional requirements for annual reporting contained in Condition S8.D is inconsistent with the PCHB Final Order on the consolidated ISGP appeals.*** In the PCHB Final Order, the PCHB held that "Quarterly discharge monitoring reports. . are likely inadequate in more complex situations such as Level 3 treatment BMPs." The PCHB ordered Ecology to refine Condition S8.D to reflect an "iterative exchange and evaluation of BMPs" between Ecology and a permittee. To accomplish this the PCHB directed Ecology in Condition S8.D to "require the use of monitoring, assessment, or evaluation information as a basis **on which Ecology** and the permittee may determine whether further modification of the BMPs or additional BMPs are necessary to meet the goal of achieving the applicable benchmarks in future discharges." PCHB Final Order, pp 71-72 (emphasis added). Implicit in any such iterative process is a determination whether a permittee must meet permit benchmarks to demonstrate its compliance with water quality standards.

The language proposed by Ecology to modify Condition S8.D does not establish the iterative process required by the PCHB Final Order. Ecology's proposed language merely requires vague additional information about monitoring and assessment in an annual report. There is no meaningful process for Ecology review and feedback in which Ecology and the permittee can work together to determine whether further modification of BMPs is necessary. If anything, the proposed language makes it more ambiguous as to when and what corrective actions are necessary. In addition, Ecology's reliance on permit waivers and time extensions may be insufficient to satisfy the PCHB's requirement of an iterative adaptive management program. Had these existing tools been adequate, in all likelihood the PCHB would not have found it necessary to require Ecology to refine Condition S8 to become involved in the interplay necessary for adaptive management when a risk to water quality might exist.
Ecology needs to address how the proposed modification to annual reports are to address the requirement for engineering reports stated in the March 2011 Frequently Asked Questions document #51.2 In that document Ecology states that any treatment system subject to engineering design requires the preparation of an engineering report as provided in WAC 173-240-130. With respect to this requirement, Ecology should explain:
2 Frequently Asked Question related to this comment letter are contained in appendix 2
o The specific requirements for an engineering report and how that is to be addressed in the proposed modifications to the annual reporting requirements.
o How the annual reporting requirements will address the submission and approval of engineering reports under WAC 173-240-130.
o Does Ecology intend to review and approve engineering reports under the proposed modifications to reporting requirements as required under WAC 173-240-130?
o How will the deadlines in the permit for implementing corrective action be addressed pending Ecology review and approval of engineering reports?
Ecology also needs to address an additional new requirement in the ISGP FAQ Document #50 that permittees in Level 3 corrective action must consider treatment BMPs that are not in Ecology manuals or approved by Ecology and further prepare a demonstrably equivalent analysis if the permittee selects a treatment BMP that has not been approved by Ecology. With respect to this requirement Ecology should explain:
How permittees should incorporate that analysis into the new annual reporting requirements.
If approval is necessary from Ecology before implementing a demonstrably equivalent treatment BMP described in an annual report.

How will Ecology implement the PCHB-required iterative review process for demonstrably equivalent treatment BMPs?
How will a permittee know that it is required to evaluate and implement demonstrably equivalent BMPs?
How, as part of the PCHB required iterative process, will Ecology evaluate the new information required in the annual reporting and determine when demonstrably equivalent treatment BMPs must be considered by a permittee?

Ecology also needs to address how the proposed annual reporting requirements will incorporate the requirement in the ISGP FAQ Document #48 to aggregate discharge exceedances from all outfalls for a specific parameter into a single site value for determination of corrective actions. The resulting corrective action level determination is then applied site-wide. Historically, each discharge at a site was treated as an independent location for purposes of counting exceedances and corrective actions were limited to the basin in which the exceedances occurred. This new theory in counting exceedances results in a greatly increased requirement for corrective actions from facilities with multiple discharges. With respect to this requirement Ecology should explain:
How does the department differentiate between the requirement for a site using a sampling approach as allowed in S3.B.5.b Substantially Identical Outfalls and the approaches described in response to Question 48 contained in the ISGP FAQ Document?
How does the permittee count a sampling exceedance when it occurs at different discharge locations on different sample dates but within the same sampling period?
Do discharges to different receiving waters require aggregation, or are those discharges to be counted independently?
Will a permittee be allowed to average across the same sample points for determination of benchmark reporting value?
3. ***Boeing proposed Level 3 corrective action***. In the event Ecology intends to develop an iterative Level 3 corrective action process as required by the PCHB prior to a final ruling on the petition for judicial review, Boeing recommends the modifying and replacing Condition S8.B through D as follows:
B. Corrective Action
Permittees that exceed any applicable *benchmark* value in Table 2 or Table 3, or an approved *site specific benchmark* in lieu of a permit *benchmark*, shall complete Corrective Action for each parameter exceeded with the following:
a. Review the SWPPP and ensure that it fully complies with Permit Condition S3, and contains the correct BMPs from the applicable *Stormwater Management Manual*.
b. Make appropriate revisions to the SWPPP to include additional *Operational Source Control*, *Structural Source Control*, and *Treatment BMPs* with the goal of achieving the applicable benchmark values in future discharges. The SWPPP may include an *adaptive management plan* for the implementation of BMPs over time as needed based on monitoring results.
c. If the *geometric mean* of monitoring data from any single outfall in the preceding two years or previous eight quarterly samples exceeds any applicable *benchmark* in Table 2 or Table 3, the review and revisions of the SWPPP must be conducted by a *stormwater professional* and specifically consider *Treatment BMPs*. The *stormwater professional* shall conduct a comprehensive review of the SWPPP and select BMPs that fully implement *AKART* with the goal of eliminating or reducing pollutants to meet *benchmarks.* The *stormwater professional*

shall design and stamp the portion of the SWPPP that addresses *stormwater treatment* structures or processes.

d. In considering *Treatment BMPs* the *stormwater professional* should consider all known, available and reasonable *Treatment BMPs.* The review should not be limited to *Treatment BMPs* identified or incorporated by reference in an applicable *Stormwater Management Manual.* The SWPPP revision and *Treatment BMP* design do not require the preparation or submission of an engineering report under WAC 173-240-130 but must include a summary of the review and analysis that the existing and selected BMPs are technologically available and economically achievable in light of the best industry practice. The Permittee is not required, however, to document that any *Treatment BMP* selected for corrective action is *demonstrably equivalent* under Condition S3.A.3.d.

e. The Permittee may apply for a *site specific benchmark* based on available data or request additional time to collect data to establish a *site specific benchmark.* The corrective actions required under Condition S8.B.c and d shall be based on the goal of meeting approved *site specific benchmarks.*

f. Summarize Corrective Actions (planned or taken) in the Annual Report (Condition S9.B).

g. **Corrective Action Deadlines:** The Permittee shall fully implement any additional or modified *Operational Source Control BMPs* and related revisions to SWPPP as soon as possible but no later than the DMR due date for the quarter the *benchmark* was exceeded. The Permittee shall fully implement any additional or modified *Structural Source Control or Treatment BMPs* and related revisions to SWPPP as soon as possible but no later than July 30th the following year unless *Ecology* has granted a request for a *site specific benchmark,* an *adaptive management plan,* a time extension or waiver.

Ecology may grant a request for a *site specific benchmark* or schedule to implement a sampling and monitoring plan to develop information to support a *site specific benchmark* by approving a *Modification of Permit Coverage*. A request for a *site specific benchmark* must be supported by an analysis by a *stormwater professional* documenting the basis for a *site specific benchmark* or a proposed sampling and monitoring plan and data analysis plan for calculating a *site specific benchmark.*

If installation of necessary *Structural Source Control or Treatment BMPs* cannot be completed by September 30th of the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.

The application for an extension may include an *adaptive management plan*. Ecology may approve additional time as provided in the *adaptive management plan* by approving a *Modification of Permit Coverage*.

If installation of necessary *Structural Source Control* or *Treatment BMPs* is not feasible or necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* shall waive the requirement for additional *Structural Source Control* or *Treatment BMPs* by approving a *Modification of Permit Coverage*.

To request a *site specific benchmark*, a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Permit Coverage* form to *Ecology* and complete public notice in accordance with Condition S2.B, by April 1st prior to the September 30th deadline applicable to the facility. The application *Modification of Permit Coverage* shall be approved denied or automatically commence as provided in Condition S2.C.

h. Additional corrective action is not necessary in the following year, where a waiver has been granted, or during the term of any approved extension or *adaptive management plan*.

Boeing offers this suggested language as an adaptive management approach that creates an iterative process between Ecology and a permittee as required by the PCHB. It is also consistent with the concept of adaptive management in program management and LEAN manufacturing systems as composed of four distinct phases:
Plan: Identify the need and actions / equipment needed to resolve the identified or anticipated problem. In this case, the focus would be using the sampling data to identify where additional BMPs or other actions may be warranted to reduce pollution or flows.
Do: Implement the plan by installing, operating, maintaining and inspecting BMPs and by taking such additional actions, such as engineering sampling, to further refine the effectiveness of the pollution control effort.
Check: Conduct sampling, flow monitoring, inspections and other action that collect data useful in evaluating the effectiveness of the BMPs and supporting actions.
Act: Using the data collected in the check phase revise the plan to focus on areas where improvement has been insufficient to consistently meet discharge goals. The use of data (*i.e.*, metrics) is a critical element in adaptive management. As noted during the PCHB hearing data collection for a stormwater effort is fraught with challenges due to high variability in weather patterns, industrial activities and sources of pollutants.
The adaptive management process should be a continuous effort in which a permittee collects data on a regular basis and compares the results to the desired outcome. The "plan-do-check-act" cycle described here is repeated until the desired results are attained or feasibility conditions preclude additional actions.
Here is a more detailed summary of the voluntary alternative corrective action approaches that Boeing is proposing:
Geometric mean. Boeing proposes that Ecology use the same statistical analysis, geometric mean, evaluated over eight quarter, used in the EPA's Multi-Sector General Permit, to address the high variability of stormwater discharges.3 The Boeing proposed permit language will still trigger Level 3 corrective action, but a determination not to implement additional treatment BMPs could be made on the basis of geometric mean assessment of the monitoring data. This option provides an important tool when assessing quarterly monitoring data. Each sampling quarter is an independent meteorological regime. Rainfall patterns differ throughout the year and there are different exposed industrial activities during each quarter. The combination of quarter specific rainfall patterns and activities will result in different pollutants and pollutant loadings being discharged from any given facility when compared to other quarters in the year. Thus a permittee's facility cannot be reasonably characterized on one year's worth of data since each quarter's data is not representative of any other quarter in that year. Weather patterns in Washington State are often significantly different from year to year which further complicates the comparison of quarterly data.
Allowance for geometric mean assessment of monitoring data over eight quarters is consistent with the PCHB ruling that at least seven quarters of data is necessary to determine if a facility can consistently attain benchmarks. And as the PCHB ruled, four quarterly samples are likely to be inadequate to determine whether additional treatment BMPs are necessary at a facility. PCHB Final Order at 71.

Site Specific Benchmarks. The permit should include a simplified mechanism to apply for a site specific benchmark using the same general criteria used to generate the permit benchmarks using more site specific data and receiving water data to create the site specific benchmark. This is not a new concept as the current permit requires waivers when additional treatment BMPs are not necessary to prevent a discharge from causing or contributing to a violation of water quality standards. Boeing is merely proposing a formal and explicit process for developing information that can be used on an iterative basis by Ecology and the permittee to determine whether additional treatment BMPs are necessary. In other words, Ecology would have to approve the equivalent of site specific benchmarks, developed by the permittee, to grant a waiver under the current permit. Boeing recommends that a probabilistic modeling approach be used in developing a site specific benchmark in recognition of the high variability of rainfall and receiving water conditions. This value would not be an effluent limit as the use of probabilistic models and limited parameters considered would not constitute a reasonable potential analysis. It would, however, be far more representative of the impact that a particular discharger would have on the receiving water. This would be the basis for creating an effective adaptive management system approach to attaining consistent protection of the receiving waters. Inclusive in the analysis for a site specific benchmark would be consideration of a technology based benchmark applicable to the facility. If that discharge value was lower than the water quality based value then the discharge value would be used as the new site specific benchmark.
Adaptive Management Plan. A facility at which the statistical average for the discharge is above the benchmark for the two years could report that fact in its annual report, together with an adaptive management plan prepared by a stormwater professional. The adaptive management plan would be subject to Ecology approval as an addition to the SWPPP in S3. A permittee choosing this option would be required to commence implementation of source, structural and treatment BMPs on the approved adaptive management schedule and provide an annual progress report on implementation to the department. The permit should be clear that upon completion of the adaptive management plan approved by Ecology that the permittee has attained the statutory presumption of compliance based on the narrative standard applicable to the ISGP. Should Ecology have information that shows that the permittee is adversely affecting water quality attainment then the department could exercise its authority under RCW 90.48.555 to require the permittee to obtain an individual or alternative general permit. Time extensions as provided under the current permit can be cumbersome and set artificial deadlines. Permittees should have the ability to submit plans that provide the necessary time and decision making tools to reduce stormwater pollution in the most effective, efficient and least resource demanding approach.

Response: Ecology has decided not to defer modifications to Condition S8, due the nature of the ongoing litigation. The suggested framework and language is inconsistent with state and federal laws, regulation and relevant case law. Furthermore, the suggested remedies are overly complex, labor intensive and unworkable for a general permit in Washington or any other state in the country.

Ecology has made significant revisions to the Level 2 and 3 requirements in S8, based on public comments, including more Ecology involvement at Level 3 through the review of engineering reports for treatment systems that involve site specific design or sizing.

Final permit language for Condition S8.D is included in Response to Comment #41, on page 35.

City of Longview

51.

The six-month window to identify and implement all capital BMPs is less than the typical select-design-bid-build project cycle for such investments. It is far less than the one- to five-year capital budget cycles of most Permittees. Perhaps acknowledging the imposition of such a deadline, Ecology has provided a mechanism for extensions (per S8.B.4.c). However, the mechanism is a permit modification, a two-month process which must be initiated no more than three months into the six-month project. This is a ridiculous solution to the impractical deadline.
We understand that the Pollution Control Hearings Board (PCHB) ordered Ecology to shorten the deadline for completing a Level 2 corrective action; but reducing the deadline from September 30th to July 30th the following year slashes precious sunshine off the construction season (e.g. not much roofing, paving, excavation, and painting done in April). This problem is exacerbated if the Level 2 corrective action is triggered late in the previous year. The April 1st deadline to request an extension occurs too early in the corrective action cycle, and should be pushed deep into summer. Plus, why should every prudent project manager have to do a complete Modification of Coverage including public notice requirements just to hedge against weather or other common project delays. This highly compressed schedule will inevitably inflate contract costs at a time when public dollars are scarce. Zinc and copper measurements are inherently erratic and the permit limits for them are tough to meet even by the cleanest, best intentioned business; so it is imperative that the corrective action process be realistic, have a simpler process for obtaining a time extension, and extend into the good weather months of August & September for structural controls.
Also, where is Table 6? The permit should summarize the corrective actions required and their associated timelines in Table 6.

Response: Based on public comments, and consideration of 1) wet-weather construction constraints, 2) environmental impacts of working during the wet season (erosion, fish windows, wet weather paving, etc.), and 3) the potential for increased workload from Level 2 extension requests, Ecology has decided to implement the PCHB ruling by shortening the Level 2 deadline from September 30th, to August 31st (beginning in 2013). This deadline may be extended on a case by case basis by submitting a Modification of Coverage request by May 15th prior to the Level 2 deadline. This deadline coincides with the Annual Report due date, and the 1st quarter DMR, and allows enough time for Ecology to review the request and make a decision in advance of the Level 2 implementation deadline. The problem with "Footnote 4" has been resolved with new language in S8.C.4.d. Table 6 was proposed in 2008 to summarize corrective actions and deadlines, but Ecology has determined that it is no longer required.

The final language is:

> **Level 2 Deadline:** The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than August 31st the following year[4].
>
> a. If installation of necessary *Structural Source Control BMPs* is not feasible by August 31st the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.

[4] For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012.

b. If installation of *Structural Source Control BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* may waive the requirement for additional *Structural Source Control BMPs* by approving a *Modification of Permit Coverage*.

c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Coverage* form to *Ecology* in accordance with Condition S2.B, by May 15th prior to Level 2 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

d. For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Dawson Consulting LLC

52.

S8.C. and D. Corrective Actions, Level Two and Level Three

At the Seattle workshop Ecology noted that under the current permit, a facility that triggers a Level Two Corrective Action and then a Level Three Corrective Action (same calendar year) can skip the Level Two and continue with the Level Three Corrective Action. This makes sense, particularly for facilities that have exhausted their Level Two BMPs but continue to exceed a benchmark. If we heard this correctly, which permit provision allows the permittee to skip Level Two? This isn't clear. The proposed revision also does not clearly address this. An additional sentence or two would be helpful, as well as an explanation and example in the Fact Sheet addendum. It would be helpful also for Ecology to confirm that Level Two can be skipped without the permittee having to obtain a waiver to do so.

In requiring further refinement of S8., the Pollution Control Hearings Board seemed to intend a joint effort on the part of the permittee and Ecology in determining whether further BMP modifications or additional BMPs are necessary at a facility to meet the goal of achieving benchmarks in future discharges. The proposed permit revisions add the requirement for the permittee to include "monitoring, assessment or evaluation information" in its Annual Report, to be used as the basis for Ecology and the permittee to make BMP determinations. However, the proposed revisions do not specify when and how Ecology will provide feedback on this monitoring, assessment or evaluation information. Meaningful and timely feedback from Ecology may be necessary for the permittee to confirm it is meeting Ecology expectations for taking "all the steps required by the adaptive management process."

Additional language is needed in the permit and in the Fact Sheet addendum to explain the mechanisms by which Ecology will participate, as necessary, in determining the required adaptive management process. This could include timely agency feedback on the Annual Report information submitted by the permittee.

Response: Ecology confirms that permittees do not have to do a Level 2 corrective action if they have to do a Level 3 corrective action for the same parameter. Additional language has been added to S8.D to clarify that a Level 2 is not required when a Level 3 is triggered.

S8.D: Permittees that exceed an applicable *benchmark* value (for a single parameter) for any three quarters during a calendar year shall complete a Level 3 Corrective Action in accordance with S8.D. A Level 2 Corrective Action is not required.

Also, a sentence has been added to S8.C that allows permittees who exceed the benchmark during only 2 quarters to skip Level 2 (without a waiver), and go directly to the implementation of a Level 3 Corrective Action:

S8.C: Permittees that exceed an applicable *benchmark* value (for a single parameter) for any two quarters during a calendar year shall complete a Level 2 Corrective Action in accordance with S8.C. Alternatively, the permittee may skip Level 2 and complete a Level 3 Corrective Action in accordance with Condition S8.D.

Examples:

- If a permittee exceeds the zinc benchmark during (only) 2 quarters during a calendar year (not 3 or 4 quarters), a Level 2 corrective action is required.
  - The permit also allows facilities subject to a Level 2 the ability to do a Level 3 (instead of a Level 2) without obtaining a waiver. Sometimes Level 3 treatment is more appropriate, effective, and/or inexpensive than Level 2 source control.
- If a permittee exceeds the zinc benchmark during 3 quarters during a calendar year, a Level 3 corrective action is required, but a Level 2 corrective action is not required.
- However, the Level 3 SWPPP revision must include additional operational and/or structural source control BMPs if necessary for proper performance and maintenance of Treatment BMPs.

Also, Ecology has made significant revisions to the Level 2 and 3 requirements in S8, based on public comments, including more Ecology involvement at Level 3 through the review of engineering reports for treatment systems that involve site specific design or sizing.
Final permit language for Condition S8.D is included in Response to Comment #41, on page 35.

Dawson Consulting LLC

53.

C.4. Level 2 Deadline, new paragraph d. For clarity, Ecology may want to change "a" previous calendar year to "the" previous calendar year if this is the intent.
Ecology proposes to delete footnotes 4 and 5 to clarify how a permittee moves from Level 2 to Level 3. The proposed revision doesn't clarify the requirements, particularly with the reference to Level 3 in the Level 2 deadline provision.
Example 1: Facility exceeds copper benchmark in Q1 and Q2 of 2012; therefore, a Level 2 corrective action is due by July 30th of 2013. If this facility exceeds the copper benchmark in Q4 of 2012, and has begun implementing a structural BMP at this point, then a Level 3 corrective action is *not* triggered in 2012? This would make sense, given that the Level Two corrective action may not have been in place long enough to show its effectiveness. Is it relevant that the facility began implementing the corrective action before the Q4/2012 exceedance?
Example 2: Facility exceeds copper benchmark in Q1 and Q2 of 2012; therefore, a Level 2 corrective action is due by July 30th of 2013. Facility begins implementing a structural BMP in

2012 and completes it before July 30, 2013. Facility exceeds copper benchmark in Q1, Q2 and Q3 of 2013. A Level 2 corrective action is *not* triggered for copper in 2013, correct? Is a Level 3 corrective action triggered for copper in 2013? Which "applicable deadline" applies here?
D. 4. Level 3 Deadline, new paragraph d. For clarity, Ecology may want to change "a" previous calendar year to "the" previous calendar year if this is the intent. As noted for the Level 2 proposed permit revision, the proposed Level 3 provision is confusing.
Example 3: Facility exceeds turbidity benchmark in Q1, Q2 and Q3 of 2012; therefore, a Level 3 corrective action is due by September 30, 2013. Facility begins implementing a treatment BMP. Facility exceeds turbidity benchmark in Q1 and Q2 of 2013. A Level 2 corrective action is *not* triggered for turbidity in 2013, correct? Facility implements the treatment BMP by September 30, 2013, but exceeds the turbidity benchmark in Q4 of 2013. A Level 3 corrective action is *not* triggered for turbidity in 2013, correct?
Example 4: Facility exceeds turbidity benchmark in Q1, Q2 and Q3 of 2012; therefore, a Level 3 corrective action is due by September 30, 2013. Facility implements a treatment BMP in Q4 of 2012, but continues to exceed the turbidity benchmark in Q1, Q2 and Q3 of 2013. Is it correct that Level 2 and Level 3 corrective actions are *not* triggered for turbidity in 2013?
If a facility has implemented (and continues to implement) Level 3 corrective actions for a parameter but continues to exceed the benchmark, under what circumstances is the facility ever required to implement a Level 2 corrective action? If the facility does not implement a Level 2 corrective action, is the facility required to obtain (and repeatedly obtain) a Level 2 waiver from Ecology?

Response: Based on public comments, additional revisions have been made to clarify Ecology's intent that additional Level 2 or 3 corrective actions aren't triggered (accrued) during the calendar year following the calendar year that the permittee triggered a Level 2 or 3 corrective action. However, benchmark exceedances begin counting towards additional Level 2 or 3 corrective actions the year after the Level 2 or 3 deadline. An example is provided below.

The final language is:

S8.C.4.d:
<u>For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

S8.D.5.d:
<u>For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

Example:

- Permittee exceeds zinc benchmark during 3 quarters in 2011, therefore a Level 3 corrective action must be completed by September 30, 2012.
- To allow a "time-out" period for the permittee to plan/install/monitor their Level 3 treatment BMPs in 2012, any zinc exceedances in 2012 do not trigger additional Level 2 or 3 corrective actions.
- If the permittee continues to exceed the zinc benchmark in 2013 (calendar year following Level 3 Treatment due date), another Level 3 corrective action is required by September 30, 2014.
- Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Landau Associates, Inc.

54.

Section S8.C.4.d of the Modified Draft Industrial Stormwater General Permit (Draft Permit), states that: "***Permittees do not trigger additional Level 2 or 3 Corrective Actions, if they are already implementing a Level 2 or 3 from a previous calendar year (for the same parameter), and the applicable deadline hasn't passed yet.***"

This is similar to Section S8.C footnote 4 of the current permit which states that: "***Facilities that continue to exceed benchmarks after a Level 2 Corrective Action is triggered, but prior to the Level 2 Deadline, are not required to complete another Level 2 or 3 Corrective Action the following year for the same parameter. However, a Level 1 Corrective Action is required each time a benchmark is exceeded."***

We have found both of these citations difficult to interpret with respect to knowing which data should be used to determine if a new corrective action is needed the following year. Is it Ecology's intent to allow Permittees not to consider benchmark exceedances from quarters that preceded the corrective action deadline when adding up the number of quarters that exceeded a benchmark in a calendar year? If so (and we assume this to be the case), this should be clearly stated. The above citation for the modified permit needs to be changed because the phrase "and the applicable deadline hasn't passed yet" nullifies the entire first half of the citation if a benchmark is exceeded after the applicable deadline. For example, if a Permittee exceeds one or two benchmarks in the third or fourth quarter following implementation of a Level 2 by July 30, they must consider data from all four quarters of that year to determine if a corrective action is needed again the following year. We suggest that this citation be replaced with the following modified citation:

Permittees do not trigger additional Level 2 or 3 Corrective Actions, if they are already implementing a Level 2 or 3 from a previous calendar year (for the same parameter) except that an additional Level 2 Corrective Action is triggered the following year if benchmarks are exceeded in both the third and fourth quarter following implementation of a Level 2 by the applicable deadline.

Note that a similar exception is not needed for implementation of a Level 3 corrective action because only one quarter of data (the fourth quarter) will be collected following the Level 3 deadline and therefore there is no way to trigger a Level 3 in the following year.

Response: Based on public comments, additional revisions have been made to clarify Ecology's intent that additional Level 2 or 3 corrective actions aren't triggered (accrued) during the calendar year following the calendar year that the permittee triggered a Level 2 or 3 corrective action. However, benchmark exceedances begin counting towards additional Level 2 or 3 corrective actions the year after the Level 2 or 3 deadline. An example is provided below. The final language is:

S8.C.4.d:
For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

S8.D.5.d:
For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Example:

- Permittee exceeds zinc benchmark during 3 quarters in 2011, therefore a Level 3 corrective action must be completed by September 30, 2012.
- To allow a "time-out" period for the permittee to plan/install/monitor their Level 3 treatment BMPs in 2012, any zinc exceedances in 2012 do not trigger additional Level 2 or 3 corrective actions.
- If the permittee continues to exceed the zinc benchmark in 2013 (calendar year following Level 3 Treatment due date), another Level 3 corrective action is required by September 30, 2014.
- Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Nisqually Environmental Sampling and Consulting

55.

Reduction of the time to implement a level 2 response should include a provision for those who are currently in a level 2 response from 2011 data. Specifically, a company who is currently expecting to have until September 30th to fully implement a level 2 response from 2011 data now will have 2 months removed from this deadline with little notice. Additionally, with the implementation of this permit modification suggested to be July 1st, and the roll back of the waiver acceptance date to April 1st, it would be difficult for those implementing a level 2 to react and be compliant to the new permit. We think this puts undue burden on those responding to 2011 data. We suggest an exclusion from this provision for those responding to 2011 data, but implementation for those responding to 2012 data.

Response: Ecology agrees that it would be unduly burdensome to shorten the Level 2 Deadline for facilities are currently working on installing Structural Source Control BMPs. These facilities began implementing Level 2 with the expectation that they had until September 30, 2012, and Ecology has decided to make the new Level 2 deadline effective in 2013 (for facilities that

triggered Level 2 based on 2012 sampling data). In the mean time, the current Level 2 deadline of September 30, 2012 remains in effect.

Ecology has added "Footnote 4" to S8.C.4:
For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012.

Port of Tacoma

56.

S8. Corrective Actions

B.1. Within 14 days of receipt of sampling results that indicate a benchmark exceedance:

a. Conduct an inspection to investigate the cause.

Comment:
This change will inhibit permittees from sampling for water quality purposes through-out the quarter, then average results for the Discharge Monitoring Report. The permit currently requires monthly inspections; facilities will be less inclined to conduct sampling more than once a quarter if a Level One response is required for each sampling event.
Example: A facility begins sampling at the beginning of the quarter and the results indicate they are slightly above benchmarks. They conduct the inspection within 14 days, review, modify and recertify the SWPPP. The facility waits till the end of the quarter before sampling again because they do not have the resources to conduct another "Level One" response, (modify and recertify the SWPPP) more than once in a quarter.

Response: Ecology understands the concern, but is not able to reconcile this issue in light of the PCHB order. As such, no change will be made in response to this comment.

Port of Tacoma

57.

S8.C.4. ***Level 2 Deadline:*** *The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable Stormwater Management Manual as soon as possible, but no later than September July 30th the following year.*
Comment:
This proposed change will jeopardize constructability during the driest months of the year; requiring facilities to begin construction during the wettest season; and increasing the potential for turbid runoff during construction activities. The Port is a public agency and therefore has a very public and lengthy process for procurement of engineering firms, Commission approvals for projects, design-bid-build process for hiring contractors, etc. If the permittee reaches a Level Two Corrective Action and starts the public process at the beginning of the year, July 30th does not allow sufficient time to coordinate and construct the required Level Two Structural Source Control BMPs and concurrently eliminates the ability to construct the BMP during the summer months.
This issue will require the permittee to apply for a permit modification for time extension and subsequent Administrative Order. As discussed in an earlier section, the modification for

extension requires the facility to have a "technical basis". If the intent of this permit is to improve the quality of stormwater discharges, the permittee needs the appropriate amount of time to:

1. Analyze the problem;
2. Investigate potential solutions;
3. Initiate a project scope;
4. Perform the cost analysis;
5. Get budget approval (for public entities this process is lengthy)
6. Contract with a design engineer
7. Apply for and obtain permits
8. Contract with general contractor
9. Complete construction

This process takes more than 4 to 7 months to complete. The permittee would rather complete the Level 2 Corrective Action in a timely manner, without having to be under an Administrative Order. This would also reduce the amount of time Ecology would have to spend for the administration of the Order.
If the appropriate amount of time is not allotted to a permittee, the consequences would be that the source control BMP that was chosen in haste to meet the permit deadline does not work and the permittee will repeat the same process the next year, causing undue costs and constraints to the facility, to Ecology and will not provide a quality or efficient corrective action solution.

Response: Based on public comments, and consideration of 1) wet-weather construction constraints, 2) environmental impacts of working during the wet season (erosion, fish windows, wet weather paving, etc.), and 3) the potential for increased workload from Level 2 extension requests, Ecology has decided to implement the PCHB ruling by shortening the Level 2 deadline from September 30th, to August 31st (beginning in 2013). This deadline may be extended on a case by case basis by submitting a Modification of Coverage request by May 15th prior to the Level 2 deadline. This deadline coincides with the Annual Report due date, and the 1st quarter DMR, and allows enough time for Ecology to review the request and make a decision in advance of the Level 2 implementation deadline.

Ecology wants to clarify that a permittee requesting a Level 2/3 time extension is not required to submit complete information on the specific BMPs that will be implemented to address the corrective action; often the permittee hasn't selected the BMPs at this stage in the process. However, the permittee is likely aware of the project management issues that can affect the completion date. Therefore the permittee's "technical basis for extension" (modification application) must include as much detail as possible regarding the proposed timeline for completion and describe issues that affect completion date; for example, state/local permits, study, design, financing, professional services and contracting, etc.

Condition S8.C.4 will be revised as follows:

Level 2 Deadline: The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than August 31st the following year[4].

a. If installation of necessary *Structural Source Control BMPs* is not feasible by August 31st the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.

b. If installation of *Structural Source Control BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* may waive the requirement for additional *Structural Source Control BMPs* by approving a *Modification of Permit Coverage*.

c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Coverage* form to *Ecology* in accordance with Condition S2.B, by May 15th prior to Level 2 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

d. For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Port of Tacoma

58.

S8.C.5. ***Additional Corrective Actions May Be Required:*** *Permittees that continue to exceed benchmark values after a Level 2 Corrective Action has been completed must complete additional corrective actions per S8.B, C or D.*

Comment:

The permittee should be allotted the appropriate amount of time to investigate and implement the appropriate Level Two Corrective Action BMP to avoid being required to repeat the process as discussed above.

S8.D.5. ***Additional Corrective Actions May Be Required:*** *Permittees that continue to exceed benchmark values after a Level 3 Corrective Action has been completed must complete additional corrective actions per S8.B, C or D.*

Comment:

The Level 3 Corrective Action is due to be completed by September 30. This does not allow enough time to monitor/assess/evaluate the success of the newly treatment BMP. If the goal is to achieve benchmarks in all future discharges, the permittees need sufficient time for monitoring after implementation.

The Port suggests allowing Level 3 Corrective Action due date to be extended to **November 30th** to allow for construction during the dry season and completing the necessary assessment and monitoring of the new system during the "First fall storm event", per Section S4.B.1.b., General Sampling Requirements, of the current permit. This will allow permittees to determine any modification(s) necessary to protect future discharges prior to the Level 3 deadline.

[4] For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012.

The proposed changed do not address whether a permittee that has completed the Level 3 Corrective Action (installed treatment) begins the next sampling event with a "clean slate" or restarts the clock at the stage before a Level 1 Corrective Action is reached.
Example: If the permittee completes implementation of treatment and samples for the first quarter, the data shows the facility to be above benchmarks, the permittee then completes a Level 1 Corrective Action and in done until the following quarter. OR does the permittee remain in the Level 3 Corrective Action?

The Port requests clarification as to whether installing treatment completes the Level 3 Corrective Action and restarts the clock for future sampling events.

Response: Based on public comments, additional revisions have been made to clarify Ecology's intent that additional Level 2 or 3 corrective actions aren't triggered (accrued) during the entire calendar year following the calendar year that the permittee triggered a Level 2 or 3 corrective action. However, benchmark exceedances begin counting towards additional Level 2 or 3 corrective actions the year after the Level 2 or 3 deadline. An example is provided below.
The final language is:

S8.C.4.d:
<u>For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

S8.D.5.d:
<u>For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

Example:

- Permittee exceeds zinc benchmark during 3 quarters in 2011, therefore a Level 3 corrective action must be completed by September 30, 2012.
- To allow a "time-out" period for the permittee to plan/install/monitor their Level 3 treatment BMPs in 2012, any zinc exceedances in 2012 do not trigger additional Level 2 or 3 corrective actions.
- If the permittee continues to exceed the zinc benchmark in 2013 (calendar year following Level 3 Treatment due date), another Level 3 corrective action is required by September 30, 2014.
- Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Port of Tacoma

59.

S8. D.2. Make appropriate revisions to the SWPPP to include additional Treatment BMPs with the goal of achieving the applicable benchmark value(s) in future discharges. The revisions shall

be based upon monitoring, assessment or evaluation information to determine whether further modification of the Level 3 Treatment BMPs or additional BMPs are necessary to meet the goal of achieving the applicable benchmark value(s) in future discharges.

S8. D.3. Summarize the Level 3 Corrective Actions (planned or taken) in the Annual Report (Condition S9.B). Include information on how monitoring, assessment or evaluation information was (or will be) used to determine whether further modification of the BMPs or additional BMPs are necessary to meet the goal of achieving the application benchmark value(s) in future discharges.

Comment:
The Level 3 Corrective Action is due to be completed by September 30. This does not allow enough time to monitor/assess/evaluate the success of the newly installed treatment BMP. If the goal is to achieve benchmarks in all future discharges, the permittees need sufficient time for monitoring after implementation.
The Port suggests allowing the Level 3 Corrective Action due date to be extended to November 30 to allow for construction during the dry season and assessment and monitoring of the new system during the "First fall storm event", per Section S4.B.1.b., General Sampling Requirements, of the current permit. This will allow permittees to determine any modification(s) are necessary to protect future discharges prior to the Level 3 deadline.
S8. D.4.c To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a Modification of Coverage form to Ecology in accordance with Condition S2.B, by ~~June~~ April 1st prior to the Level 3 Deadline. Ecology will approve or deny the request within 60 days of receipt of a complete Modification of Coverage request.

Comment:
This proposed change for the due date of the modification will inhibit the ability of the permittee to complete an appropriate analysis of potential source control Best Management Practices (BMPs). Ecology's *Modification of Permit Coverage Form*, ECY 070-361 (Rev. 04/2011), requires the Level 2/ Level 3 extensions requests provide a "technical basis for extension" and include a "proposed timeline for completion and describe issues that affect completion date; for example, state/local permits, study, design, financing, professional services and contracting, etc." Reducing the submission schedule does not allow enough time to provide all of the technical information that is needed for selecting BMPs that will solve the problem, provide source control and improve water quality.
The Port suggests that Ecology not change the application due date to ensure there is adequate time for facilities to investigate/analyze the problem, select appropriate source control BMPs and support the intent of this permit, which is to improve water quality stormwater discharges at industrial facilities.

Response: Ecology has decided not to extend the Level 3 implementation deadline to November 30th as suggested; once the treatment system is installed, testing and adjustments can occur during the remainder of the year (September 30-December 31) without accruing any new Level 2 or 3 corrective actions. Ecology has considered public comments and the pros and cons associated with various deadlines and scheduling constraints, and has decided make the

Modification of Coverage deadline (for Level 2/3 waiver or extension requests) consistent with the current Annual Report due date: May 15th. This is also the due date for the 1st quarter DMR, and there are administrative efficiencies gained by making these all due on the same date.

Ecology wants to clarify that a permittee requesting a Level 2/3 time extension is not required to submit complete information on the specific BMPs that will be implemented to address the corrective action; often the permittee hasn't selected the BMPs at this stage in the process. However, the permittee is likely aware of the project management issues that can affect the completion date. Therefore the permittee's "technical basis for extension" (modification application) must include as much detail as possible regarding the proposed timeline for completion and describe issues that affect completion date; for example, state/local permits, study, design, financing, professional services and contracting, etc.

Condition S8.D.5.c will be revised as follows:

To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a Modification of Coverage form to *Ecology* in accordance with Condition S2.B, by May 15th ~~June 1st~~ prior to the Level 3 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

Port of Tacoma

60.

Overall Comment:
The Port is concerned that the proposed modifications and schedule of implementation does not give the permittees adequate time to prepare and budget for the changes in operations necessary to ensure compliance with the new permit. Modifying the permit as part of the regular permit cycle would have allowed facilities to adapt their operations to prepare for implementation and provide enough time for facilities to plan/update their program budgets to account for the additional sampling, staff/consultant time for inspections, the shortening of the implementation schedule for Modification applications and Level 3 Corrective Action deadlines.

The Port feels these mid-cycle/mid-budget year proposed modifications will be difficult and costly to permittees and limit their ability to plan for effective source control solutions.

Response: Based on public comments, and consideration of 1) wet-weather construction constraints, 2) environmental impacts of working during the wet season (erosion, fish windows, wet weather paving, etc.), and 3) the potential for increased workload from Level 2 extension requests, Ecology has decided to implement the PCHB ruling by shortening the Level 2 deadline from September 30th, to August 31st (beginning in 2013). This deadline may be extended on a case by case basis by submitting a Modification of Coverage request by May 15th prior to the Level 2 deadline. The problem with "Footnote 4" has been resolved with new language in S8.C.4.d.

The final language is:

Level 2 Deadline: The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than August 31st the following year[4].

a. If installation of necessary *Structural Source Control BMPs* is not feasible by August 31st the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.

b. If installation of *Structural Source Control BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* may waive the requirement for additional *Structural Source Control BMPs* by approving a *Modification of Permit Coverage*.

c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Coverage* form to *Ecology* in accordance with Condition S2.B, by May 15th prior to Level 2 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

d. For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Puget Soundkeeper, Columbia Riverkeeper, Waste Action Project

61.

Condition S8.B.

The commenters support the proposed modification of S8.B. to include a 14-day timeline for commencement of a Level One Corrective Action.

However, the commenters suggest a further modification to provide for summary reporting of Level One Corrective Actions on discharge monitoring reports. The modified S8.B. would continue to limit reporting requirements for Level One to summarization in the annual report. Additional reporting on the discharge monitoring report forms (or in a brief submission accompanying electronically-filed DMRs) would encourage compliance by reminding permittees of the Level One requirements and would facilitate Ecology regulation by providing more timely indications of permittee compliance. As written, an Ecology inspector or facility manager, or a member of the public, has no way to know whether a permittee has performed a Level One Corrective Action before reviewing an annual report without either asking the permittee or conducting an inspection.

Response: Ecology considered this suggestion but has decided not to require permittees to summarize their Level 1 corrective actions on their Discharge Monitoring Reports (DMRs). Under the previous permit, DMRs were generally not reviewed by Ecology inspectors because they are kept at Ecology headquarters for data entry and filing; the discharge monitoring data is hand-entered in the Ecology's PARIS database, but the information in the DMR comments section (where Level 1 corrective actions were summarized prior to 2010) is not entered into PARIS due to database and resource issues. Ecology believes the Annual Reports are a better

[4] For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012.

way to track and review Level 1 summaries because they are scanned and uploaded into PARIS, making the entire Annual Report available to permittees, inspectors and the public.

Puget Soundkeeper, Columbia Riverkeeper, Waste Action Project

62.

Condition S8. Footnotes and S8.C.4.d., S8.C.5., S8.D.4.d., and S8.D.5.
The commenters support the removal of the confusing footnotes 4 and 5. However, while the proposed new language in S8.C.4.d. and S8.D.4.d. certainly represents an improvement in clarity, we suggest the following language for S8.C.4.d. and S8.D.4.d., which is yet more clear: Permittees do not trigger additional Level 2 or 3 Corrective Actions if they are already implementing a Level 2 or 3 Corrective Action (for the same parameter) triggered the previous calendar year and the applicable Level 2 or 3 implementation deadline has not yet passed.
The new language in S8.C.5. and S8.D.5. is also helpful for clarification. We suggest further clarification by inserting the words "or after the applicable deadline for Level 2 implementation has passed," after "has been completed" in S8.C.5., and "or after the applicable deadline for Level 3 implementation has passed," after "has been completed" in S8.D.5. This is important to notify permittees that failure to meet the implementation deadlines does not afford them additional time to exceed benchmarks without triggering a new Level Two or Level Three Corrective Action.

Response: Based on public comments, additional revisions have been made to clarify Ecology's intent that additional Level 2 or 3 corrective actions aren't triggered (accrued) during the calendar year following the calendar year that the permittee triggered a Level 2 or 3 corrective action. However, benchmark exceedances begin counting towards additional Level 2 or 3 corrective actions the year after the Level 2 or 3 deadline. An example is provided below.

The final language is:

S8.C.4.d:
For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

S8.D.5.d:
For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Example:

- Permittee exceeds zinc benchmark during 3 quarters in 2011, therefore a Level 3 corrective action must be completed by September 30, 2012.
- To allow a "time-out" period for the permittee to plan/install/monitor their Level 3 treatment BMPs in 2012, any zinc exceedances in 2012 do not trigger additional Level 2 or 3 corrective actions.

- If the permittee continues to exceed the zinc benchmark in 2013 (calendar year following Level 3 Treatment due date), another Level 3 corrective action is required by September 30, 2014.
- Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Puget Soundkeeper, Columbia Riverkeeper, Waste Action Project

63.

Condition S8.C.4.

While the modifications to the Level Two Corrective Action timing requirements represent an improvement over the current permit language, they do not satisfy the PCHB's order. The modifications simply move up by two months the deadlines for implementation of Level Two Corrective Actions and for waiver or time extension requests. The PCHB rejected the Level Two timeline because it provides "a permittee up to one and one half years of the five year permit cycle to implement a Level 2 corrective action, depending on when during the calendar year the benchmark exceedences occur." *Copper Dev. Ass'n v. Ecology*, PCHB No. 09-135, Findings of Fact, Conclusions of Law, and Order (4/25/11) at 67. This deficiency is not adequately addressed by taking two months off the schedule – leaving a permittee with up to one year and four months of the five year permit cycle to implement a Level 2 corrective action if it is triggered in the second quarter of a calendar year. Ecology probably must depart from its dependence on the calendar year-based Level 2 implementation schedule to satisfy the PCHB's order. We suggest that the permit allow six months from the second benchmark exceedence to implement the additional structural source control BMPs required for Level 2, or until the next July 30, whichever is later, if necessary construction work can only be legally performed during the dry season.

Response: Based on public comments, and consideration of 1) wet-weather construction constraints, 2) environmental impacts of working during the wet season (erosion, fish windows, wet weather paving, etc.), and 3) the potential for increased workload from Level 2 extension requests, Ecology has decided to implement the PCHB ruling by shortening the Level 2 deadline from September 30th, to August 31st (beginning in 2013). Conditions S8.C & D have been clarified with respect to Level 2 and 3 for a parameter being mutually exclusive. Permittees need to consider data from the entire calendar year to determine if a Level 2 or Level 3 is required for a parameter. As such, the August 31st deadline allows 8 months to complete a Level 2 corrective action. The problem with "Footnote 4" has been resolved with new language in S8.C.4.d.

The final language is:

> **Level 2 Deadline:** The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than August 31st the following year[4].

[4] For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012.

a. If installation of necessary *Structural Source Control BMPs* is not feasible by August 31st the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.

b. If installation of *Structural Source Control BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* may waive the requirement for additional *Structural Source Control BMPs* by approving a *Modification of Permit Coverage*.

c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Coverage* form to *Ecology* in accordance with Condition S2.B, by May 15th prior to Level 2 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.

d. For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Puget Soundkeeper, Columbia Riverkeeper, Waste Action Project

64.

Condition S8.D.

The commenters are concerned that the additional language in S.8.D.2. makes yet less clear what is required for a Level Three Corrective Action. We worry that the addition of this language is likely to seriously complicate efforts to enforce Level Three Corrective Action requirements, a crucial part of the ISGP scheme. We support the additional language in S8.D.3. and believe that the inclusion of this language would suffice to comply with the PCHB's order that Level Three "should *also* require the use of monitoring, assessment or evaluation information as a basis on which Ecology and the permittee may determine whether *further* modifications of the BMPs or additional BMPs are necessary" and the inclusion of this information in the annual report. *Id.* at 71 – 72 (emphasis added). In its order on this point, the PCHB was addressing Boeing's complaint about Level Three with a mandate for feedback and iterative evaluation to avoid an endless do-loop of successive Level Three Corrective Actions. *Id.* at 39, 71 – 72. The PCHB did not tell Ecology to remove or lessen the requirement to implement additional treatment BMPs as part of a Level Three Corrective Action, which is a possible interpretation of the confusing and contradictory new language in S8.D.2.

The existing S8.D.2. language provides unequivocally that Level Three entails revision to the SWPPP to include additional treatment BMPs. The proposed additional language muddies this relatively clear direction by stating that the SWPPP revisions are to be based on monitoring, assessment or evaluation "to determine whether further modification of the Level 3 Treatment BMPs or additional BMPs are necessary …." Does this mean, as permittees and their lawyers are likely to assert, that the SWPPP revision need not include additional treatment BMPs unless this monitoring, assessment or evaluation information indicates that such are necessary? If it does, what is the standard for determining the necessity of the additional treatment (or other) BMPs? This interpretation of this additional language would render S8. inadequate to ensure that discharges do not cause or contribute to violations of water quality standards, as Ecology intended it to do. The proposed language should be removed from S8.D.2.

How does the proposed modification to S8. substantively change what a permittee must do to satisfy the Level Three Corrective Action requirement? How are the two sentences of S8.D.2. reconciled with each other?

Response: Ecology agrees that the proposed revisions to S.8.D.2 (draft) could have introduced confusion and made it less clear what is required a Level 3. Ecology did not intend this section to mean that the SWPPP revision need not include additional treatment BMPs unless this monitoring, assessment or evaluation information indicates that such are necessary. Ecology has always intended Level 3 Corrective Actions to include additional treatment BMPs (e.g., modification of existing treatment BMPs, or installation of new treatment BMPs) unless the requirement is waived through a Modification of Coverage. Ecology has made significant revisions to the Level 2 and 3 requirements in S8, based on public comments, including more Ecology involvement at Level 3 through the review of engineering reports for treatment systems that involve site specific design or sizing.

Final permit language for Condition S8.D is included in Response to Comment #41, on page 35.

Washington Refuse and Recycling Association

65.

The modification to S8. **Corrective Actions**
We believe that the changes of the deadline for completing Level 2 corrective measures is just not reflective of the true building/construction period available in which construction can take place in our state, specifically western Washington. Most Western Washington residents live by the saying "summer starts on July 5th", and that is true for the period of time for much of our construction activities as well. The losing of August and September for months to comply with a problem identified the previous year seems unrealistic to many of our companies.
Proposed Revisions
3. Pg 5 #4 Level 2 Deadline: The Permittees shall fully implement the revised SWPPP according to permit condition S3 and the applicable Stormwater Management Manual as soon as possible, but no later than August 30th the following year.
Reason: Footnote 4 and 5 has been deleted, thereby reducing the amount of exceedances that can be registered. To shorten or remove both the months of August and September, from the construction calendar in the rainy state of Washington is extremely burdensome on the facility owner. Many of the BMP's need a dry preparation and installation period i.e. painting, re-sealing, paving etc.

Response: Based on public comments, and consideration of 1) wet-weather construction constraints, 2) environmental impacts of working during the wet season (erosion, fish windows, wet weather paving, etc.), and 3) the potential for increased workload from Level 2 extension requests, Ecology has decided to implement the PCHB ruling by shortening the Level 2 deadline from September 30th to August 31st, and allowing facilities to implement a Level 3 corrective action in lieu of a Level 2 corrective action. Ecology also clarified that a Level 2 corrective action is not *required* if a permittee has triggered a Level 3 corrective action.

The final language is:

Level 2 Deadline: The Permittee shall fully implement the revised SWPPP according to Permit Condition S3 and the applicable *Stormwater Management Manual* as soon as possible, but no later than August 31st the following year[4].

a. If installation of necessary *Structural Source Control BMPs* is not feasible by August 31st the following year, *Ecology* may approve additional time, by approving a *Modification of Permit Coverage*.
b. If installation of *Structural Source Control BMPs* is not feasible or not necessary to prevent discharges that may cause or contribute to a violation of a water quality standard, *Ecology* may waive the requirement for additional *Structural Source Control BMPs* by approving a *Modification of Permit Coverage*.
c. To request a time extension or waiver, a Permittee shall submit a detailed explanation of why it is making the request (technical basis), and a *Modification of Coverage* form to *Ecology* in accordance with Condition S2.B, by May 15th prior to Level 2 Deadline. *Ecology* will approve or deny the request within 60 days of receipt of a complete *Modification of Coverage* request.
d. For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Washington Refuse and Recycling Association

66.

The Modification to S8.c.4 and S8.D.4

We believe that Ecology's proposed revisions allow some leeway for permitees that are still in the process of installing Level 2 and 3 Corrective Actions from an exceedance during the prior year. Specifically, proposed revisions state "Permittees do not trigger additional Level 2 or 3 Corrective Actions, if they are already implementing a Level 2 or 3 Corrective Action from a previous calendar year (for the same parameter) and the applicable deadline hasn't passed." This is a reasonable consideration, allowing permittees to complete Corrective Actions before additional penalties are incurred. However, many Corrective Actions will likely have a favorable impact on other parameters as well. We think that the exception to avoid additional penalties should not be limited to just the same parameter so long as the permittee can reasonable demonstrate that the Corrective Action being installed will have a favorable impact on the new parameter(s) that are exceeding limits.

Proposed Revisions

4. Pg. #6- Level 2 and Level 3 Corrective Actions: Permittees do not trigger additional Level 2 or 3 Corrective Actions, if they are already implementing a Level 2 or 3 Corrective Action from a previous calendar year (for the same parameter) and the applicable deadline hasn't passed. If additional parameters have triggered Corrective Action during the calendar year of a Corrective Action installation, and the permittee can demonstrate that those parameters can reasonably be expected to be addressed by the Corrective Action being installed, Ecology may grant an exception allowing sufficient time to determine if the Corrective Action is effective for the additional parameters.

[4] For Level 2 Corrective Actions triggered in 2011 and due in 2012, the Level 2 Deadline is September 30, 2012.

Response: Based on public comments, additional revisions have been made to clarify Ecology's intent that additional Level 2 or 3 corrective actions aren't triggered (accrued) during the calendar year following the calendar year that the permittee triggered a Level 2 or 3 corrective action. However, benchmark exceedances begin counting towards additional Level 2 or 3 corrective actions the year after the Level 2 or 3 deadline. An example is provided below.

The final language is:

S8.C.4.d:
For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

S8.D.5.d:
For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.

Example:

- Permittee exceeds zinc benchmark during 3 quarters in 2011, therefore a Level 3 corrective action must be completed by September 30, 2012.
- To allow a "time-out" period for the permittee to plan/install/monitor their Level 3 treatment BMPs in 2012, any zinc exceedances in 2012 do not trigger additional Level 2 or 3 corrective actions.
- If the permittee continues to exceed the zinc benchmark in 2013 (calendar year following Level 3 Treatment due date), another Level 3 corrective action is required by September 30, 2014.
- Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Weyerhaeuser

67.

S8.C.2. and D.2. – Level Two and Level Three Corrective Actions – The current permit language demands that "additional" BMPs be identified and implemented in pursuit of the goal of achieving the applicable benchmark values. This directive is counter to RCW 90.48.555(6) which states that, at all times, "all applicable and appropriate best management practices" be selected, implemented and maintained. Ecology needs to recognize that responsible Permittees have been adjusting their SWPPPs with an "adaptive management" approach for quite a number of years by now. At some point in the Corrective Action process a Permittee is likely to conclude that all applicable and appropriate BMPs have been implemented in the pursuit of the "goal" of achieving the benchmark value(s). As such, a demand for serial "addition" of BMPs may be hollow. The agency would more appropriately reference the "all applicable and appropriate" language.

Response: Ecology disagrees with the suggestion that S8.C.2 and D.2. are counter to RCW 90.48.555(6). Ecology believes Condition S8 contains an "enforceable adaptive management mechanism" that is consistent with the intent and requirements of the PCHB order and applicable state and federal water quality laws and regulations.

Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

Weyerhaeuser

68.

S8. C.5. and D.5. – Additional Corrective Action May Be Required – The subsection heading indicates additional corrective actions "may" be required; the section text says "must." What permit requirement does Ecology intend?
The comment offered above for S8.C.2. and D.2. applies to C.5. and D.5. as well.
S8. D.2. – The last sentence demands Level 3 Treatment BMPs or additional BMPs necessary to "meet" the goal of achieving the applicable benchmark value(s). The permitting concepts and language are really strained at this point (with no thanks to the PCHB). The permit pushes to treat benchmark values as numeric effluent limits, but not really as they are just goals, but then unending activity needs to continue if the goals are not consistently achieved (ala effluent limits). With this nuanced approach and outcome, Ecology needs to be prepared to accept Permittee judgments on BMP adequacy as equally credible as agency determinations.

Response: Based on public comments, additional revisions have been made to clarify Ecology's intent that additional Level 2 or 3 corrective actions aren't triggered (accrued) during the calendar year following the calendar year that the permittee triggered a Level 2 or 3 corrective action. However, benchmark exceedances begin counting towards additional Level 2 or 3 corrective actions the year after the Level 2 or 3 deadline. An example is provided below.
The final language is:

S8.C.4.d:
<u>For the year following the calendar year the permittee triggered a Level 2 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

S8.D.5.d:
<u>For the year following the calendar year the Permittee triggered a Level 3 corrective action, benchmark exceedences (for the same parameter) do not count towards additional Level 2 or 3 Corrective Actions.</u>

Example:

- Permittee exceeds zinc benchmark during 3 quarters in 2011, therefore a Level 3 corrective action must be completed by September 30, 2012.
- To allow a "time-out" period for the permittee to plan/install/monitor their Level 3 treatment BMPs in 2012, any zinc exceedances in 2012 do not trigger additional Level 2 or 3 corrective actions.

- If the permittee continues to exceed the zinc benchmark in 2013 (calendar year following Level 3 Treatment due date), another Level 3 corrective action is required by September 30, 2014.
- Waivers are available if a permittee can justify that additional treatment BMPs are not feasible or not necessary to prevent discharges that cause or contribute to violations of water quality standards.

APPENDIX G
MATERIAL SAFETY DATA SHEETS

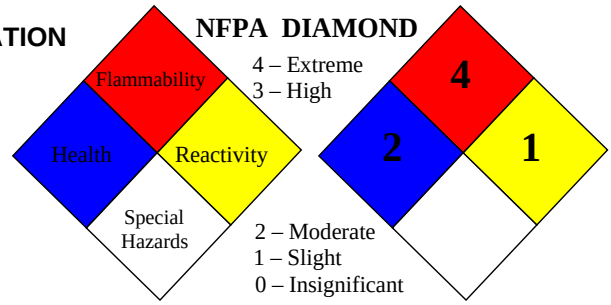
INCIDENTAL MATERIALS

The table below lists the incidental materials that are anticipated to be used and stored on site. Note that their manufacturers and trade names may differ after construction, but the types of products and their purposes are expected to be consistent with this list.

Product Trade Name	Manufacturer	MSDS Date	Max Amount On Site
Crude Oil: Bakken	Enbridge	6/8/2011	2.16 million bbl
Crude Oil: Generic	Tesoro	12/7/2012	
Crude Oil: Sour Heavy	Tesoro	2/2/2013	
Crude Oil: Sour Light	Tesoro	2/2/2013	
Crude Oil: Sweet Heavy	Tesoro	2/2/2013	
Crude Oil: Sweet Light	Tesoro	2/2/2013	
Cargill Sodium Chloride (salt)	Cargill	11/1/2012	500 lbs
CTI-220	Corrosion Technology	2/1/2011	110 gals
Diesel Low Sulfur and Ultra Low Sulfur Diesel	Tesoro	12/1/2011	500 gals
Mobil Actrel 1138L Cleaner	Exxon	11/21/2011	20 gals
Mobil Delvac Elite 15W-40	Exxon	6/1/2013	220 gals
Mobil Delvac Extended Life Antifreeze	Exxon	6/1/2013	275 gals
Mobil Grease CM-P	Exxon	6/1/2013	400 lbs
Mobil Grease XHP 462	Exxon	6/1/2013	120 lbs
Mobil Hydraulic AW 68	Exxon	6/1/2013	275 gals
Mobil Polyrex Eem	Exxon	6/1/2013	120 lbs
Nalco NexGuard 22310	Nalco	1/12/2011	310 gals
Nalco Tri-Act 1820	Nalco	4/5/2005	310 gals
Nalco 1720	Nalco	1/12/2011	310 gals
Nalco 8735	Nalco	1/21/2011	140 gals
PB Blaster	PB Blaster	6/1/2013	5 gals
Caprinus 40 Wt.	Shell	6/1/2013	275 gals
Mineral Spirits	Sunnyside	5/20/2005	20 gals
Simple Green Cleaner	Sunshine Makers, Inc.	1/1/2011	110 gals
Micro-Blaze CSR	Verde Environmental	1/1/2011	20 gals
WD-40	WD-40 Company	3/11/2010	5 gals

Material Safety Data Sheet

1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION



Manufacturer/Supplier: Enbridge Pipelines Inc.
10201- Jasper Avenue
Edmonton, Alberta T5J 3N7
CANADA
Product Name: Bakken Crude Oil
Synonyms: Hydrocarbons of Petroleum

General Information: 780-420-5306
Emergency Telephone Number (24 hrs): CHEMTREC 800-424-9300 USA
CANUTEC 613-996-6666 Canada
Date Prepared: 06/08/2011

2 – PRODUCT COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Number	Normal % * by Wt./Vol.	Occupational Exposure Limits (ppm)		
			OSHA	ACGIH	NIOSH
Petroleum Hydrocarbons	68919-39-1	100	N/A	N/A	N/A
1t,2-dimethylcyclopentane	28729-52-4	1.8	None	None	None
2-methylhexane	591-76-4	1.0	None	None	None
2-methylpentane	107-83-5	1.8	None	500	100
3-methylhexane	589-34-4	1.6	None	None	None
3-methylpentane	96-14-0	1.3	None	500	100
2-methylheptane	592-27-8	1.4	None	300	None
Benzene	71-43-2	0.4	1	0.5	0.1
cyclohexane	110-82-7	1.0	300	100	300
i-pentane	109-66-0	1.8	1000	600	120
methylcyclohexane	108-87-2	2.3	500	400	400
methylcyclopentane	96-37-7	2.2	None	None	None
n-butane	106-97-8	1.9	800	1000	800
n-heptane	142-82-5	3.4	500	400	85
n-Hexane	110-54-3	3.4	50	50	50
n-Pentane	109-66-0	3.4	600	600	120
n-octane	111-65-9	3.0	500	300	75

n-nonane	111-84-2	2.2	None	200	200
n-decane	124-18-5	2.0	None	None	None
n-undecane	1120-21-4	1.7	None	None	None
n-dodecane	112-40-3	1.5	None	None	None
n-tridecane	629-50-5	1.3	None	None	None
Toluene	108-88-3	0.9	100	20	100
Hydrogen sulfide	7783-06-4	<0.00001	$20^{Ceiling}$	1	$10^{Ceiling}$
Ethylbenzene	100-41-4	0.6	100	20	100
Xylenes	1330-20-7	0-5	100	100	100

* Values do not reflect absolute minimums and maximums; those values may vary from time to time.
N/A - Not Available

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3 – HAZARDS IDENTIFICATION

Flammability: Flammable liquid and vapor. Keep away from heat, sparks, flames or other sources of ignition (such as static electricity, pilot lights, mechanical/electrical equipment).
HMIS Classification for Flammability: 4

Stability: Stable under normal conditions. Avoid all sources of ignition.
HMIS Classification for Reactivity: 1

Potential Health Effects from Overexposure

Acute Effects:

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and central nervous system depression. Aspiration of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin Contact: Prolonged and repeated contact may cause defattting and drying of the skin and can lead to irritation and/or dermatitis.

Eye Contact: Liquid or vapor contact may cause mild eye irritation, including stinging, watering, redness and swelling. Hydrogen sulfide (H_2S) may cause burning or tearing and visual disturbances at repeated exposures above the TLV.

Inhalation: Prolonged or excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract and may lead to headache, nausea, drowsiness, fatigue, pneumonitis, pulmonary edema, CNS depression, coma and respiratory arrest.

Chronic Health Effects from Overexposures:

Skin and eye irritation. May affect the respiratory and central nervous systems.

Special Toxic Effects:

n-Hexane (CAS 110-54-3)

Target Organs – Excess exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesia of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone. Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Benzene (CAS 71-43-2)

Carcinogenicity: Benzene is a known animal carcinogen and is known to produce leukemia in humans. Benzene has been identified as a human carcinogen by NTP, IARC and OSHA.

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4 – FIRST AID MEASURES

Ingestion: Aspiration hazard. Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe damage. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration.

Skin Contact: Wipe material from skin and remove contaminated clothing. Cleanse affected areas thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser. If irritation or redness develops, seek medical attention.

Eye Contact: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water for 15 minutes, with eyelids held open. If symptoms persist, seek medical attention.

Inhalation: If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, qualified personnel should administer oxygen. Seek immediate medical attention.

Notes to Physician: Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.

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5 – Exposure Controls/ Personal Protection

Eye Protection: Safety glasses or goggles are recommended when there is a possibility of splashing or spraying.

Skin Protection: The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation. Depending on conditions, the use of an apron or chemical protective clothing may be necessary.

Respiratory Protection: A NIOSH certified air purifying respirator with an organic vapor cartridge may be used under conditions where airborne concentrations of hydrocarbons are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known or any other circumstances where air purifying respirators

may not provide adequate protection. A respiratory protection program that meets US OSHA's 29 CFR 1910.134, Canadian Labour Code Part II and ANSI Z88.2 requirements must be followed when workplace conditions warrant a respirator's use.

Engineering Controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

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6 – FIRE FIGHTING MEASURES

Flash Point:	< 40 °C	Lower Explosive Limit:	Not Established
Auto Ignition Temperature:	Not data available	Upper Explosive Limit:	Not Established

Basic Fire Fighting Procedures: Long-duration fires involving diluent stored in tanks may result in a boilover. The contents of the tank may be expelled beyond the containment dikes or ditches. All personnel should be kept back a safe distance when a boilover is anticipated (reference NFPA 11). For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant. Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

Extinguishing Media: Any extinguisher capable of handling Class B fires is recommended, including extinguishing media such as CO_2, dry chemical or foam. Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Firefighting should be attempted only by those who are adequately trained and equipped with proper personal protective equipment.

Unusual Fire and Explosion Hazards: This material is flammable and may be ignited by heat, sparks, flames or other sources of ignition (such as static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flashback or explode. May create vapor/air explosion hazard indoors, outdoors or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

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7 – ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.

Spill management: Wear appropriate breathing apparatus (if applicable) and protective clothing. A vapor suppressing foam may be used to reduce vapors. Try to work upwind of spill. Dike and contain land spills; contain water spills by booming. For large spills remove by mechanical means such as vacuuming or pumping and place in containers. All equipment used when

handling the product must be grounded. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids. Do not wash spills into sewers or other public water systems.

Reporting: Report spills to local or federal authorities as appropriate or required.

8 – HANDLING AND STORAGE

The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Do not enter confined spaces such as tanks or pits without following proper entry procedures. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.

Use appropriate grounding and bonding practices. Stores in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to hear, open flames, strong oxidizers or other sources of ignition. Do not cut drill, grind or weld on empty containers since they may contain explosive residues.

Harmful concentrations of hydrogen sulfide (H_2S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments. Stay upwind and vent open hatches before uploading.

Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear to brown liquid
Physical Form:	Liquid
Substance type (Pure/Mixture):	Mixture
Boiling Temperature:	94 to 1330 ºF
Melting Temperature:	Not determined
Vapor Pressure:	about 7.47 psi
Vapor Density:	1.0 - 3.9
Evaporation Rate:	(Ethyl ether =1) >1
Specific Gravity:	0.82
Water Solubility:	Negligible
pH:	Not determined
Viscosity:	5.43 mm^2/s
Color:	Clear to brown
Odor:	Rotten egg, petroleum like odor

10 – STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity.
CHEMICAL STABILITY:	Stable at 70 °F, 760 mmHg pressure.
HAZARDOUS DECOMPOSITION PRODUCTS:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
HAZARDOUS POLYMERIZATION:	Will not occur
INCOMPATIBILITY:	Strong oxidizers such as nitrates, chlorates, peroxides.

11 – TOXICOLOGICAL INFORMATION– CHRONIC AND ACUTE HEALTH HAZARDS

This product contains aliphatic naphatha at a level of >0.1%. Lifetime skin painting studies in mice with similar naphthas have shown wither negative or very weak dermal carcinogenic activity following prolonged and repeated skin contact. Some other petroleum fractions that show carcinogenic activity when tested at nonirritating dose levels did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chromic irritation and not dose. Some components of aliphatic naphthas, i.e., paraffins and olefins, have been shown to produce a species specific, sex hormonal dependent kidney damage develops via the formation of alpha-2u-globulin, a mechanism unique to the male rat. Humans do not for alpha-2u-globulin; therefore, the kidney effects resulting from this mechanism are not relevant in humans.

This product contains benzene at a level of 0.1%. Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

Hydrogen sulfide gas (H_2S) is toxic by inhalation. Prolonged breathing of 50-100 ppm H_2S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respectively. Over the years a number of acute cases of H_2S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

This product may contain hexane at a level of >1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.

This product may contain xylenes at a level of >1.0%. Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals, Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.

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12 – DISPOSAL INFORMATION

Container contents should be completely used and containers should be emptied prior to discard. Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities. This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law

requires disposal at a licensed hazardous waste disposal facility. This product could also contain benzene at >0.5 ppm and could exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.

13 – ENVIRONMENTAL INFORMATION

Spill or Release to the Environment: Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended. Stay upwind and away from spill/release. Notify persons downwind of spill/release, isolate immediate hazard area and keep unauthorized personnel out. Product may release large amounts of flammable vapors (e.g., methane, ethane and propane) at or below ambient temperature depending on source and process conditions. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory equipment as conditions warrant. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment drainage systems and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state (provincial) and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount into navigable waters, notify appropriate federal, state (provincial) and local agencies.

Sara Title III Information: This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Toluene	CAS – 108-88-3	Weight % - 0 – 2%
n-Hexane	CAS – 110-54-3	Weight % - up to 11%
Benzene	CAS – 71-43-2	Weight % - 0 – 2%

14 – REGULATORY INFORMATION

USA: All of the components of this product are on the Toxic Substances Control Act (TSCA) Chemical Inventory.

Canada: All the components of this product are on the Canadian Domestic Substances List (DSL), or have been notified under the New Substances Notification Regulations, but have not yet been published in the Canada Gazette.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Classification:	Class B2 Flammable Liquids Class D2B Other Toxic Effects - Skin Irritant Class D2A Other Toxic Effects – Embryotoxic/Fetotoxic
US EPA Reportable Quantity:	The estimated reportable quantity (RQ) for this material is based on the weight % shown below:
RQ based on benzene –	The RQ for benzene is 10 pounds, which equals 3,333 pounds of natural gas condensate (556 gallons). The RQ is based on 0.3 wt. % benzene.
RQ based on n-Hexane –	The RQ for n-Hexane is 5000 pounds, which equals 50,000 pounds of natural gas condensate (8,333 gallons). The RQ is based on 10 wt. % n-Hexane.
RQ based on toluene –	The RQ for toluene is 1000 pounds, which equals 50,000 pounds of natural gas condensate (8,333 gallons). The RQ is based on 2 wt. % toluene.

15 – SPECIAL PRECAUTIONS / SUPPLEMENTAL INFORMATION

Keep containers tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces and all sources of ignition. Post area “No Smoking or Open Flame”. Store only in approved containers. Keep away from any incompatible material. Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet US OSHA standards, Canadian Labour Codes and other appropriate fire codes.

Depending on the source of natural gas condensate, there could be some amount of NORM (naturally occurring radioactive materials) in the scale, deposit and sludge associated with this material. Proper measurements should be taken prior to handling this material or any equipment contaminated with this material. If NORM is indicated, refer to API Bulletin E2, “Bulletin on Management of Naturally Occurring Radioactive Materials in Oil and Gas Production,” for additional information.

Empty Containers: “Empty” containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks or other sources of ignition. They may explode and cause injury or death. “Empty” drums should be completely drained, properly bunged and promptly shipped to the supplier or a drum re-conditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1 and other governmental and industrial references pertaining to cleaning, repairing, welding or other contemplated operations.

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16 – TRANSPORTATION REQUIREMENTS

General Transportation Information:

DOT Proper Shipping Name (49 CFR 172.101):	Petroleum Crude Oil
DOT Hazard Classes (49 CFR 172.101):	3
UN/NA Code (49 CFR 172.101):	UN1267
Packing Group (49 CFR 172.101):	II
Bill of Lading Description (49 CFR 172.202):	Petroleum Crude Oil
DOT Labels Required (49 CFR 172.101):	Flammable Liquid

Please note that the actual shipping name and associated data can vary due to the properties of the product. Other acceptable shipping names may include Petroleum Distillate n.o.s. 1268, Gasoline UN1203, Flammable liquids, n.o.s. (pentane) UN1993 or Hydrocarbons, Liquid n.o.s. (condensate) UN3295.

PREPARED BY: Enbridge Pipelines Inc.

Disclaimer

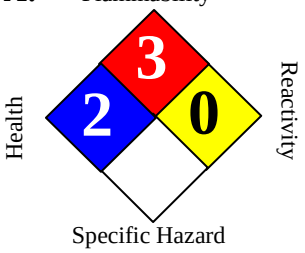
The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet (MSDS). However, MSDS’s may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
m^3	Cubic meter
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
n.o.s.	Not Otherwise Specified
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
REL	Recommended Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average

Safety Data Sheet
Crude Oil

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude Oil			
Synonyms	:	Sour Crude Oil, Sweet Crude Oil, Light Crude Oil, Heavy Crude Oil, Generic Crude Oil, 888100008800			
SDS Number	:	888100008800	**Version**	:	1.7
Product Use Description	:	Refining feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications

Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word **Danger**

Hazard Statements

Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.

Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
N-hexane	110-54-3	0 - 1.5%
Hydrogen Sulfide	7783-06-4	Variable

Sulfur	7704-34-9	Trace - 5%
Benzene	71-43-2	0.1 - 3%
Cumene	98-82-8	Variable Trace < 1%
Naphthalene	91-20-3	Variable Trace < 1%
Xylene	1330-20-7	Variable Trace < 1%
Ethylbenzene	100-41-4	Variable Trace < 1%
Polycyclic Aromatic Compounds		Variable
Toluene	108-88-3	Variable Trace < 1%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_AL	0.5 ppm
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
	Cumene	98-82-8	TWA	50 ppm
	Ethylbenzene	100-4-4	TWA	100 ppm
	Naphthalene	91-20-3	TWA	10 ppm
	Toluene	108-88-3	TWA	200 ppm
	Xylenes	1330-20-7	TWA	100 ppm

			Ceiling	300 ppm
	Polycyclic Aromatic Compound (Benzene Soluble)		TWA	0.2 mg/m3
ACGIH	N-hexane	110-54-3	TWA	50 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Cumene	98-82-8	TWA	50 ppm
	Ethylbenzene	100-4-4	TWA	50 ppm
		100-4-4	STEL	125 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Toluene	108-88-3	TWA	20 ppm
	Xylenes	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Polycyclic Aromatic Compound (Benzene Soluble)		TWA	0.2 mg/m3

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection : Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Typical is a thick, dark yellow to brown or greenish black liquid
Odor		Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold		Odor threshold varies with the composition of the crude oil
pH		Not applicable
Melting point/freezing point		-30° to 30°C has been reported as a pour point
Initial boiling point & range		Distillation is typically not performed above 300°C at atmospheric pressure
Flash point		-7 to 75°C
Evaporation rate		Higher initially and declines if lighter components evaporate
Flammability (solid, gas)		Flammable gas or vapors released by liquid
Upper explosive limit		Varies with composition but typical is approximately 7%
Lower explosive limit		Varies with composition but typical is approximately 0.7%
Vapor pressure		6 to 45 kPa
Vapor density (air = 1)		No data available
Relative density (water = 1)		0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)		1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)		2 to > 6 as log Pow
Auto-ignition temperature		Varies with composition
Decomposition temperature		Will evaporate or boil and possibly ignite before decomposition occurs
Kinematic viscosity		5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.

Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation : May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Ingestion Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Skin irritation Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.

Eye irritation Irritating to eyes.

Chronic exposure This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component:

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg

		Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

		Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h

Skin irritation: Classification: Irritating to skin.
Result: Skin irritation

Eye irritation: Classification: Irritating to eyes.
Result: Mild eye irritation

Teratogenicity: N11.00418960

Carcinogenicity

NTP	: Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h
Sulfur	7704-34-9	Acute and prolonged toxicity for aquatic invertebrates: EC0 Species: Daphnia magna (Water flea) Dose: > 10,000 mg/l Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 353
Packing instruction (passenger aircraft)	: Y341

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Fire Hazard Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
Xylene	1330-20-7

Components	CAS-No.
hydrogen sulfide	7783-06-4

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
Xylene	1330-20-7

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	
Xylene	

California Prop. 65	:	WARNING! This product contains a chemical known to the State of California to cause cancer. Benzene 71-43-2 WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Benzene 71-43-2 Toluene 108-88-3

SECTION 16. OTHER INFORMATION

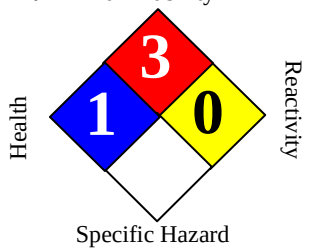
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 12/07/2012

Safety Data Sheet
Crude oil, sour heavy

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, sour heavy			
Synonyms	:	Sour Crude, Crude Oil Sour, RS294, 0000002670, 888100005182			
SDS Number	:	888100005182	**Version**	:	1.8
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.

May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	80 - 85%
Benzene	71-43-2	5 - 7%
Toluene	108-88-3	5 - 7%
Ethylbenzene	100-41-4	5 - 7%
Xylene	1330-20-7	5 - 7%

Hydrogen Sulfide	7783-06-4	< 0.5%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If not breathing, give artificial respiration. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Seek medical advice if symptoms persist or develop. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Dangerous fire and explosion hazard when exposed to heat, sparks or flame. Do not allow liquid runoff to enter sewers or public waters.

Special protective equipment for fire-fighters : Firefighters should wear self-contained breathing apparatus and full protective clothing as need for protection from heat and airborne combustion products. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.

Further information : Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Additional advice : Inform the responsible authorities in case of leakage, or of entry into waterways, soil or drains.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". Hydrogen sulfide may accumulate in tanks and bulk transport compartments. Consider appropriate respiratory protection (see Section 8). Stand upwind. Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated and gas tested prior to entry.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Toluene	108-88-3	TWA	50 ppm
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Xylene	1330-20-7	TWA	100 ppm

		1330-20-7	STEL	150 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended.

Skin and body protection : Chemical protective clothing such as DuPont Tyvek QC, TyChem® or equivalent, recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : If hydrogen sulfide concentration may exceed permissible exposure limit, a positive-pressure SCBA or Type C supplied air respirator with escape bottle is required as respiratory protection. If hydrogen sulfide concentration is below H2S permissible exposure limit a NIOSH/ MSHA-approved air-purifying respirator with acid gas cartridges may be acceptable for odor control, but continuous air monitoring for H2S is recommended. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures : Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Consider disposal of contaminated clothing rather than laundering to prevent the formation of flammable vapors which could ignite via washer or dryer.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Typical is a thick, dark yellow to brown or greenish black liquid

Odor Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.

Odor threshold Odor threshold varies with the composition of the crude oil

pH Not applicable

Melting point/freezing point -30° to 30°C has been reported as a pour point

Initial boiling point & range Distillation is typically not performed above 300°C at atmospheric pressure

Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)	2 to > 6 as log Pow
Auto-ignition temperature	Varies with composition
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5

	minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion	Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation	Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact
Eye irritation	Irritating to eyes.
Chronic exposure	This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.
Target organs	Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit

Dose: 2,001 mg/kg
Acute inhalation toxicity: LC50 rat
Dose: 171.6 mg/l
Exposure time: 4 h
Skin irritation: Classification: Irritating to skin.
Result: Skin irritation
Eye irritation: Classification: Irritating to eyes.
Result: Mild eye irritation
Teratogenicity: N11.00418960

Carcinogenicity :

NTP Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)

IARC Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9)
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)
Ethylbenzene (CAS-No.: 100-41-4)

OSHA Benzene (CAS-No.: 71-43-2)

CA Prop 65 WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene (CAS-No.: 108-88-3)
Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene 108-88-3

Toxicity to fish:
LC50
Species: Carassius auratus (goldfish)
Dose: 13 mg/l
Exposure time: 96 h

Acute and prolonged toxicity for aquatic invertebrates:
EC50
Species: Daphnia magna (Water flea)
Dose: 11.5 mg/l
Exposure time: 48 h

Toxicity to algae:
IC50
Species: Selenastrum capricornutum (green algae)
Dose: 12 mg/l
Exposure time: 72 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 366
Packing instruction (cargo aircraft)	: Y344

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 355
Packing instruction (passenger aircraft)	: Y344

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply**.**

CERCLA Reportable Quantity : 118 lbs

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
Ethylbenzene	100-41-4
Toluene	108-88-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known in the State of California to cause cancer.

Ethylbenzene	100-41-4
Benzene	71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

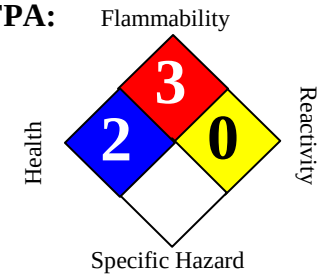
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude oil, sour light

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, sour light			
Synonyms	:	Hydrogen sulfide crude; hydrogen sulfide oil; crude oil; sealed oil; separator crude; sour crude; sour oil, petroleum, RS294, 0000002670, 888100005161			
SDS Number	:	888100005161	**Version**	:	1.3
Product Use Description	:	Refining feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.

Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
N-hexane	110-54-3	0 - 1.5%
Hydrogen Sulfide	7783-06-4	Highly Variable

Sulfur	7704-34-9	1 - 1.5%
Benzene	71-43-2	0.1 - 3%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_AL	0.5 ppm
OSHA Z1	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
OSHA Z1	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	N-hexane	110-54-3	TWA	50 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1ppm
		7783-06-4	STEL	5 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection	:	Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.
Respiratory protection	:	A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Typical is a thick, dark yellow to brown or greenish black liquid
Odor	Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold	Odor threshold varies with the composition of the crude oil
pH	Not applicable
Melting point/freezing point	-30° to 30°C has been reported as a pour point
Initial boiling point & range	Distillation is typically not performed above 300°C at atmospheric pressure
Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
	2 to > 6 as log Pow

Partition coefficient (n-octanol/water)	Varies with composition
Auto-ignition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Decomposition temperature	5 to > 1300 mm²/s at 38°C
Kinematic viscosity	

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion	Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation	Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been

reported from prolonged or repeated skin contact.

Eye irritation Irritating to eyes.

Chronic exposure This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component:

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

		Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h
Sulfur	7704-34-9	Acute and prolonged toxicity for aquatic invertebrates: EC0 Species: Daphnia magna (Water flea) Dose: > 10,000 mg/l Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 353
Packing instruction (passenger aircraft)	: Y341

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status : On TSCA Inventory

DSL Status : All components of this product are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 104 lbs

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.
hydrogen sulfide	7783-06-4

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

Benzene 71-43-2

WARNING! This product contains a chemical known to the State of California to

cause birth defects or other reproductive harm.

Benzene	71-43-2

SECTION 16. OTHER INFORMATION

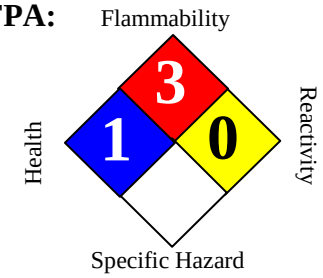
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude Oil, Sweet Heavy

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude Oil, Sweet Heavy			
Synonyms	:	Sweet Heavy Crude Oil, RS295, 888100005156			
SDS Number	:	888100005156	**Version**	:	1.3
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway Drive, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See

Section 11.

Precautionary statements

Prevention : Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses,
if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
Toluene	108-88-3	0 - 7%
N-hexane	110-54-3	0 - 5%
Benzene	71-43-2	0.1 - 3%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. If symptoms persist, seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers..

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Toluene	108-88-3	TWA	50 ppm
	N-hexane	110-54-3	TWA	50 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Hydrogen Sulfide	7783-06-4	PEL	1 ppm
			STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection : Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or

		canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Typical is a thick, dark yellow to brown or greenish black liquid
Odor		Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold		Odor threshold varies with the composition of the crude oil
pH		Not applicable
Melting point/freezing point		-30° to 30°C has been reported as a pour point
Initial boiling point & range		Distillation is typically not performed above 300°C at atmospheric pressure
Flash point		-7 to 75°C
Evaporation rate		Higher initially and declines if lighter components evaporate
Flammability (solid, gas)		Flammable gas or vapors released by liquid
Upper explosive limit		Varies with composition but typical is approximately 7%
Lower explosive limit		Varies with composition but typical is approximately 0.7%
Vapor pressure		6 to 45 kPa
Vapor density (air = 1)		No data available
Relative density (water = 1)		0.9 to 1.0 g/mL is typical at 15°C
Solubility (in water)		1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)		2 to > 6 as log Pow
Auto-ignition temperature		Varies with composition
Decomposition temperature		Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity		5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability		Stable under normal conditions.
Possibility of hazardous reactions		Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid		Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products		Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	:	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion		Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation		Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.
Eye irritation		Irritating to eyes.
Chronic exposure		This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.

Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity :

NTP
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)

IARC
Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9)
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)
Ethylbenzene (CAS-No.: 100-41-4)

OSHA
Benzene (CAS-No.: 71-43-2)

CA Prop 65
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene (CAS-No.: 108-88-3)
Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h
N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: III

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: III

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: I1I
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 366
Packing instruction (cargo aircraft)	: Y344

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: III
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 355
Packing instruction (passenger aircraft)	: Y344

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: III
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Fire Hazard Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 111 lbs

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

benzene 71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

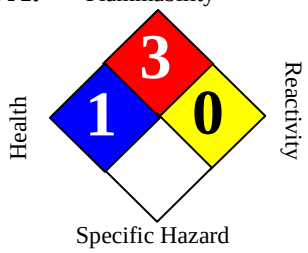
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude oil, light sweet

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, light sweet			
Synonyms	:	Petroleum Crude Oil, Crude Sweet, 888100005188			
SDS Number	:	888100005188	**Version**	:	1.3
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See

Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	80 - 85%
Benzene	71-43-2	5 - 7%
Toluene	108-88-3	5 - 7%
Ethylbenzene	100-41-4	5 - 7%

Xylene	1330-20-7	5 - 7%
Hydrogen Sulfide	7783-06-4	< 0.5%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If not breathing, give artificial respiration. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Seek medical advice if symptoms persist or develop. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Dangerous fire and explosion hazard when exposed to heat, sparks or flame. Do not allow liquid runoff to enter sewers or public waters.

Special protective equipment for fire-fighters : Firefighters should wear self-contained breathing apparatus and full protective clothing as need for protection from heat and airborne combustion products. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.

Further information : Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems, unless system is designed and permitted to

handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Additional advice : Inform the responsible authorities in case of leakage, or of entry into waterways, soil or drains.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". Hydrogen sulfide may accumulate in tanks and bulk transport compartments. Consider appropriate respiratory protection (see Section 8). Stand upwind. Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated and gas tested prior to entry.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Toluene	108-88-3	TWA	50 ppm

	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended.

Skin and body protection : Chemical protective clothing such as DuPont Tyvek QC, TyChem® or equivalent, recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : If hydrogen sulfide concentration may exceed permissible exposure limit, a positive-pressure SCBA or Type C supplied air respirator with escape bottle is required as respiratory protection. If hydrogen sulfide concentration is below H2S permissible exposure limit a NIOSH/ MSHA-approved air-purifying respirator with acid gas cartridges may be acceptable for odor control, but continuous air monitoring for H2S is recommended. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures : Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Consider disposal of contaminated clothing rather than laundering to prevent the formation of flammable vapors which could ignite via washer or dryer.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Typical is a thick, dark yellow to brown or greenish black liquid

Odor Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.

Odor threshold Odor threshold varies with the composition of the crude oil

pH Not applicable

Melting point/freezing point	-30° to 30°C has been reported as a pour point
Initial boiling point & range	Distillation is typically not performed above 300°C at atmospheric pressure
Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)	2 to > 6 as log Pow
Auto-ignition temperature	Varies with composition
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of

reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Ingestion

Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Skin irritation

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.

Eye irritation

Irritating to eyes.

Chronic exposure

This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs

Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component :

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation

		Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 353
Packing instruction (passenger aircraft)	: Y341

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status : On TSCA Inventory

DSL Status : All components of this product are on the Canadian DSL list.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 118 lbs

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
Ethylbenzene	100-41-4
Toluene	108-88-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known in the State of California to cause cancer.

Ethylbenzene 100-41-4

Benzene	71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Material Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Chemical Product Name	Sodium Chloride (Salt), Compressed
Chemical Family	Alkali Metal/Halide
Chemical Name	Sodium Chloride
Formula	NaCl
Molecular Weight	58.44
Commercial Name	Diamond Crystal® Bright & Soft™ Salt Pellets

Manufacturer
Cargill Incorporated
Salt Division
P. O. Box 5621
Minneapolis, MN 55440
(800) 377-1017

Emergency Telephone Numbers
CHEMTREC (800) 424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

Description
Compressed white pellets.

Ingredient Name / **CAS Number**	**Exposure Limits**	**Concentration (%)**
Sodium Chloride 7647-14-5		99.97%
Sodium Hexametaphosphate 10124-56-8		0.03%

3. HAZARDS INDENTIFICATION

EMERGENCY OVERVIEW

HMIS Health: 1, Flammability: 0, Reactivity: 0, Protective Equipment: A

Potential Health Effects

Route(s) Of Entry: Ingestion, skin/eye contact, inhalation.

Human Effects and Symptoms of Overexposure:

Acute Inhalation: Irritation of the respiratory tract.

Chronic Inhalation: No applicable information found for chronic systemic effects

Acute Skin Contact: Large amounts can cause irritation and if applied to damaged skin, absorption can occur with effects similar to those via ingestion.

Chronic Skin Contact: No applicable information found for chronic systemic effects.

Acute Eye Contact: Irritation with burning and tearing (salt concentrations greater than the normal saline present).

Chronic Eye Contact: No applicable information found for chronic systemic effects.

Acute Ingestion: Intake of large amounts has generally occurred for deliberate reasons: suicide, absorption, and to induce vomiting. The following effects were observed; nausea and vomiting, diarrhea, cramps, restlessness, irritability, dehydration, water retention, nose bleed, gastrointestinal tract damage, fever, sweating, sunken eyes, high blood pressure, muscle weakness, dry mouth and nose, shock, cerebral (fluid on brain) or pulmonary edema (fluid in lungs), blood cell shrinkage, and brain damage (due to dehydration of brain cells). Death is generally due to cardiovascular collapse or CNS damage. Less than a few grams would not be harmful. For larger quantities, drink large amounts of water or milk.

Chronic Ingestion: No applicable information found for chronic systemic effects.

Carcinogenicity

NTP: Not listed as a carcinogen or mutagen.
IARC: Not listed as a carcinogen or mutagen.
OSHA: Not listed as a carcinogen or mutagen.

Medical Conditions Aggravated by Exposure: In some cases of confirmed hypertension, ingestion may result in elevated blood pressure.

4. FIRST AID MEASURES

First Aid For Eyes: For eye contact, flush with water immediately, lifting eyelids occasionally.

First Aid For Skin: Remove clothing from affected area. Wash skin thoroughly. Rinse carefully.

First Aid For Inhalation: If person breathes large quantities, remove to fresh air at once. If breathing stops, apply artificial respiration immediately.

First Aid For Ingestion: Less than a few grams would not be harmful. For larger quantities, drink large amounts of water or milk.

5. FIRE AND MEASURES

Flash Point: N/A

Extinguishing Media: N/A. This product is nonflammable.

Special Fire Fighting Procedures: N/A.

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak Procedures: Contain spills to prevent contamination of water supply or sanitary sewer system. Vacuum or sweep into containers for proper disposal.

7. HANDLING AND STORAGE

Storage Temperature (min./max.): Avoid humid or wet conditions as product will cake and become hard.

Special Sensitivity: Avoid contact with strong acids.

Handling and Storage Precautions: Becomes hygroscopic at 70% Relative Humidity

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection Requirements: Eyeglasses or goggles should be worn in dusty areas.

Skin Protection Requirements: Protective clothing may be worn in dusty areas, but is generally not required.

Respiratory/Ventilation Requirements: NIOSH/MSHA approved respirator for particulates.

Exposure Limits: Not listed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form: White crystalline solid with slight halogen odor.

Color: White crystalline solid

Odor: Halogen odor

Boiling Point (760mm Hg) (^{O}C): 760 mm Hg. 1465 degrees C.

Melt Point/Freeze Point (^{O}C): 801 degrees C.

PH: 6.7 - 7.3

Solubility In Water (g/cc, %): 26.4%

Specific Gravity (H_20=1): 2.16 (H_2O)

Bulk Density: 53-83 Lbs/Ft^3

% Volatile By Weight: N/A

Vapor Pressure (mm Hg/747^{O}C): = 2.4

Vapor Density (Air=1): (Air=1) N/A

10. REACTIVITY

Stability: Stable

Incompatibilities: Avoid contact with strong acids. Becomes corrosive to metals when wet.

Decomposition Products: May evolve chlorine gas when in contact with strong acids.

11. TOXICOLOGICAL INFORMATION

Description: Not Listed

12. ECOLOGICAL INFORMATION

Ecotoxicity: Not Listed.

Environmental Degradation: Not Listed.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method: Follow applicable Federal, state and local regulations.

14. TRANSPORTATION INFORMATION

D.O.T. Shipping Name: Not Listed

Technical Shipping Name: Not Listed

D.O.T Hazard Class: Not Listed

U.N./N.A. Number: Not Listed

Product Rq (lbs.): N/A

D.O.T. Label: Not Listed

D.O.T. Placard: N/A

Freight Class Bulk: N/A

Freight Class Package: N/A

Product Label: N/A

15. REGULATORY INFORMATION

OSHA Status: Not Listed

TSCA Status: Listed as non hazardous.

Cercla reportable Quantity
SARA Title III
Section 302 Extremely
Hazardous Substances: Not Listed

Section 311/312
Hazard categories: Not Listed

Section 313
Toxic Chemicals: Not Listed

RCRA Status: Not Listed

HMIS: 1 0 0 A

State Regulatory Information

Component Name /CAS Number	Concentration	State-Code
N/A		

16. OTHER INFORMATION

Reason For Issue: Regulatory Compliance
Prepared By: Steve Karl
Approved By: Sarah Hubert
Title: Director-Quality Administration
Approval Date: November 2012
Supersedes Date:
MSDS Number: ND14

Disclaimer: All statements, technical information and recommendations contained herein are, the best of our knowledge, reliable and accurate; however no warranty, either expressed or implied is made with respect thereto, nor will any liability be assumed for damages resultant from the use of the material described.

It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations. It is also the responsibility of the user to maintain a safe workplace. The user should consider the health hazards and safety information provided herein as a guide and should take the necessary steps to instruct employees and to develop work practice procedures to ensure a safe work environment.

This information is not intended as a license to operate under, or a recommendation to practice or infringe upon any patent of this Company or others covering any process, composition of matter or use.

Material Safety Data Sheet

IDENTITY	Other Common Names:
CTI - 220	Cleaning Compound

HAZARD RATING SCALE: 4=Extreme; 3=High; 2=Moderate; 1=Insignificant
Toxicity = 1 Fire = 2 Reactivity = 0

Section I

Distributor's name	Emergency Telephone Number: 800-535-5053	
Corrosion Technology, Inc.	Telephone Number for Information: 610-429-1450	
125 Willowbrook Lane	Fax Number: 610-429-1473	
West Chester, PA 19382	Prepared By: James Kent	Date Prepared: FEB 2011

Section II—Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	%	CAS No.	PEL/TLV
Aromatic hydrocarbon	>35	64742-95-6	not established
Naphthalene	<4	91-20-3	TWA of 10 ppm
1,2,4 Trimethylbenzene	<1	95-63-6	TWA of 25 ppm
Potassium Hydroxide	<5	1310-58-3	PEL/TLV 2mg/mg3

Section III—Physical/Chemical Characteristics

Boiling Point (o F)	220 to 400	Specific Gravity (H_20 = 1)	.99
Vapor Pressure (mm Hg)	ND	Melting Point	N/A
Vapor Density (AIR = 1)	N/A	% Volatile	80%

Solubility in Water: emulsifies

Appearance and Odor: clear liquid with aromatic odor

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	160° F TCC	Flammable Limits	LEL ND	UEL ND

Extinguishing Media: Dry chemical, carbon dioxide, halon, foam or water spray is recommended.

Special Fire Fighting Procedures

Wear appropriate protective equipment including respiratory protection as conditions warrant. Water spray may be useful in minimizing vapors and cooling containers exposed to heat and flame.

Unusual Fire and Explosion Hazards

This material is combustible and may be ignited by sparks, flame or other sources of ignition.

Section V—Reactivity Data

Stability	Unstable	☐	Conditions to Avoid N/A
	Stable	☒	

Incompatibility *(Materials to Avoid)*: Strong acids, bases or oxidizing agents.

Hazardous Decomposition or Byproducts: Thermal decomposition may yield carbon monixide and/or carbon dioxide.

Hazardous Polymerization	May Occur	☐	Conditions to Avoid N/A
	Will Not Occur	☒	

Section VI—Health Hazard Data

Acute: Skin & Eye Irritant

Chronic: None Known

Signs and Symptoms of Exposure

INHALATION: Excessive concentration of vapors or mists may cause irritation of nose & throat and signs of nervous system depression (e.g. drowsiness, dizziness, fatigue)

SKIN: Skin irritant; prolonged or repeated contact may cause redness, burning , cracking of the skin

EYES: Eye irritant; contact with the liquid or exposure to vapors or mists may cause burning, tearing, and redness.

INGESTION: May cause irritation of digestive tract, and signs of nervous system depression.

Medical Conditions
Generally Aggravated by Exposure

Respiratory symptoms associated with pre-existing lung disorders (asthma- like conditions) may be aggravated by exposure.

Listed as potential Carcinogen? IARC? No

National Toxicology Program? No

Emergency and First Aid Procedures

INHALATION: If affected, remove person to fresh air. Seek medical assistance if irritation persists.

SKIN: Remove contaminated clothing and flush area with soap & water. Seek medical attention if irritation occurs.

EYES: If irritation from exposure develops, move victim away from exposure into fresh air. For direct contact, flush with water for 15 minutes. Seek medical attention.

INGESTION: Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious, place on the left side with the head down. If possible, do not leave victim unattended. Seek medical attention immediately.

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Flush with water into retaining area or container. Avoid exposure to sparks, fire or hot metal surfaces. Small spills can be absorbed on suitable oil absorbent. Wear appropriate protective equipment. Do not allow to enter sewers or streams.

Waste Disposal Method Dispose of in accordance with all local, state and federal regulations.

Precautions to Be Taken in Handling and Storing Keep away from heat, sparks and open flames. Use with adequate ventilation. Keep out of reach of children. Keep containers tightly closed when not in use. Store in area with good ventilation. Wash thoroughly after use. "Empty containers" contain residue and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, or sparks.

Section VIII—Control Measures

Respiratory Protection *(Specify Type)*

Self contained breathing apparatus for concentrations above exposure limits.

Ventilation	Local Exhaust ☐	Special	
	Mechanical *(General)* ☐	Other	If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional ventilation or exhaust systems may be required.

Protective Gloves rubber or neoprene

Eye Protection goggles and /or face shield

Other Protective Clothing or Equipment rubber apron, eye wash and safety shower.

Work/Hygienic Practices

N/A = Not Applicable **ND = Not Determined** **< = Less Than** **> = Greater Than**

The information provided in this Material Safety Data Sheet has been obtained from sources believed to be reliable and is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control. All risks of use of the product are therefore assumed by the user and we expressly disclaim all warranties of every kind and nature, including warranties of merchantability and fitness for a particular purpose in respect to the use or suitability of the product.

Material Safety Data Sheet
Diesel Low Sulfur (LSD) and Ultra Low Sulfur Diesel (ULSD)

NFPA:

TESORO

HMIS III:

HEALTH	1
FLAMMABILITY	2
PHYSICAL	0

0 = Insignificant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Diesel Low Sulfur (LSD) and Ultra Low Sulfur Diesel (ULSD)			
Synonyms	:	CARB Diesel, 888100004478			
MSDS Number	:	888100004478	**Version**	:	2.19
Product Use Description	:	Fuel			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Regulatory status : This material is considered hazardous by the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200).

Signal Word : WARNING

Hazard Summary : Toxic. Combustible Liquid

Potential Health Effects

Eyes : Eye irritation may result from contact with liquid, mists, and/or vapors.

Inhalation : Vapors or mists from this material can irritate the nose, throat, and lungs, and can cause signs and symptoms of central nervous system depression, depending on the concentration and duration of exposure.

Skin : Skin irritation leading to dermatitis may occur upon prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Long-term, repeated skin contact may cause skin cancer

Ingestion : Harmful or fatal if swallowed. Do NOT induce vomiting. This material can irritate the mouth, throat, stomach, and cause nausea, vomiting, diarrhea and restlessness Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death.

Target Organs : Central nervous system, Eyes, Skin, Kidney, Liver

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6	100%
Nonane	111-84-2	0 - 5%
Naphthalene	91-20-3	0 - 1%
1,2,4-Trimethylbenzene	95-63-6	0 - 2%
Xylene	1330-20-7	0 - 2%
Sulfur	7704-34-9	15 ppm maximum

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Give oxygen. If breathing is irregular or stopped, administer artificial respiration. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Wash contaminated clothing before re-use. If skin irritation persists, seek medical attention immediately.

Eye contact : Remove contact lenses. Rinse thoroughly with plenty of water for at least 15 minutes. If symptoms persist, seek medical attention.

Ingestion : Do not induce vomiting without medical advice. If a person vomits when lying on his back, place him in the recovery position. Seek medical attention immediately.

Notes to physician : Symptoms: Dizziness, Discomfort, Headache, Nausea, Disorder, Vomiting, Lung edema, Aspiration may cause pulmonary edema and pneumonitis, Liver disorders, Kidney disorders.

SECTION 5. FIRE-FIGHTING MEASURES

Form : Liquid

Flash point : 38℃ Minimum for #1 Diesel, 52℃ Minimum for #2 Diesel

Auto Ignition temperature : 257 ℃ (495 ℉)

Lower explosive limit : 0.6 %(V)

Upper explosive limit : 4.7 %(V)

Suitable extinguishing media : Carbon dioxide (CO2), Water spray, Dry chemical, Foam, Keep containers and surroundings cool with water spray.

Specific hazards during fire fighting : Fire Hazard Do not use a solid water stream as it may scatter and spread fire. Cool closed containers exposed to fire with water spray.

Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus and protective suit. Use personal protective equipment.
Further information	:	Exposure to decomposition products may be a hazard to health. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact. Ensure adequate ventilation. Use personal protective equipment.
Environmental precautions	:	Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection. Discharge into the environment must be avoided. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	:	Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Handling	:	Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.
Advice on protection against fire and explosion	:	Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples: (1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators. (2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha). (3) Storage tank level floats must be effectively bonded. For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API

Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Dust explosion class : Not applicable

Requirements for storage areas and containers : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Other data : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Advice on common storage Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA Z1	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Naphthalene	91-20-3	PEL	10 ppm 50 mg/m3
ACGIH	Diesel Fuel	68476-30-2	TWA	100 mg/m3
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Nonane	111-84-2	TWA	200 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. Consult manufacturer specifications for further information.

Skin and body protection : If needed to prevent skin contact, chemical protective clothing such as of DuPont

		TyChem®, Saranex or equivalent recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.
Respiratory protection	:	A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Work / Hygiene practices	:	Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquid
Appearance	:	Clear, straw colored
Odor	:	Characteristic petroleum (kerosene) odor
Flash point - typical	:	38℃ Minimum for #1 Diesel, 52℃ Minimum for #2 Diesel
Auto Ignition temperature	:	257 ℃ (495 ℉)
Thermal decomposition	:	No decomposition if stored and applied as directed.
Lower explosive limit	:	0.6 %(V)
Upper explosive limit	:	4.7 %(V)
pH	:	Not applicable
Freezing point	:	No data available
Boiling point	:	154 - 372 ℃(310° - 702 ℉)
Vapor Pressure	:	< 2 mm Hg at 20 ℃
Density	:	**0.86** g/cm3
Water solubility	:	Negligible
Viscosity, dynamic	:	1.7 - 40 mPa.s at 37.8 ℃ (100.0 ℉)

Percent Volatiles	:	100 %
Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature		Diesel Fuel Oils at terminal load rack: At least 25 pS/m Ultra Low Sulfur Diesel (ULSD) without conductivity additive: 0 pS/m to 5 pS/m ULSD at terminal load rack with conductivity additive: At least 50 pS/m but conductivity may decrease from environmental factors such as temperature drop. JP-8 at terminal load rack: 150 pS/m to 600 pS/m

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid	:	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers. Viton ® ; Fluorel ®
Materials to avoid	:	Strong oxidizing agents. Peroxides
Hazardous decomposition products	:	Carbon monoxide, carbon dioxide and noncombusted hydrocarbons (smoke). Diesel exhaust particulates may be a lung hazard - see Section 11.
Thermal decomposition	:	No decomposition if stored and applied as directed.
Hazardous reactions	:	Keep away from oxidizing agents, and acidic or alkaline products.

SECTION 11. TOXICOLOGICAL INFORMATION

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3)
IARC	:	Naphthalene (CAS-No.: 91-20-3)
OSHA	:	No component of this product which is present at levels greater than or equal to 0.1 % is identified as a carcinogen or potential carcinogen by OSHA.
CA Prop 65	:	WARNING! This product contains a chemical known to the State of California to cause cancer. naphthalene (CAS-No.: 91-20-3)
Skin irritation	:	Irritating to skin.
Eye irritation	:	Irritating to eyes.
Further information	:	Studies have shown that similar products produce skin cancer or skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation. Positive mutagenicity results have been reported. Repeated over-exposure may cause liver and kidney injury IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

Component:

Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit

		Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 7.64 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Severe skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Nonane	111-84-2	Acute oral toxicity: LD50 mouse Dose: 218 mg/kg Acute inhalation toxicity: LC50 rat Exposure time: 4 h
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
1,2,4-Trimethylbenzene	95-63-6	Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as

information applicable, under Federal and State regulations.

Component:

Naphthalene	91-20-3	Toxicity to algae: EC50 Species: Dose: 33 mg/l Exposure time: 24 h
1,2,4-Trimethylbenzene	95-63-6	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 7.72 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia Dose: 3.6 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : In accordance with local and national regulations.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: DIESEL FUEL
UN-No.	: UN1202 (NA 1993)
Class	: 3
Packing group	: III

TDG

Proper shipping name	: DIESEL FUEL
UN-No.	: UN1202 (NA 1993)
Class	: 3
Packing group	: III

IATA Cargo Transport

UN UN-No.	: UN1202 (NA 1993)
Description of the goods	: DIESEL FUEL
Class	: 3
Packaging group	: III
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 366
Packing instruction (cargo aircraft)	: Y344

IATA Passenger Transport

UN UN-No.	: UN1202 (NA 1993)
Description of the goods	: DIESEL FUEL
Class	: 3
Packaging group	: III

	ICAO-Labels	: 3
	Packing instruction (passenger aircraft)	: 355
	Packing instruction (passenger aircraft)	: Y344

IMDG-Code

	UN-No.	: UN 1202 (NA 1993)
	Description of the goods	: DIESEL FUEL
	Class	: 3
	Packaging group	: III
	IMDG-Labels	: 3
	EmS Number	: F-E S-E
	Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : Combustible Liquid
Moderate skin irritant
Moderate eye irritant
Toxic by ingestion
POSSIBLE CANCER HAZARD

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

TSCA Status : On TSCA Inventory

DSL Status : All components of this product are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
1,2,4-Trimethylbenzene	95-63-6
Naphthalene	91-20-3

PENN RTK US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Nonane	111-84-2

Naphthalene	91-20-3
1,2,4-Trimethylbenzene	95-63-6
xylene	1330-20-7
Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Xylene	1330-20-7
1,2,4-Trimethylbenzene	95-63-6
Naphthalene	91-20-3
Nonane	111-84-2

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Nonane	111-84-2
Naphthalene	91-20-3
1,2,4-Trimethylbenzene	95-63-6
Xylene	1330-20-7
Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

Naphthalene 91-20-3

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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12/01/2011

1153, 1250, 1443, 1454, 1814, 1815, 1866, 1925

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **ACTREL 1138L CLEANER**
Product Description: Dearomatized Hydrocarbons

Intended Use: Cleaner/degreaser

COMPANY IDENTIFICATION

Supplier: **EXXONMOBIL CHEMICAL COMPANY**
P.O. BOX 3272
HOUSTON, TX. 77253-3272 USA

24 Hour Health Emergency	(800) 726-2015
Transportation Emergency Phone	(800) 424-9300 or (703) 527-3887 CHEMTREC
Product Technical Information	(281) 870-6000/Health & Medical (281) 870-6884
Supplier General Contact	(281) 870-6000

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	100 %

Hazardous Constituent(s) Contained in Complex Substance(s)

Name	CAS#	Concentration*
NONANE	111-84-2	1 - 5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume. Concentration values may vary.

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL PHYSICAL / CHEMICAL EFFECTS

Combustible. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited. Material can accumulate static charges which may cause an ignition.

POTENTIAL HEALTH EFFECTS

Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage. May be irritating to the eyes, nose, throat, and lungs. Vapors may cause drowsiness and dizziness.

NFPA Hazard ID:	Health:	1	Flammability:	2	Reactivity:	0
HMIS Hazard ID:	Health:	1	Flammability:	2	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Flammable. Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Combustible. Vapors are flammable and heavier than air. Vapors may travel across the ground and reach remote ignition sources causing a flashback fire danger. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Smoke, Fume, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >38°C (100°F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 0.8 UEL: 5.7
Autoignition Temperature: 258°C (496°F)

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor and, when applicable, H2S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to aromatic hydrocarbons are recommended. Note: gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapor; but may not prevent ignition in closed spaces.

Water Spill: Stop leak if you can do it without risk. Eliminate sources of ignition. Warn other shipping. If the Flash Point exceeds the Ambient Temperature by 10 degrees C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Loading/Unloading Temperature: [Ambient]

Transport Temperature: [Ambient]
Transport Pressure: [Ambient]

Static Accumulator: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be grounded and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.
Storage Temperature: [Ambient]
Storage Pressure: [Ambient]

Suitable Containers/Packing: Tank Cars; Tank Trucks; Drums
Suitable Materials and Coatings (Chemical Compatibility): Stainless Steel; Carbon Steel; Polypropylene; Polyethylene; Teflon
Unsuitable Materials and Coatings: Natural Rubber; Butyl Rubber; Ethylene-proplyene-diene monomer (EPDM); Polystyrene

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Source	Form	Limit / Standard			NOTE	Source
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	Vapor.	RCP - TWA	1200 mg/m3	213 ppm	Total Hydrocarbons	ExxonMobil
NONANE		TWA	200 ppm		N/A	ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Adequate ventilation should be provided so that exposure limits are not exceeded. Use explosion-proof ventilation equipment.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Half-face filter respirator

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Chemical resistant gloves are recommended.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Chemical/oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Form: Clear
Color: Colorless
Odor: Mild Petroleum/Solvent
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15.6 °C): 0.772
Density (at 15 ºC): 773 kg/m³ (6.45 lbs/gal, 0.77 kg/dm³)
Flash Point [Method]: >38°C (100°F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 0.8 UEL: 5.7
Autoignition Temperature: 258°C (496°F)
Boiling Point / Range: 161°C (322°F) - 176°C (349°F)
Vapor Density (Air = 1): 4.7 at 101 kPa
Vapor Pressure: 0.262 kPa (1.97 mm Hg) at 20 °C
Evaporation Rate (n-butyl acetate = 1): 0.26
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/D
Solubility in Water: Negligible
Viscosity: 1.01 cSt (1.01 mm2/sec) at 40 °C | 1.17 cSt (1.17 mm2/sec) at 25°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: -59°C (-74°F)
Melting Point: N/A
Pour Point: < 60°C (140°F)
Molecular Weight: 137
Hygroscopic: No
Coefficient of Thermal Expansion: 0.00078 V/VDEGC

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Avoid heat, sparks, open flames and other ignition sources.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: Data available.	May cause central nervous system effects.
Irritation: Data available.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Toxicity: LD50 > 15000 mg/kg	Minimally Toxic. Based on test data for structurally similar

	materials.
Skin	
Toxicity: LD50 > 3160 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: Data available.	Mildly irritating to skin with prolonged exposure.
Eye	
Irritation: Data available.	May cause mild, short-lasting discomfort to eyes.

CHRONIC/OTHER EFFECTS

For the product itself:

Vapor/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness and other central nervous system effects including death.
Prolonged and/or repeated skin contact with low viscosity materials may defat the skin resulting in possible irritation and dermatitis.
Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.
Material -- Not expected to demonstrate chronic toxicity to aquatic organisms.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be readily biodegradable.

Hydrolysis:

Material -- Transformation due to hydrolysis not expected to be significant.

Photolysis:

Material -- Transformation due to photolysis not expected to be significant.

Atmospheric Oxidation:

Material -- Expected to degrade rapidly in air

OTHER ECOLOGICAL INFORMATION

VOC (EPA Method 24): 6.442 lbs/gal

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP). Potential RCRA characteristics: IGNITABILITY.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
ID Number: 1268
Packing Group: III
ERG Number: 128
Label(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S., 3, PG III

Footnote: The flash point of this material is greater than 100 F. Regulatory classification of this material varies. DOT: Flammable liquid or combustible liquid. OSHA: Combustible liquid. IATA/IMO: Flammable liquid.

LAND (TDG)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
UN Number: 1268
Packing Group: III

SEA (IMDG)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
EMS Number: F-E, S-E
UN Number: 1268

Packing Group: III
Label(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S., 3, PG III, (>38°C c.c.)

AIR (IATA)
Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
UN Number: 1268
Packing Group: III
Label(s) / Mark(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S., 3, PG III

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purpose, this material is classified as hazardous in accordance with OSHA 29CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: ENCS, IECSC, DSL, AICS, TSCA, KECI, PICCS

EPCRA: This material contains no extremely hazardous substances.

CERCLA: This material is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA petroleum exclusion applies for this product. Contact local authorities to determine if other reporting requirements apply.

CWA / OPA: This product is classified as an oil under Section 311 of the Clean Water Act (40 CFR 110) and the Oil Pollution Act of 1990. Discharge or spills which produce a visible sheen on either surface water, or in waterways/sewers which lead to surface water, must be reported to the National Response Center at 800-424-8802.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: Fire.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	17, 18, 19
NONANE	111-84-2	1, 5, 9, 13, 16, 17, 18, 19

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapor Pressure was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 15: List Citations Table was modified.
Section 15: National Chemical Inventory Listing was modified.
Composition: Concentration Footnote was modified.
Section 08: Exposure Limits Table was modified.
Composition: Primary Ingredient Name was added.
Composition: CAS Number was added.
Composition: Concentration - Header was added.
Composition: Constituents Table - Header was added.
Composition: Component table was added.

PRECAUTIONARY LABEL TEXT:
Contains: DISTILLATES (PETROLEUM), HYDROTREATED LIGHT
CAUTION!
HEALTH HAZARDS
Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage.
PHYSICAL HAZARDS
Combustible. Material can accumulate static charges which may cause an ignition.

PRECAUTIONS
Avoid contact with skin. Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation.

FIRST AID
Inhalation: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention. Do not induce vomiting.

Skin: Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

FIRE FIGHTING MEDIA

Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

SPILL/LEAK
Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

Water Spill: Stop leak if you can do it without risk. Eliminate sources of ignition. Warn other shipping. Report spills as required to appropriate authorities. If the Flash Point exceeds the Ambient Temperature by 10 degrees C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants.

The information and recommendations contained herein are, to the best of ExxonMobil's knowledge and belief, accurate and reliable as of the date issued. You can contact ExxonMobil to insure that this document is the most current available from ExxonMobil. The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. If buyer repackages this product, it is the user's responsibility to insure proper health, safety and other necessary information is included with and/or on the container. Appropriate warnings and safe-handling procedures should be provided to handlers and users. Alteration of this document is strictly prohibited. Except to the extent required by law, re-publication or retransmission of this document, in whole or in part, is not permitted. The term, "ExxonMobil" is used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobil Corporation, or any affiliates in which they directly or indirectly hold any interest.

Internal Use Only
MHC: 1A, 0, 1, 0, 2, 0

DGN: 4400252HUS (1007642)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: MOBIL DELVAC ELITE 15W-40
Product Description: Base Oil and Additives
Product Code: 201520508530, 444604-00, 97AJ90
Intended Use: Engine oil

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
ZINC DITHIOPHOSPHATE	68649-42-3	< 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity: 0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >215°C (419°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable

regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with used product. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store

in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective

equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.875
Flash Point [Method]: >215°C (419°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 111 cSt (111 mm2/sec) at 40 °C | 15 cSt (15 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -27°C (-17°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

For the product itself:

Diesel engine oils: Not carcinogenic in animals tests. Used and unused diesel engine oils did not produce any carcinogenic effects in chronic mouse skin painting studies.
Oils that are used in gasoline engines may become hazardous and display the following properties: Carcinogenic in animal tests. Caused mutations in vitro. Possible allergen and photoallergen. Contains polycyclic aromatic compounds (PAC) from combustion products of gasoline and/or thermal degradation products.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: KECI, TSCA, DSL
Special Cases:

Inventory	Status
AICS	Restrictions Apply
ELINCS	Restrictions Apply
IECSC	Restrictions Apply

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ZINC DITHIOPHOSPHATE	68649-42-3	< 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
ZINC DITHIOPHOSPHATE	68649-42-3	13, 15, 17

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 06: Notification Procedures - Header was modified.
Section 13: Disposal Considerations - Disposal Recommendations was modified.
Section 01: Product Code was modified.
Section 10 Stability and Reactivity - Header was modified.
Section 13: Disposal Recommendations - Note was modified.
Section 13: Empty Container Warning was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 08: Personal Protection was modified.
Section 08: Hand Protection was modified.
Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Section 07: Handling and Storage - Storage Phrases was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Oral Lethality Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Section 15: List Citations Table was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Code to MHCs was modified.
Section 08: Exposure limits/standards was modified.
Section 15: Special Cases Table was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 06: Notification Procedures was modified.
Section 09: Oxidizing Properties was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 09: Decomposition Temperature was added.
Section 09: Decomposition Temp - Header was added.
Section 09: Vapor Pressure was added.

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Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 7082558XUS (1013321)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL DELVAC EXTENDED LIFE 50/50 PREDILUTED COOLANT/ANTIFREEZE**
Product Description: Glycol
Product Code: 351010101596, 840439-00, 97AA97
Intended Use: Antifreeze/coolant

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
DIETHYLENE GLYCOL	111-46-6	1 - 5%
ETHYLENE GLYCOL	107-21-1	40 - 50%
INORGANIC SALTS AND ORGANIC ACID SALTS		< 2%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

May cause harm to the unborn child. Harmful or fatal if swallowed. Ingestion may cause serious adverse effects and may be fatal. May cause kidney failure and central nervous system effects. Prolonged exposure to elevated concentrations of mist or liquid may cause irritation of the skin, eyes, and respiratory tract. High-pressure injection under skin may cause serious damage.

Target Organs: Kidney | Reproductive system |

NFPA Hazard ID:	Health:	1	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	2*	Flammability:	0	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention.

NOTE TO PHYSICIAN

This product contains ethylene glycol and/or diethylene glycol which, if ingested, are metabolized to toxic metabolites by the enzyme alcohol dehydrogenase, for which ethanol and 4-methylpyrazole {U.S. drug name Fomepizole, trade name Antizol} are antagonists. Administration of oral or intravenous ethanol or intravenous 4-methylpyrazole may arrest further metabolism of this material and thereby ameliorate the toxicity. Use of ethanol or 4-methylpyrazole does not affect toxic metabolites that are already present and is not a substitute for hemodialysis.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, alcohol-resistant foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water or Regular Foam

FIRE FIGHTING

Fire Fighting Instructions: Material will not burn. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

Unusual Fire Hazards: Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: N/A
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: >371°C (700°F)

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Do not touch or walk through spilled material. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Consult an expert. Warn other shipping. Material will sink. Remove material, as much as possible, using mechanical equipment.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Remove debris in path of spill and remove contaminated debris from shoreline and water surface and dispose of according to local regulations. Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid breathing mists or vapors. Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Source	Form	Limit / Standard			NOTE	Source
DIETHYLENE GLYCOL		TWA	10 mg/m3		N/A	AIHA WEEL
ETHYLENE GLYCOL	Aerosol.	Ceiling	100 mg/m3		N/A	ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use

conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

If prolonged or repeated contact is likely, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid
Color: Orange
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 1.07
Flash Point [Method]: N/A
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: >371°C (700°F)
Boiling Point / Range: 106C (223F) - 108C (226F)
Vapor Density (Air = 1): 2.1 at 101 kPa [n-Butyl Acetate]
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: 8.6
Log Pow (n-Octanol/Water Partition Coefficient): < 2
Solubility in Water: Complete
Viscosity: <15.6 cSt (15.6 mm2/sec) at 40 C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: -37°C (-35°F)
Melting Point: N/D

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers, Strong Acids

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: Data available.	Negligible hazard at ambient/normal handling temperatures. Based on test data for structurally similar materials.
Ingestion	
Toxicity (Human): LDLo 100 ml	Moderately toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

Contains:

DIETHYLENE GLYCOL (DEG): Orally, DEG is more toxic to humans than animal test data indicate. Probable lethal dose for an adult is about 50 ml (2 oz.), or 2 -3 swallows. Smaller amounts may cause kidney degeneration and failure. Benign urinary bladder tumors were observed in rats, no tumors were observed in mice.

ETHYLENE GLYCOL (EG): Repeated high oral exposure has caused kidney damage, neurological effects, degeneration of the liver and changes in blood chemistry and circulating blood cells in laboratory animals. Repeated overexposure has the potential to cause similar toxic effects in humans. EG causes developmental and reproductive effects at high dose levels in laboratory animals. The relevance of these findings to humans is uncertain.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC 3 = IARC 1 5 = IARC 2B

2 = NTP SUS 4 = IARC 2A 6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Material -- Expected to remain in water or migrate through soil.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be readily biodegradable.

Atmospheric Oxidation:

Material -- Expected to degrade rapidly in air

BIOACCUMULATION POTENTIAL

Material -- Potential to bioaccumulate is low.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Even though this product is biodegradable, it must not be indiscriminately discarded into the environment. Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Ethylene Glycol)

Hazard Class & Division: 9

ID Number: 3082

Packing Group: III

Product RQ: 10638.3 LBS - ETHYLENE GLYCOL

ERG Number: 171

Label(s): 9

Transport Document Name: UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Ethylene Glycol), 9, PG III, RQ

Footnote: This material is not regulated under 49 CFR when the quantity in a package is less than the Product RQ.

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purpose, this material is classified as hazardous in accordance with OSHA 29CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: TSCA

EPCRA: This material contains no extremely hazardous substances.

CERCLA:

Chemical Name	CAS Number	Typical Value	Component RQ	Product RQ
ETHYLENE GLYCOL	107-21-1	40 - 50%	5000 LBS	10638.3 LBS

SARA (311/312) REPORTABLE HAZARD CATEGORIES: Immediate Health. Delayed Health.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ETHYLENE GLYCOL	107-21-1	40 - 50%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DIETHYLENE GLYCOL	111-46-6	16, 19
ETHYLENE GLYCOL	107-21-1	1, 13, 16, 17, 18, 19

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 04: First Aid Inhalation - Header was modified.
Section 04: First Aid Ingestion - Header was modified.
Section 06: Protective Measures was modified.
Section 09: Color was modified.
Section 09: Evaporation Rate - Header was modified.
Hazard Identification: Health Hazards was modified.
Hazard Identification: NFPA Flammability was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 09: Viscosity was modified.
Section 14: Product RQ was modified.
Hazard Identification: Health Hazards was modified.
Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: CERCLA Table was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
Section 16: NA Contains was modified.
Section 08: Exposure Limits Table was modified.

PRECAUTIONARY LABEL TEXT:

Contains: ETHYLENE GLYCOL

DANGER!

HEALTH HAZARDS

May cause harm to the unborn child. Harmful or fatal if swallowed.

Target Organs: Kidney | Reproductive system |

FIRST AID

Inhalation: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention.

Skin: Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

FIRE FIGHTING MEDIA

Use water fog, alcohol-resistant foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

SPILL/LEAK

Land Spill: Stop leak if you can do it without risk. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Recover by pumping or with suitable absorbent. Do not touch or walk through spilled material.

Water Spill: Stop leak if you can do it without risk. Report spills as required to appropriate authorities. Material will sink. This product emulsifies, disperses or is miscible in water. Consult an expert.

Internal Use Only

MHC: 2, 0, 0, 0, 0, 0 PPEC: C

DGN: 7074341XUS (1011503)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBILGREASE CM-P**
Product Description: Base Oil and Additives
Product Code: 2015A0106050, 530147-00
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
MOLYBDENUM (IV) SULFIDE	1317-33-5	1 - 5%
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	1 - 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >204C (400F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The

National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Source	Form	Limit / Standard			NOTE	Source
MOLYBDENUM (IV) SULFIDE [as Mo]	Total dust.	TWA	15 mg/m3		N/A	OSHA Z1
MOLYBDENUM (IV) SULFIDE [as Mo]	Inhalable fraction.	TWA	10 mg/m3		N/A	ACGIH
MOLYBDENUM (IV) SULFIDE [as Mo]	Respirable	TWA	3 mg/m3		N/A	ACGIH

	fraction.					

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Gray
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.919
Flash Point [Method]: >204C (400F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 316C (600F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 320 cSt (320 mm2/sec) at 40 C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: 260°C (500°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks

Inhalation	
Toxicity: No end point data.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

OTHER ECOLOGICAL INFORMATION

VOC (EPA Method 24): 0.077 lbs/gal

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: ENCS, AICS, TSCA, EINECS,

IECSC, DSL

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	1 - 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
HYDRO TREATED HEAVY NAPHTHENIC DISTILLATE	64742-52-5	13, 16, 17, 18, 19
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	64742-53-6	16, 17
MOLYBDENUM (IV) SULFIDE	1317-33-5	1, 4, 13, 16, 19
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	13, 15, 17
ZINC DINONYLNAPHTHALENE SULFONATE	28016-00-4	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 04: First Aid Skin was modified.
Section 04: First Aid Inhalation was modified.
Section 06: Notification Procedures - Header was modified.

Section 01: Product Code was modified.
Section 10 Stability and Reactivity - Header was modified.
Section 13: Disposal Recommendations - Note was modified.
Section 13: Empty Container Warning was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Personal Protection was modified.
Section 08: Hand Protection was modified.
Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Land was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 11: Skin Irritation Conclusion was modified.
Section 11: Inhalation Lethality Test Comment was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Code to MHCs was modified.
Section 08: Exposure limits/standards was modified.
Section 15: OSHA Hazard Communication Standard was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 06: Notification Procedures was modified.
Section 08: Exposure Limits Table was modified.
Section 09: Oxidizing Properties was modified.
Section 08: OEL Table - Notation Column - Header was modified.
Section 08: Exposure Limit Values - Header was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 09: Decomposition Temperature was added.
Section 09: Decomposition Temp - Header was added.
Section 09: Vapor Pressure was added.
Section 15: TSCA Class 2 Statement was deleted.

The information and recommendations contained herein are, to the best of ExxonMobil's knowledge and belief, accurate and reliable as of the date issued. You can contact ExxonMobil to insure that this document is the most current available from ExxonMobil. The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. If buyer repackages this product, it is the user's responsibility to insure proper health, safety and other necessary information is included with and/or on the container. Appropriate warnings and safe-handling procedures should be provided to handlers and users. Alteration of this document is strictly prohibited. Except to the extent required by law, re-publication or retransmission of this document, in whole or in part, is not permitted. The term, "ExxonMobil" is used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobil Corporation, or any affiliates in which they directly or indirectly hold any interest.

Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 2006083XUS (550247)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBILGREASE XHP 462**
Product Description: Base Oil and Additives
Product Code: 2015A0202527, 642538-00, 97AB14
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
ZINC DITHIOPHOSPHATE	68649-42-3	1 - 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary

from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >294C (561F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable

regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Blue
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.9
Flash Point [Method]: >294C (561F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 316C (600F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 460 cSt (460 mm2/sec) at 40 C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/D
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: PICCS, KECI, TSCA, AICS, EINECS, IECSC

Special Cases:

Inventory	Status
ENCS	Restrictions Apply
NDSL	Restrictions Apply

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ZINC DITHIOPHOSPHATE	68649-42-3	1 - 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
NAPHTHENIC ACIDS, ZINC SALTS	12001-85-3	15
ZINC DITHIOPHOSPHATE	68649-42-3	13, 15, 17
ZINC NEODECANOATE	27253-29-8	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 06: Notification Procedures - Header was modified.
Section 01: Product Code was modified.
Section 10 Stability and Reactivity - Header was modified.
Section 13: Disposal Recommendations - Note was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.

Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Personal Protection was modified.
Section 07: Handling and Storage - Handling was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Code to MHCs was modified.
Section 08: Exposure limits/standards was modified.
Section 15: OSHA Hazard Communication Standard was modified.
Section 15: Special Cases Table was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 06: Notification Procedures was modified.
Section 09: Oxidizing Properties was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 09: Decomposition Temperature was added.
Section 09: Decomposition Temp - Header was added.
Section 09: Vapor Pressure was added.

Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 7049658XUS (1009426)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL HYDRAULIC AW 68**
Product Description: Base Oil and Additives
Product Code: 201560106520, 583039-49, 970557
Intended Use: Hydraulic fluid

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

No Reportable Hazardous Substance(s) or Complex Substance(s).

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use

adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >218°C (424°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The

National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.883
Flash Point [Method]: >218°C (424°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F)
Vapor Density (Air = 1): > 2 at 101 kPa
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: 68 cSt (68 mm2/sec) at 40 °C | 8.5 cSt (8.5 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -12°C (10°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

OTHER ECOLOGICAL INFORMATION

VOC: 0 G/L [ASTM E1868-10]

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: AICS, DSL, IECSC, PICCS, TSCA

EPCRA SECTION 302: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
ZINC ALKYLDITHIOPHOSPHATE	68649-42-3	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 04: First Aid Inhalation - Header was modified.
Section 04: First Aid Ingestion - Header was modified.
Section 13: Disposal Considerations - Disposal Recommendations was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: Evaporation Rate - Header was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Section 07: Handling and Storage - Storage Phrases was modified.
Hazard Identification: Health Hazards was modified.

Section 11: Dermal Lethality Test Data was modified.
Section 11: Dermal Lethality Test Comment was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 11: Dermal Irritation Test Data was modified.
Section 11: Eye Irritation Test Data was modified.
Section 11: Oral Lethality Test Comment was modified.
Section 11: Inhalation Irritation Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 09: Relative Density was modified.
Section 15: Community RTK - Header was modified.
Section 16: MSN, MAT ID was modified.
Section 08: Exposure limits/standards was modified.
Section 09: Oxidizing Properties was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 12: Other Ecological Information - Header was added.
Section 15: Chemical Name - Header was added.
Section 15: CAS Number - Header was added.
Section 15: List Citations - Header was added.
Section 15: List Citations Table was added.
Section 12: California VOC was added.
Section 12: California VOC was added.
Section 15: Special Cases - Header was deleted.
Section 15: Special Cases Table was deleted.
Section 15: Inventory - Header was deleted.
Section 15: Status - Header was deleted.

Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 2006835XUS (1012737)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL POLYREX EM**
Product Description: Base Oil and Additives
Product Code: 2015A020G010, 641688-00, 97Y278
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
AMINES, C12-14-ALKYL, ISOOCTYL PHOSPHATES	68187-67-7	1 - 5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION
Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

SKIN CONTACT
Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT
Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION
First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING
Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES
Flash Point [Method]: >204°C (399°F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES
In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
Chemical resistant gloves are recommended. If contact with forearms is likely wear gauntlet style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
Chemical/oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Blue
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.884
Flash Point [Method]: >204°C (399°F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 330°C (626°F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 95 cSt (95 mm2/sec) at 40 °C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: >250°C (482°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures. Based

	on assessment of the components.
Ingestion	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Mildly irritating to skin with prolonged exposure. Based on assessment of the components.
Eye	
Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements: AICS, IECSC, KECI, TSCA

Special Cases:

Inventory	Status
NDSL	Restrictions Apply

EPCRA SECTION 302: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DIPHENYLAMINE	122-39-4	18

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 06: Protective Measures was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapor Pressure was modified.
Hazard Identification: Health Hazards was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Dermal Lethality Test Comment was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 11: Dermal Irritation Test Data was modified.
Section 11: Eye Irritation Test Data was modified.
Section 11: Oral Lethality Test Comment was modified.
Section 11: Inhalation Irritation Test Data was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 14: LAND (TDG) - Header was modified.

Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 15: Community RTK - Header was modified.
Section 11: Additional Health Information was modified.
Section 09: Melting Point C(F) was modified.
Section 15: Special Cases Table was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 09: Vapor Pressure was added.

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Internal Use Only
MHC: 0B, 0B, 0, 0, 2, 0 PPEC: A

DGN: 2031547XUS (1008419)

SAFETY DATA SHEET

PRODUCT

NALCO® 1720

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® 1720**

APPLICATION : OXYGEN SCAVENGER

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2* FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Bisulfite	7631-90-5	10.0 - 30.0
Potassium Bisulfite	7773-03-7	1.0 - 5.0
Cobalt Sulfate	10124-43-3	< 0.1

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Harmful if swallowed. Contains Sulfite. Causes asthmatic signs and symptoms in hyper-reactive individuals. Irritating to respiratory system. May cause cancer by inhalation. Cobalt and cobalt compounds have been classified as possible carcinogens to humans (Group 2B) by IARC. The ACGIH lists cobalt and inorganic compounds as an animal carcinogen (A3). Contact with acids liberates toxic gas.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Use a mild soap if available. Protect product from freezing.
Wear suitable protective clothing.
Not flammable or combustible. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Harmful if swallowed. Contains Sulfite. May cause asthmatic-like attack.

INHALATION :
Irritant to respiratory system. Causes asthmatic signs and symptoms in hyper-reactive individuals. May cause cancer by inhalation.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
This product contains cobalt compounds. The International Agency for Research on Cancer (IARC) has evaluated cobalt and cobalt compounds and found it to be a possible human carcinogen.
Ingestion of sulfite can cause a severe allergic reaction in asthmatics and some sulfite sensitive individuals. The resulting symptoms can include difficulty in breathing, flushed skin and a rash. Chronic exposure to sulfites may cause symptoms of upper respiratory disease and affect sense of taste and smell.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush with large amounts of water. Use soap if available. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Not expected to burn. Use extinguishing media appropriate for surrounding fire. Keep containers cool by spraying with water.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Store the containers tightly closed. Store in suitable labeled containers. Store separately from acids. Store separately from oxidizers. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles. Protect product from freezing.

SUITABLE CONSTRUCTION MATERIAL :
Polypropylene, Buna-N, EPDM, Polyethylene, Polyurethane, PVC, Neoprene, Chlorosulfonated polyethylene rubber, Fluoroelastomer Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Brass, Mild steel, Stainless Steel 304, Stainless Steel 316L, 100% phenolic resin liner, Epoxy phenolic resin

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below. Exposure limits are listed for sulfur dioxide (SO2) since this product evolves SO2 when open to the atmosphere.

Substance(s)	Category:	ppm	mg/m3	Non-Standard Unit
Sodium Bisulfite	ACGIH/TWA		5	
Sulfur Dioxide	ACGIH/STEL	0.25		
	OSHA Z1/PEL	5	13	

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Pink Clear
ODOR	Pungent

SPECIFIC GRAVITY	1.22 - 1.28 @ 60 °F / 15.6 °C
DENSITY	10.1 - 10.7 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	3.3 - 4.1
VISCOSITY	5 cps @ 60 °F / 15 °C
FREEZING POINT	11 °F / -11 °C
BOILING POINT	205 °F / 96 °C
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Contains Sulfite. SO2 may react with vapors from neutralizing amines and may produce a visible cloud of amine salt particles.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of sulfur, Hydrogen sulfide (H2S)

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species:	Rat
LD50:	4,112 mg/kg
Test Descriptor:	Similar Product

ACUTE DERMAL TOXICITY :
Species: Rabbit
LD50: > 3,000 mg/kg
Test Descriptor: Similar Product

SENSITIZATION :
Sulfites can cause an allergic reaction in sensitive individuals.

CARCINOGENICITY :
This product contains cobalt compounds. The International Agency for Research on Cancer (IARC) has evaluated cobalt and cobalt compounds and found it to be a possible human carcinogen.

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	382 mg/l	Product
Inland Silverside	96 hrs	> 5,000 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	728 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	> 5,000 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
The product will not bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	SODIUM BISULFITE
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Flash Point :	None
Reportable Quantity (per package) :	18,347 lbs
RQ Component :	SODIUM BISULFITE

AIR TRANSPORT (ICAO/IATA) :

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	SODIUM BISULFITE
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Reportable Quantity (per package) :	18,347 lbs
RQ Component :	SODIUM BISULFITE

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Bisulfite : Respiratory irritant
Potassium Bisulfite : Irritant
Cobalt Sulfate : Systemic Effect, Irritant, Cancer suspect agent (refer to Section 3)

CERCLA/SUPERFUND, 40 CFR 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sodium Bisulfite	18,347 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X Immediate (Acute) Health Hazard

X	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

Limitations: no more than required to produce intended technical effect.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 141556
This product is acceptable for treating boilers or steam lines where steam produced may contact edible products and/or cooling systems where the treated water may not contact edible products in and around food processing areas, excluding such use in areas where meat and poultry are processed (G9).

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Sodium Bisulfite	Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Cobalt Sulfate	Sec. 112

CALIFORNIA PROPOSITION 65 :
This material contains trace amounts of chemicals known to the State of California to cause cancer.

Substance(s)	Concentration	EFFECTS
• Cobalt Sulfate	< .1 %	Causes Cancer

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Bisulfite 7631-90-5

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

F100777

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 01/12/2011
Version Number : 6.7

SAFETY DATA SHEET

PRODUCT

NALCO® 8735

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® 8735**

APPLICATION : pH STABILIZER

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 0 / 0 INSTABILITY : 1 / 1 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Hydroxide	1310-73-2	30.0 - 60.0
Potassium Hydroxide	1310-58-3	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Corrosive. May cause tissue damage.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear a face shield. Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots.
Not flammable or combustible. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage.

SKIN CONTACT :
Corrosive; causes permanent skin damage.

INGESTION :
Corrosive; causes chemical burns to the mouth, throat and stomach.

INHALATION :
Elevated temperatures or mechanical action may form vapors, mists or fumes which may be irritating to the eyes, nose, throat and lungs.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. Use a mild soap if available. For a large splash, flood body under a shower. Get immediate medical attention. Contaminated clothing, shoes, and leather goods must be discarded or cleaned before re-use.

INGESTION :
Get immediate medical attention. DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink.

INHALATION :
Remove to fresh air, treat symptomatically. Get immediate medical attention.

NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Not expected to burn. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Do not mix with acids.

STORAGE CONDITIONS :
Store the containers tightly closed. Store separately from acids. Store in suitable labeled containers.

SUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 304, Stainless Steel 316L, Hastelloy C-276, Buna-N, Nylon, Polyethylene, Polypropylene, PVC, HDPE (high density polyethylene), Plexiglass, PTFE, Perfluoroelastomer, Polytetrafluoroethylene/polypropylene copolymer, Chlorosulfonated polyethylene rubber, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Aluminum, Mild steel, Natural rubber, Brass, Copper, Ethylene propylene, Neoprene, Polyurethane, Fluoroelastomer

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

Sodium Hydroxide	ACGIH/Ceiling	2

	OSHA Z1/PEL	2
Potassium Hydroxide	ACGIH/Ceiling	2

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Eye wash station and safety shower are necessary. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Colorless
ODOR	None
SPECIFIC GRAVITY	1.50 - 1.53 @ 60 °F / 15.6 °C
DENSITY	12.5 - 12.7 lb/gal
SOLUBILITY IN WATER	Complete

pH (5 %)	14
FREEZING POINT	-10 °F / -23 °C
BOILING POINT	293 °F / 145 °C
VAPOR PRESSURE	0.5 mm Hg @ 100 °F / 37.7 °C
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Gives off hydrogen by reaction with metals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: None known

11. TOXICOLOGICAL INFORMATION

The following results are for the hazardous components.

ACUTE ORAL TOXICITY :
Species: Rat
LD50: 205 mg/kg
Test Descriptor: Potassium Hydroxide

ACUTE DERMAL TOXICITY :
Species: Rabbit
LD50: 1,260 mg/kg
Test Descriptor: Potassium Hydroxide

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product, unless otherwise indicated.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	102 mg/l	Similar Product
Mosquito Fish (Gambusia spp.)	96 hrs	125 mg/l	Active Substance

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	180 mg/l		Similar Product
Daphnia magna	48 hrs	156 mg/l		Active Substance

PERSISTENCY AND DEGRADATION :

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	0 mg/l	Product

The product does not contain any organic substances.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II
Flash Point :	None
Reportable Quantity (per package) :	3,000 lbs
RQ Component :	SODIUM HYDROXIDE

AIR TRANSPORT (ICAO/IATA) :

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II
Reportable Quantity (per package) :	3,000 lbs
RQ Component :	SODIUM HYDROXIDE

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Hydroxide : Corrosive
Potassium Hydroxide : Corrosive, HARMFUL

CERCLA/SUPERFUND, 40 CFR 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sodium Hydroxide	3,000 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

Limitations: no more than required to produce intended technical effect.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 062440
This product is acceptable as a compound for the treatment of entire potable water systems (G1) in official establishments in and around food processing areas. This product is acceptable for treatment of cooling and retort water (G5) in and around food processing areas. This product is acceptable for use in meat, poultry, and other food processing areas as a Boiler Treatment Product (G6), for treating boiler and steam lines where the steam produced may contact edible products. Acceptable usage shall be in accordance with the dosage limitations specified on the product label.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Sodium Hydroxide • Potassium Hydroxide	Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Potassium Hydroxide	1310-58-3
Sodium Hydroxide	1310-73-2

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 01/21/2011
Version Number : 1.16

MATERIAL SAFETY DATA SHEET

PRODUCT

NexGuard 22310

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NexGuard 22310**

APPLICATION : BOILER WATER INTERNAL TREATMENT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. No adverse effects expected.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. If symptoms develop, seek medical advice.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Do not touch spilled material. Ventilate spill area if possible. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid eye and skin contact. Do not take internally. Ensure all containers are labelled. Keep the containers closed when not in use.

STORAGE CONDITIONS :
Protect product from freezing. Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
PVC, Stainless Steel 304, EPDM, Buna-N, HDPE (high density polyethylene), Polyurethane, Hypalon, Viton, Neoprene, Polypropylene, Polyethylene, Stainless Steel 316L, 100% phenolic resin liner

UNSUITABLE CONSTRUCTION MATERIAL :
Brass, Mild steel, Epoxy phenolic resin

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Respiratory protection is not normally needed.

HAND PROTECTION :
Neoprene gloves, Nitrile gloves, Butyl gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Moderate

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Fluorescent Orange Yellow
ODOR	Normally None, however residual ammonia may be present in headspace of newly opened containers

SPECIFIC GRAVITY	1.19 @ 77 °F / 25 °C
DENSITY	9.9 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	10.5
FREEZING POINT	22 °F / -6 °C
VAPOR PRESSURE	Same as water
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of sulfur

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	7,070 mg/l	Product
Fathead Minnow	96 hrs	1,086 mg/l	Product
Inland Silverside	96 hrs	> 5,000 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	1,650 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	> 5,000 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

- Immediate (Acute) Health Hazard
- Delayed (Chronic) Health Hazard
- Fire Hazard
- Sudden Release of Pressure Hazard
- Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : This product is in full compliance with the applicable Federal laws and regulations pertaining to food additives and may be used for applications covered under 21 CFR 173.310 Boiler Water Additives (steam from treated boilers may contact food). A copy of FDA's acknowledgement of Nalco's effective notification is available on the FDA website at: http://vm.cfsan.fda.gov/~dms/opa-fcn.html, FCN000105 and FCN000031.

The following limitations apply:

Maximum dosage	Limitation
93 PPM	in the boiler feedwater

The polymer must not be used at pressures above 1,000 PSIG (147 kPa).

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 121221
This product is acceptable for use in meat, poultry, and other food processing areas as a Boiler Treatment Product (G6), for treating boiler and steam lines where the steam produced may contact edible products. Acceptable usage shall be in accordance with the dosage limitations specified on the product label.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 111 (40 CFR 60, Volatile Organic Compounds), Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Sulfate	7757-82-6
Inorganic Solvent	Proprietary

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
Not considered a WHMIS controlled product.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

16. OTHER INFORMATION

Nalco Internal Number F105654

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

PRODUCT

NexGuard 22310

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

Prepared By : Product Safety Department
Date issued : 01/13/2006
Version Number : 1.19

PRODUCT

TRI-ACT® 1820

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **TRI-ACT® 1820**

APPLICATION : CORROSION INHIBITOR

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 2 / 2 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Cyclohexylamine	108-91-8	10.0 - 30.0
Diethylethanolamine	100-37-8	5.0 - 10.0
Morpholine	110-91-8	5.0 - 10.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Corrosive. Combustible. May cause tissue damage. Harmful if absorbed through skin. Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Keep away from sources of ignition - No smoking. Keep away from heat. Keep container tightly closed and in a well-ventilated place. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Protect product from freezing.
Wear a face shield. Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots.
Combustible Liquid; may form combustible mixtures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, or expose containers to flame or other sources of ignition.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage. Exposure to low vapor concentrations can result in foggy or blurred vision, objects appearing bluish and appearance of a halo around lights. These symptoms are temporary.

SKIN CONTACT :
May cause severe irritation or tissue damage depending on the length of exposure and the type of first aid administered. Harmful if absorbed through skin.

INGESTION :
Not a likely route of exposure. Corrosive; causes chemical burns to the mouth, throat and stomach.

INHALATION :
Irritating, in high concentrations, to the eyes, nose, throat and lungs. Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Immediately flush eye with water for at least 15 minutes while holding eyelids open. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. For a large splash, flood body under a shower. Remove contaminated clothing. Wash off affected area immediately with plenty of water. Get immediate medical attention. Contaminated clothing, shoes, and leather goods must be discarded or cleaned before re-use.

INGESTION :
DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink. Get immediate medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 131 °F / 55 °C (PMCC)

EXTINGUISHING MEDIA :
Dry powder, Carbon dioxide, Foam, Other extinguishing agent suitable for Class B fires, For large fires, use water spray or fog, thoroughly drenching the burning material.
Keep containers cool by spraying with water.

FIRE AND EXPLOSION HAZARD :
Combustible Liquid; may form combustible mixtures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, or expose containers to flame or other sources of ignition.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ventilate spill area if possible. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Remove sources of ignition. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Do not breathe vapors/gases/dust. Use with adequate ventilation. Avoid generating aerosols and mists. Keep away from acids and oxidizing agents. Do not use, store, spill or pour near heat, sparks or open flame. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available.

STORAGE CONDITIONS :
Store the containers tightly closed. Store away from heat and sources of ignition. Use proper grounding procedures. Store separately from acids. Store separately from oxidizers. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles.

SUITABLE CONSTRUCTION MATERIAL :
HDPE (high density polyethylene), Natural rubber, Viton, Polypropylene, Stainless Steel 304, Stainless Steel 316L, Surface-modified HDPE (high density polyethylene), Kalrez, PTFE

UNSUITABLE CONSTRUCTION MATERIAL :
Carbon Steel C1018, Epoxyresin coating

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :
Substance(s)

Cyclohexylamine	TWA: 10 ppm , 41 mg/m3
Diethylethanolamine	TWA: 2 ppm , 9.6 mg/m3 (Skin)
Morpholine	TWA: 20 ppm , 71 mg/m3 (Skin)

OSHA/PEL :
Substance(s)

Cyclohexylamine	TWA: 10 ppm , 40 mg/m3
Diethylethanolamine	TWA: 10 ppm , 50 mg/m3 (Skin)
Morpholine	TWA: 20 ppm , 70 mg/m3 (Skin) STEL: 30 ppm , 105 mg/m3 (Skin)

* A skin notation refers to the potential significant contribution to overall exposure by the cutaneous route, including mucous membranes and the eyes.

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Butyl gloves, Most glove materials are of low chemical resistance. Replace gloves regularly.

SKIN PROTECTION :
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Eye wash station and safety shower are necessary. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Light yellow
ODOR	Amine

SPECIFIC GRAVITY	0.98 - 0.99 @ 77 °F / 25 °C
DENSITY	8.1 - 8.2 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	12.0 - 13.0
VISCOSITY	5 cps @ 77 °F / 25 °C
FREEZING POINT	27 °F / -3 °C
VAPOR PRESSURE	6 mm Hg @ 68 °F / 20 °C
VOC CONTENT	40 %

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Heat and sources of ignition including static discharges.

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Avoid contact with SO2 or acidic bisulfite products, which may react to form visible airborne amine salt particles. Certain amines in contact with nitrous acid, organic or inorganic nitrites or atmospheres with high nitrous oxide concentrations may produce N-nitrosamines, many of which are cancer-causing agents to laboratory animals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	779 mg/kg	Similar Product

Rating : Non-Hazardous

ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	2,055 mg/kg	Similar Product

Rating : Non-Hazardous

ACUTE INHALATION TOXICITY :

Species	LC50	Test Descriptor
Rat	> 12000 PPM (8 hrs)	Similar Product

Rating : Non-Hazardous

PRIMARY SKIN IRRITATION :

Draize Score	Test Descriptor
8.0 / 8.0	Similar Product

Rating : Extremely irritating (Corrosive)

PRIMARY EYE IRRITATION :

Draize Score	Test Descriptor
110.0 / 110.0	Similar Product

Rating : Extremely irritating (Corrosive)

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	130 mg/l	Product
Fathead Minnow	96 hrs	75 mg/l	Product
Sheepshead Minnow	96 hrs	454 mg/l	Product
Fish		650 mg/l	Product
Inland Silverside	96 hrs	500.0 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	190 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	131 mg/l		Product

AQUATIC PLANT RESULTS :

Species	Exposure	EC50/LC50	Test Descriptor
Algae		5,000 mg/l	Product

AQUATIC MICROORGANISM RESULTS :

Species	Exposure	EC50/LC50	Test Descriptor
Pseudomonas putida		7,500 mg/l	Product

PERSISTENCY AND DEGRADATION :

Chemical Oxygen Demand (COD) : 563,000 mg/l

The organic portion of this preparation is expected to be readily biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D001, D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical Name(s) :	CYCLOHEXYLAMINE, DIETHYLAMINOETHANOL, MORPHOLINE
UN/ID No :	UN 2920
Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II
Flash Point :	55 °C / 131 °F

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical Name(s) :	CYCLOHEXYLAMINE, DIETHYLAMINOETHANOL, MORPHOLINE
UN/ID No :	UN 2920

Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II
IATA Cargo Packing Instructions :	812
IATA Cargo Aircraft Limit :	30 L (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical Name(s) :	CYCLOHEXYLAMINE, MORPHOLINE
UN/ID No :	UN 2920
Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Cyclohexylamine : Corrosive, Flammable
Diethylethanolamine : Combustible., Corrosive
Morpholine : Corrosive, Flammable

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required. Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product contains the following substance(s) which is listed in Appendix A and B as an Extremely Hazardous Substance. Listed below are the statutory Threshold Planning Quantity (TPQ) for the substance(s) and the Reportable Quantity (RQ) of the product. If a reportable quantity of product is released, it requires notification to your State Emergency Response Commission. You may also be required to notify the National Response Center - See CERCLA/SUPERFUND, above.

Extremely Hazardous Substance	TPQ	RQ
Cyclohexylamine	10,000 lbs	40,000 lbs

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard

X	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710) The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

The following limitations apply:

Maximum dosage	Limitation
45 PPM	in the steam.

This product can not be used where the steam produced will contact milk or milk products.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 062362
This product is acceptable for use in meat, poultry, and other food processing areas as a Boiler Treatment Product (G6), for treating boiler and steam lines where the steam produced may contact edible products. Acceptable usage shall be in accordance with the dosage limitations specified on the product label.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 111 (40 CFR 60, Volatile Organic Compounds), Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Morpholine	Sec. 111
• Cyclohexylamine	Sec. 111

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Cyclohexylamine	108-91-8
Morpholine	110-91-8
Diethylethanolamine	100-37-8

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
B3 - Combustible Liquids, E - Corrosive Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

THE PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippine Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Moderate

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 04/05/2005
Version Number : 1.9

PB BLASTER

Product: PB−B

Section 1: PRODUCT INFORMATION

Chemical family: Mixture.

Manufacturer: Truflex/Pang Rubber Products Company, Inc.
200 East Coshocton Street
P.O. Box 486
Johnstown, Ohio 43031.

Manufacturer emergency phone number: Chemtrec 800−424−9300.
International: 703−527−3887.

Information phone number: 740−967−9015.
800−433−8324.

Supplier: Same as manufacturer.

Product name: PB BLASTER (MSDS #113)

Product uses: Penetrating lubricant.

Catalog number(s): PB−B

TDG classification:

AEROSOLS
UN1950
Class 2.1.

May be shipped as Consumer Commodity ORM−D.

Labels required: None

Emergency response guidebook number: 126

EmS number: 2−13

Reportable Quantity (DOT): Not applicable.

Effective date: 2010/9/20

Revision No.: 3

Last review: 2010/9/20

NFPA:

Section 2: HAZARDOUS INGREDIENTS

C.A.S.	Concentration% wgt/wgt	Ingredient Name	ACGIH−TLV TWA	LD/50	LC/50
124−38−9	< 2	CARBON DIOXIDE	5000 PPM	NOT AVAILABLE	NOT AVAILABLE
34590−94−8	> 3	DIPROPYLENE GLYCOL MONOMETHYL ETHER	100 PPM (SKIN)	5400 UL/KG RAT ORAL 5.5 ML/KG RAT ORAL 10 ML/KG RABBIT DERMAL	NOT AVAILABLE
64742−57−0	20 − 30	PETROLEUM OIL	5 MG/M3	NOT AVAILABLE	NOT AVAILABLE

64742−94−5	> 50	NAPHTHA, PETROLEUM		> 2 ML/KG RABBIT DERMAL	> 590 MG/M3/4H RAT INHALATION
84133−50−0	> 2	ALKYLOXYPOLYETHYLENEOXYETHANOL		NOT AVAILABLE	NOT AVAILABLE

Section 3: PHYSICAL DATA

Physical state: Liquid.

Appearance & odor: Amber
Dark brown.
Strong aromatic odour.
Viscous liquid.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): >1

Volatiles (%)

By volume: 69.1

Evaporation rate (butyl acetate = 1): >1

Boiling point (°C): 178 − 215 (352−418°F)

Freezing point (°C): Not available.

pH: Not available.

Specific gravity @ 20 °C: 0.9020 (7.515 lbs/gal)

Solubility in water (%): Not available.

Coefficient of water\oil dist.: Not available.

VOC: 5.194 LBS/GAL (615.8 G/L)

Section 4: FIRE & EXPLOSION DATA

Flammability: Flammable aerosol.

Conditions of flammability: Vapours are heavier than air and may travel along the ground and be ignited by flames, sparks or other ignition sources at locations distant from the material handling point.
Heat, sparks and open flames.

Extinguishing media: Carbon dioxide, dry chemical, foam.

Special procedures: Self−contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto−ignition temperature: Not available.

Flash point (°C), method: Tag Closed Cup.
66.7 (152°F)

Lower flammability limit (% vol): Not available.

Upper flammability limit (% vol): Not available.

Explosion Data

Sensitivity to static discharge: Take precautionary measures against static discharge.

Sensitivity to mechanical impact: Contents under pressure.

Hazardous combustion products: Oxides of carbon (CO, CO2).
Various hydrocarbons.

Explosive power: Product (even just residue) can ignite explosively.

Section 5: REACTIVITY DATA

Chemical stability: Product is stable.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizing agents.

Hazardous decomposition products: See hazardous combustion products.

Section 6: TOXICOLOGICAL PROPERTIES

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of acute exposure

Eye contact: May cause irritation.
May cause redness and tearing.
May cause stinging.
May cause swelling.

Skin contact: May cause skin burns.
May cause mild irritation.
May cause drying and cracking.
May cause redness or burning sensation.

Inhalation: May cause drowsiness.
May cause kidney and liver damage.
May cause irritation of the respiratory tract.
May cause light headedness.

Ingestion: Can cause irritation to mouth, throat, esophagus and stomach.
Aspiration hazard if swallowed.

Effects of chronic exposure: May affect the central nervous system.

LD50 of product, species & route: Not available for mixture, see the ingredients section.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Section 7: PREVENTATIVE MEASURES

Precautionary Measures

Gloves/Type:

Chemical resistant gloves.
Polyvinyl alcohol gloves.
Nitrile gloves.

Respiratory/Type:

NIOSH approved respirator, if necessary.
(negative pressure type).

Footwear/Type:

Impervious boots.

Clothing/Type: Impervious clothing.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Explosion proof ventilation equipment.
Local exhaust and/or general ventilation.

Leak/Spill: Recover using a pump.
Eliminate all sources of ignition.
Dike area to prevent spreading.
Evacuate all non−essential personnel.
Prevent entry into drains, sewers, and other waterways.
Absorb residual material with sand or other absorbent material.
Stop leak if without risk.
Wear appropriate protective equipment.
Ground handling equipment.
Transfer to an approved container for disposal.
Notify the appropriate authorities as required.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Maintain a good personal hygiene.
Keep away from heat, sparks, and open flame.
Use adequate ventilation.
Wash thoroughly after using, particularly before eating or smoking.
Wear personal protective equipment appropriate to task.
Empty containers containing residue may cause a hazard.
Do not cut, grind, weld or drill empty container.
Use proper grounding procedures.
Avoid contact with skin, eyes and clothing.
Avoid breathing vapor, fumes or mist.
Launder contaminated clothing prior to reuse.
Do not ingest.

Storage requirements: Store away from all sources of ignition.
Store away from strong acids or oxidizers.

Special shipping information: See transportation information.

Section 8: FIRST AID MEASURES

Skin contact: Remove contaminated clothing.
Wash with mild soap and water.
Consult a physician if irritation persists.

Eye contact: Flush eyes with clear, running water for 20 minutes while holding eyelids open. If irritation persists, consult a physician.

Inhalation: Keep person warm and at rest.
Remove victim to fresh air. If breathing is difficult administer oxygen. If not breathing, have qualified person give artificial respiration. Obtain medical attention.

Ingestion: If victim is drowsy or unconscious, place on left side with head down. Do not leave individual unattended.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Additional information: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any inaccuracies.

Section 9: ADDITIONAL INFORMATION

General note: This material safety data sheet was prepared from information obtained from various sources, including product suppliers and the Canadian Center for Occupational Health and Safety.

Data prepared by: Global Safety Management
3340 Peachtree Road, #1800
Atlanta, GA 30326

Phone: 877−683−7460
Fax: (877) 683−7462

Web: www.globalsafetynet.com
Email: info@globalsafetynet.com.

See www.techtirerepairs.com for the latest MSDSs.

Material Safety Data Sheet

1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : **Shell Caprinus XR 40**
Uses : Engine oil.

Manufacturer/Supplier : **SOPUS Products**
700 Milam
700 Milam
Houston TX 77002-2806
Houston TX 77002-2806
USA
USA

MSDS Request :

Emergency Telephone Number
Spill Information : 877-242-7400
Health Information : 877-242-7400

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Identity	CAS No.	Concentration
Distillates (petroleum), hydrotreated light naphthenic	64742-53-6	30.00 - 60.00 %

The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.
Highly refined mineral oils and additives.

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance and Odour : Amber. Liquid at room temperature. Slight hydrocarbon.

Health Hazards : Not classified as dangerous for supply or conveyance.
Safety Hazards : Not classified as flammable but will burn.
Environmental Hazards : Not classified as dangerous for the environment.

Health Hazards : Not expected to be a health hazard when used under normal conditions.

Health Hazards
Inhalation : Under normal conditions of use, this is not expected to be a primary route of exposure.
Skin Contact : Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Contact : May cause slight irritation to eyes.
Ingestion : Low toxicity if swallowed.
Other Information : Used oil may contain harmful impurities.
Signs and Symptoms : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas.

		Ingestion may result in nausea, vomiting and/or diarrhoea.
Aggravated Medical Condition	:	Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.
Environmental Hazards	:	Not classified as dangerous for the environment.
Additional Information	:	Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

4. FIRST AID MEASURES

General Information	:	Not expected to be a health hazard when used under normal conditions.
Inhalation	:	No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
Skin Contact	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.
Eye Contact	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion	:	In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
Advice to Physician	:	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point	:	Typical 260 °C / 500 °F (COC)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V)(based on mineral oil)
Auto ignition temperature	:	> 320 °C / 608 °F
Specific Hazards	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
Suitable Extinguishing Media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media	:	Do not use water in a jet.
Protective Equipment for Firefighters	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations.

Protective measures	:	Avoid contact with skin and eyes. Use appropriate containment

to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

Clean Up Methods : Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice : Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

General Precautions : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

Handling : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.

Storage : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50 °C / 32 - 122 °F

Recommended Materials : For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials : PVC.

Additional Information : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Mist.)		5 mg/m3	
Oil mist, mineral	ACGIH	STEL(Mist.)		10 mg/m3	
Distillates (petroleum), hydrotreated light naphthenic	ACGIH	TWA(Mist.)		5 mg/m3	

Distillates (petroleum), hydrotreated light naphthenic	ACGIH	STEL(Mist.)		10 mg/m3	
Distillates (petroleum), hydrotreated light naphthenic	OSHA Z1	PEL	500 ppm	2,000 mg/m3	
Distillates (petroleum), hydrotreated light naphthenic	OSHA Z1A	TWA	400 ppm	1,600 mg/m3	

Additional Information : Shell has adopted as Interim Standards the OSHA Z1A values that were established in 1989 and later rescinded.

Exposure Controls : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

Personal Protective Equipment : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Respiratory Protection : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].

Hand Protection : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should

be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Eye Protection	:	Wear safety glasses or full face shield if splashes are likely to occur.
Protective Clothing	:	Skin protection not ordinarily required beyond standard issue work clothes.
Monitoring Methods	:	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Environmental Exposure Controls	:	Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Amber. Liquid at room temperature.
Odour	:	Slight hydrocarbon.
pH	:	Not applicable.
Initial Boiling Point and Boiling Range	:	> 280 °C / 536 °F estimated value(s)
Pour point	:	Typical -9 °C / 16 °F
Flash point	:	Typical 260 °C / 500 °F (COC)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature	:	> 320 °C / 608 °F
Vapour pressure	:	< 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Density	:	Typical 0.908 g/cm3 at 15 °C / 59 °F
Water solubility	:	Negligible.
n-octanol/water partition coefficient (log Pow)	:	> 6 (based on information on similar products)
Kinematic viscosity	:	Typical 150 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	:	> 1 (estimated value(s))
Evaporation rate (nBuAc=1)	:	Data not available

10. STABILITY AND REACTIVITY

Stability	:	Stable.
Conditions to Avoid	:	Extremes of temperature and direct sunlight.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition Products	:	Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
Acute Dermal Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit

Acute Inhalation Toxicity	:	Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation	:	Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation	:	Expected to be slightly irritating.
Respiratory Irritation	:	Inhalation of vapours or mists may cause irritation.
Sensitisation	:	Not expected to be a skin sensitiser.
Repeated Dose Toxicity	:	Not expected to be a hazard.
Mutagenicity	:	Not considered a mutagenic hazard.
Carcinogenicity	:	Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic effects.
Reproductive and Developmental Toxicity	:	Not expected to be a hazard.
Additional Information	:	Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Continuous contact with used engine oils has caused skin cancer in animal tests.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity	:	Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
Mobility	:	Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
Persistence/degradability	:	Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation	:	Contains components with the potential to bioaccumulate.
Other Adverse Effects	:	Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal	:	Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

IMDG
This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)
This material is not classified as dangerous under IATA regulations.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Federal Regulatory Status

Notification Status

DSL	All components listed.
EINECS	All components listed or polymer exempt.
TSCA	All components listed.

Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA.

SARA Hazard Categories (311/312)
No SARA 311/312 Hazards.

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

New Jersey Right-To-Know Chemical List

Distillates (petroleum), hydrotreated light naphthenic (64742-53-6)	Listed.

Pennsylvania Right-To-Know Chemical List

Distillates (petroleum), hydrotreated light naphthenic (64742-53-6)	Listed.

16. OTHER INFORMATION

NFPA Rating (Health, Fire, Reactivity)	:	0, 1, 0
MSDS Version Number	:	6.0
MSDS Effective Date	:	02/18/2010
MSDS Revisions	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
MSDS Regulation	:	The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
MSDS Distribution	:	The information in this document should be made available to all who may handle the product.
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

301

MATERIAL SAFETY DATA SHEET

Complies with OSHA Hazard Communication Standard 29 CFR 1910.1200

Date of Prep: 04/25/2011

SECTION 1

SUNNYSIDE CORPORATION
225 CARPENTER AVENUE
WHEELING, ILLINOIS 60090 (847) 541-5700
EMERGENCY TELEPHONE (800) 424-9300

FOR INFORMATION: (847) 541-5700
- SUNNYSIDE CORPORATION
- CHEM TREC

Product Class: Petroleum Hydrocarbon

Manufacturer's Code: 301

Trade Name: ODORLESS MINERAL SPIRITS
CALIFORNIA COMPLIANT

NPCA HMIS: Health: 1
Fire: 1
Reactivity: 0

Product Appearance and Odor: Clear, water-white liquid; mild petroleum odor.

SECTION 2 -- HAZARDOUS INGREDIENTS

OCCUPATIONAL EXPOSURE LIMITS

INGREDIENT	CAS #	PERCENT	ACGIH TLV (TWA)	ACGIH TLV (STEL)	OSHA PEL (TWA)	OSHA PEL (STEL)	VAPOR PRESSURE
Petroleum distillate	64742-47-8		N.E.	N.E.	N.E.	N.E.	0.07 MM Hg @ 20^{O} C.

SECTION 3 -- EMERGENCY AND FIRST AID PROCEDURES

Eye Contact: Flush eyes with plenty of water for 15 minutes while holding eyelids open. Get medical attention.

Skin Contact: Remove contaminated clothing/shoes. Flush skin with water. Follow by washing with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned.

Inhalation: Remove victim to fresh air and if breathing is difficult, oxygen should be provided by qualified personnel. Give artificial respiration if not breathing. Get medical attention.

Ingestion: Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Get medical attention.

SECTION 4 -- PHYSICAL DATA

The following data represent approximate or typical values. They do not constitute product specifications.

Boiling Range:	430-520^{O} (F)	Vapor Density:	Heavier than air
Evaporation Rate:	Slower than ether	% Volatile By Volume:	Approx. 100%
Weight Per Gallon:	6.67 lbs.	VOC: California ARB definition:	0.5% (4g/L)
Solubility in Water:	Negligible; less than 0.1%		

SECTION 5 -- FIRE AND EXPLOSION DATA

Flammability Classification: Non-flammable
Flash Point: 205^{O}(F) Tag. Closed cup
Autoignition Temperature: 477^{O}F
Lower Explosive Limit: 0.6%
Extinguishing Media: Carbon dioxide, foam, dry chemical, water spray. Do not use direct water stream; it will spread fire.
Unusual Fire and Explosion Hazards: Do not store or mix with strong oxidants.
Special Fire Fighting Procedures: Use air-supplied rescue equipment for enclosed areas. Cool exposed containers with water. Prevent run off from entering streams, sewers, or drinking water supply.

SECTION 6 -- HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE:	Not established. 166 ppm exposure recommended by manufacturer.
EFFECTS OF OVEREXPOSURE Acute Eye Contact:	May cause irritation, discomfort, redness and swelling of the eye.
Skin Contact:	Liquid is slightly irritating to the skin. Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis.
Inhalation:	Vapors may cause irritation to nose, throat and respiratory tract. Breathing of high vapor concentrations may result in headaches, dizziness and other signs of nervous system depression. These effects have been observed after misuse or abuse of this product. When used in a reasonable and foreseeable manner, no adverse effects are anticipated from exposure to this product.
Ingestion:	Ingestion may result in vomiting, aspiration (breathing) of vomitus into the lungs must be avoided as even small quantities may result in aspiration pneumonitis.
Chronic:	Repeated skin contact may aggravate an existing dermatitis (skin condition).
Carcinogenicity:	This product has not been identified as a carcinogen by NTP, IARC, or OSHA.
Medical Conditions Aggravated by Exposure:	Conditions aggravated by exposure may include skin disorders and respiratory (asthma-like) disorders.

SECTION 7 -- REACTIVITY DATA

Stability:	Stable
Conditions to Avoid:	Heat, sparks, flame, and high energy ignition sources..
Incompatibility (Materials to Avoid):	Strong oxidizing agents like liquid chlorine or concentrated oxygen.
Hazardous Decomposition Products:	Thermal decomposition may yield carbon dioxide and carbon monoxide.
Hazardous Polymerization:	Will not occur.

SECTION 8 -- SPILL OR LEAK PROCEDURES

Steps to be taken in case material is spilled or released: Remove ignition sources, evacuate area, avoid breathing vapor or contact with liquid. Recover free liquid or stop leak if possible. Dike large spills and use absorbent material for small spills. Keep spilled material out of sewers, ditches and bodies of water.

Waste disposal method: Incinerate under safe conditions; dispose of in accordance with local, state and federal regulations.

SECTION 9 -- SAFE HANDLING AND USE INFORMATION

Respiratory Protection:	Appropriate vapor canister, self-contained breathing apparatus or supplied-air hose mask, if needed.
Ventilation:	Sufficient, in volume and pattern, to keep workroom concentration below current applicable OSHA safety and health requirements. See Section 2. Use explosion-proof equipment. No smoking.
Protective Gloves:	Rubber or neoprene.
Eye Protection:	Chemical safety goggles.
Other Protective Equipment:	Impervious clothing or boots, if needed. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

SECTION 10 -- SPECIAL PRECAUTIONS

Dept. of Labor Storage Category:	Non-flammable.
Hygienic Practices:	Keep away from heat, sparks and open flame. Keep containers closed when not in use. Avoid eye contact. Avoid prolonged or repeated contact with skin. Wash skin with soap and water after contact.
Additional Precautions:	Ground containers when transferring liquid to prevent static accumulation and discharge. Additional information regarding safe handling of products with static accumulation potential can be ordered by contacting the American Petroleum Institute (API) for API Recommended Practice 2003, entitled "Protection Against Ignitions Arising Out of Static, Lighting, and Stray Currents" (American Petroleum Institute, 1720 L Street Northwest, Washington, DC 20005), or the National Fire Protection Association (NFPA) for NFPA 77 entitled "Static Electricity" (National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101).
Empty Container Warning:	"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks or other sources of ignition; they may explode and cause injury or death. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to supplier or disposed of in an environmentally safe manner and in accordance with governmental regulations.

SECTION 11 -- ADDITIONAL INFORMATION

This product contains the following toxic chemical(s) which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

TOXIC CHEMICAL	CAS #	APPROXIMATE % BY WEIGHT
NONE	NONE	NONE

SARA Title III Hazard Categories:	None.
Common Names:	Solvent Naphtha (Petroleum), Aliphatic Hydrocarbon, Petroleum Distillate
California Proposition 65:	This product may contain trace amounts of Benzene, Ethyl Benzene and Toluene- which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65.
TRANSPORTATION	Not regulated by U.S. D.O.T. as a hazardous material.

Material Safety Data Sheet: **Simple Green® All-Purpose Cleaner and Simple Green® Scrubbing Pad**
Version No. 13005-11B Date of Issue: September 2011 *ANSI-Z400.1-2003 Format*

Section 1: PRODUCT & COMPANY IDENTIFICATION

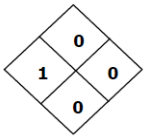
Product Name: Simple Green® All-Purpose Cleaner
Additional Names: Simple Green® Concentrated Cleaner Degreaser Deodorizer
Simple Green® Scrubbing Pad (Fluid in pad only)

Manufacturer's Part Number: **Please refer to page 4*

Company: Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Beach, CA 92649 USA
Telephone: 800-228-0709 ● 562-795-6000 Fax: 562-592-3830
Emergency Phone: Chem-Tel 24-Hour Emergency Service: 800-255-3924

Section 2: HAZARDS IDENTIFICATION

Emergency Overview: **CAUTION. Irritant. This is a Green colored liquid with a sassafras added odor. Scrubbing pad is a green fibrous rectangle infused with Simple Green Cleaner.**



NFPA/HMIS Rating:
Health = 1 = slight
Fire, Reactivity, and Special = 0 = minimal

Potential Health Effects

Eye Contact: Mildly irritating.
Skin Contact: No adverse effects expected under typical use conditions. Prolonged exposure may cause dryness. Chemically sensitive individuals may experience mild irritation.
Ingestion: May cause stomach or intestinal irritation if swallowed.
Inhalation: No adverse effects expected under typical use conditions. Adequate ventilation should be present for prolonged usage in small enclosed areas.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Percent Range
Water	7732-18-5	≥ 78%
2-butoxyethanol	111-76-2	≤ 5%
Ethoxylated Alcohol Mixture	Proprietary	≤ 5%
Tetrapotassium Pyrophosphate	7320-34-5	≤ 5%
Sodium Citrate	68-04-2	≤ 5%
Fragrance	Proprietary	≤ 1%
Colorant	Proprietary	≤ 1%

Section 4: FIRST AID MEASURES

If Inhaled: If adverse effect occurs, move to fresh air.
If on skin: If adverse effect occurs, rinse skin with water.
If in eyes: Flush with plenty of water. After 5 minutes of flushing, remove contact lenses, if present. Continue flushing for at least 10 more minutes. If irritation persists seek medical attention.
If ingested: Drink plenty of water to dilute.

Section 5: FIRE FIGHTING MEASURES

This formula is stable, non-flammable, and will not burn. No special procedures necessary

Flammability: Non-flammable
Flash Point: Non-flammable

Suitable Extinguishing Media: Use Dry chemical, CO2, water spray or "alcohol" foam.
Extinguishing Media to Avoid High volume jet water.
Special Exposure Hazards: In event of fire created carbon oxides, oxides of phosphorus may be formed.
Special Protective Equipment: Wear positive pressure self-contained breathing apparatus; Wear full protective clothing.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: See section 8 – personal protection.

Environmental Precautions: Do not allow into open waterways and ground water systems.

Method for Clean Up: Dilute with water and rinse into sanitary sewer system or soak up with inert absorbent material.

Section 7: HANDLING AND STORAGE

Handling: Keep container tightly closed. Ensure adequate ventilation. Keep out of reach of children.

Storage: Keep in cool dry area.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limit Values:	OSHA PEL	ACGIH TLV
2-butoxyethanol	TWA 50 ppm (240 mg/m^3)	20 ppm (97 mg/m^3)
Tetrapotassium Pyrophosphate		5 mg/m^3

Exposure Controls:
Eye Contact: Use protective glasses if splashing or spray-back is likely.
Respiratory: Use in well ventilated areas.
Skin Contact: Prolonged exposure or dermal sensitive individuals should use protective gloves.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Green Liquid	**Vapor Pressure:**	18 mmHg @20°C; 23.5 mmHg @26°C	
Odor:	Added Sassafras odor	**Density:**	8.5 lb/gal;	
Specific Gravity:	1.010 ± 0.010	**Water Solubility:**	100%	
pH:	9.5 ± 0.5	**VOC composite Partial Pressure:**		TBD
Boiling Point:	~210°F (98 °C)	**VOC:**	CARB Method 310	3.8%
Freezing Point:	~ 32°F (0 °C)		SCAQMD Method 313	2.8%
Nutrient Content:	Phosphorous: 0.28% Chloride: ~110 ppm	Sulfur: ~180 ppm Fluorine: ~90 ppm		

Section 10: STABILITY AND REACTIVITY

Stability:	Stable
Materials to Avoid:	None known
Hazardous Decomposition Products:	Normal products of combustion - CO, CO2; Oxides of Phosphorous may occur.

Section 11: TOXICOLOGICAL INFORMATION

Acute Toxicity: Oral LD_{50} (rat) > 5 g/kg body weight
Dermal LD_{50} (rabbit) > 5 g/kg body weight
Toxicity calculated from ingredients using OECD SERIES ON TESTING AND ASSESSMENT Number 33

Carcinogens: No ingredients are listed by OSHA, IARC, or NTP as known or suspected carcinogens.

Section 12: ECOLOGICAL INFORMATION

Hazard to wild mammals:	Low, based on toxicology profile
Hazard to avian species:	Low, based on toxicology profile
Hazard to aquatic organisms:	Low, based on toxicology profile
Chemical Fate Information:	Readily Biodegradable per OECD 301D, Closed Bottle Test

Section 13: DISPOSAL CONSIDERATIONS

Appropriate Method for Disposal:

Unused Product:	*Dilute with water to use concentration and dispose by sanitary sewer.
Used Product:	*This product can enter into clarifiers and oil/water separators. Used product may be hazardous depending on the cleaning application and resulting contaminants.
Empty Containers:	*Triple-rinse with water and offer for recycling if available in your area. Otherwise, dispose as non-hazardous waste.

*Dispose of used or unused product, and empty containers in accordance with the local, State, Provincial, and Federal regulations for your location. Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

Section 14: TRANSPORT INFORMATION

U.S. Department of Transportation (DOT) / Canadian TDG: Not Regulated
IMO / IDMG: Not classified as Dangerous
ICAO/ IATA: Not classified as Dangerous
ADR/RID: Not classified as Dangerous

U.N. Number	Not Required	Proper Shipping Name:	Detergent Solution
Hazard Class:	Non-Hazardous	Marine Pollutant:	No

Section 15: REGULATORY INFORMATION

All components are listed on: EINECS, TSCA, DSL and AICS Inventory.
No components listed under: Clean Air Act Section 112; Clean Water Act 307 & 311

SARA Title III: 2-butoxyethanol is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 as Category N230 – Certain Glycol Ethers.

RCRA Status: Not a hazardous waste CERCLA Status : No components listed

State Right To Know Lists

2-butoxyethanol Illinois, Massachusetts, New Jersey, Pennsylvania, Rhode Island

WHMIS Classification – Category D, subcategory 2B, eye irritant

Name	Toxic Substances List – Schedule 1 – CEPA (Canadian Environmental Protection Act)	NPRI Inventory
2-butoxyethanol	Yes	No

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by Canada's Controlled Products Regulation.

Section 16: OTHER INFORMATION

Questions about the information found on this MSDS should be directed to:
SUNSHINE MAKERS, INC. – TECHNICAL DEPARTMENT
15922 Pacific Coast Hwy. Huntington Beach, CA 92649
Phone: 800/228-0709 [8am-5pm Pacific time, Mon-Fri] *Fax:* 562/592-3830 *Email:* infoweb@simplegreen.com

CAGE CODE 1Z575
GSA/FSS - CONTRACT NO. GS-07F-0065J
Scrubbing Pad GSA/BPA - CONTRACT NO. GS-07F-BSIMP
National Stock Numbers & Industrial Part Numbers:

	Part Number	NSN	Size
Simple Green	13012	7930-01-342-5315	24 oz spray (12/case)
	13005	7930-01-306-8369	1 Gallon (6/case)
	13006	7930-01-342-5316	5 Gallon
	13016	7930-01-342-5317	15 Gallon
	13008	7930-01-342-4145	55 Gallon
	13103	N/A	2oz samples
	13225	N/A	2.5 Gallon
	13275	N/A	275 Gallon tote
	48049	N/A	1 Gallon Conc. w/ 32oz dilution
Scrubbing Pad	10224	7930-01-346-9148	Each (24/case)

Retail Numbers:

Part Number	Size
13002	16 oz Trigger (12/case)
13005	1 Gallon (6/case)
13013	24 oz Trigger (12/case)
13014	67 oz / 2 L (6/case)
13033	32 oz Trigger (12/case)
80007	Tier display holding 13005 (36/Tier)

part number is for both industrial and retail

****International Part Numbers May Differ.**

DISCLAIMER: The information provided with this MSDS is furnished in good faith and without warranty of any kind. Personnel handling this material must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of this material and the safety and health of employees and customers. Sunshine Makers, Inc. assumes no additional liability or responsibility resulting from the use of, or reliance on this information.

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910 1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

Micro-Blaze® Emergency Liquid Spill Control

Note: Blank spaces are not permitted. If any item is not applicable or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's name: Verde Environmental, Inc.	Emergency Telephone Number: 800 / 626-6598
Address: 9223 Eastex Freeway	Telephone Number for Information: 713 / 691-6468
Houston, Texas 77093-7001	Date Prepared: 01/01/2011
	Signature of Preparer: *William L. Scogin, President*

Section II—Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s)) CAS Number:	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
****** NO HAZARDOUS COMPONENTS OR INGREDIENTS ******				
Per OSHA –29 CFR 1910.1200 -- All ingredients are organic and completely biodegrable.				
Ingredients not precisely identified are proprietary or non-hazardous				

Section III—Physical/Chemical Characteristics

Boiling Point	100°C	Specific Gravity (H_20 = 1)	1.0
Vapor Pressure (mm Hg)	Equiv. water	Melting Point	N / A
Vapor Density (AIR = 1)	Equiv. water	Evaporation Rate (Butyl Acetate = 1)	N / A

Solubility in Water: 99%

Appearance and Odor: Cream to tan, opaque liquid, perfumed

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N / A	Non-flammable	----	----

Extinguishing Media: Non-flammable

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None - **NON-FLAMMABLE**

OSHA 174 Sept. 1985

Section V—Reactivity Data

Stability			Conditions to Avoid
	Unstable		
	Stable XXXX		

Incompatibility *(Materials to Avoid)* Strong acids or alkali compounds may inactivate biological cultures.

Hazardous Decomposition or Byproducts

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	XXXX	

Section VI—Health Hazard Data

Route(s) of Entry Inhalation? Skin? Ingestion?

Health Hazards *(Acute and Chronic)* May cause diarrhea if ingested in large amounts. **NON-TOXIC**

Organisms used are non-pathogenic. These organisms are susceptible to commonly use antibiotics.

Carcinogenicity N / A NTP? N / A IARC Monographs? N / A OSHA Regulated? N / A

Signs and Symptoms of Exposure Skin: slight redness on hands and forearms if individual has a history of dermal allergic reaction.

Medical Conditions Generally Aggravated by Exposure Dermal allergic reaction on skin if susceptible person has continual exposure.

Emergency and First Aid Procedures Ingestion: Drink water or milk to dilute. Induce vomiting only if advised by physician or poison control center.

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled May mop up spills; may flush down sanitary drain into waste water treatment lines.

Waste Disposal Method Disposal of this product or its residue must be done in accordance with all local, state and federal requirements.

Precautions to Be Taken in Handling and Storing Avoid eye contact.

Other Precautions To maintain shelf life, avoid temperatures under 32°F or over 120°F for long periods of time. Microbes are viable up to 180° F. KEEP FROM PROLONGED FREEZING.

Section VII—Control Measures

Respiratory Protection *(Specify Type)* Avoid breathing mists; mask advised if spraying in enclosed, unventilated space.

Ventilation	Local Exhaust	Special
	Mechanical *(General)*	Other Normal room ventilation.

Protective Gloves None required. Eye Protection Avoid splashing in eyes; may irritate.

Other Protective Clothing or Equipment None required.

Work/Hygienic Practices Minimize exposure in accordance with good hygiene practices.

We believe the statements, technical information and recommendations herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

Material Safety Data Sheet

1 - Chemical Product and Company Identification

Manufacturer: WD-40 Company **Address: 1061 Cudahy Place (92110)** **P.O. Box 80607** **San Diego, California, USA** **92138 –0607** **Telephone:** **Emergency only: 1-888-324-7596 (PROSAR)** **Information: 1-888-324-7596** **Chemical Spills: 1-800-424-9300 (Chemtrec)** **1-703-527-3887 (International Calls)**	**Chemical Name: Organic Mixture** **Trade Name: WD-40 Aerosol** **Product Use: Lubricant, Penetrant, Drives Out Moisture, Removes and Protects Surfaces From Corrosion** **MSDS Date Of Preparation: 6/8/12**

2 – Hazards Identification

Emergency Overview:
DANGER! Flammable aerosol. Contents under pressure. Harmful or fatal if swallowed. If swallowed, may be aspirated and cause lung damage. May cause eye irritation. Avoid eye contact. Use with adequate ventilation. Keep away from heat, sparks and all other sources of ignition.

Symptoms of Overexposure:
Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.
Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.
Eye Contact: Contact may be irritating to eyes. May cause redness and tearing.
Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. This product is an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis, severe lung damage and death.
Chronic Effects: None expected.
Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be aggravated by exposure.

Suspected Cancer Agent:
Yes No X

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent
Aliphatic Hydrocarbon	64742-47-8	45-50
Petroleum Base Oil	64742-58-1 64742-53-6 64742-56-9 64742-65-0	<25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Carbon Dioxide	124-38-9	2-3
Non-Hazardous Ingredients	Mixture	<10

4 – First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.
Eye Contact: Flush thoroughly with water. Remove contact lenses if present after the first 5 minutes and continue flushing for several more minutes. Get medical attention if irritation persists.
Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.

Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

5 – Fire Fighting Measures

Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.
Special Fire Fighting Procedures: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.
Unusual Fire and Explosion Hazards: Contents under pressure. Keep away from ignition sources and open flames. Exposure of containers to extreme heat and flames can cause them to rupture often with violent force. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back.

6 – Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area. Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use only with adequate ventilation. Keep away from heat, sparks, pilot lights, hot surfaces and open flames. Unplug electrical tools, motors and appliances before spraying or bringing the can near any source of electricity. Electricity can burn a hole in the can and cause contents to burst into flames. To avoid serious burn injury, do not let the can touch battery terminals, electrical connections on motors or appliances or any other source of electricity. Wash thoroughly with soap and water after handling. Keep containers closed when not in use. Keep out of the reach of children. Do not puncture, crush or incinerate containers, even when empty.
Storage: Store in a cool, well-ventilated area, away from incompatible materials. Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m3 TWA, 10 mg/m3 STEL ACGIH TLV 5 mg/m3 TWA OSHA PEL
LVP Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Carbon Dioxide	5000 ppm TWA (OSHA/ACGIH), 30,000 ppm STEL (ACGIH)
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product
Engineering Controls: Use in a well-ventilated area.
Personal Protection:
Eye Protection: Avoid eye contact. Always spray away from your face.
Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended
Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.
Personal Protection:
Eye Protection: Safety goggles recommended where eye contact is possible.

Skin Protection: Wear chemical resistant gloves.
Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.
Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Boiling Point:	361 - 369°F (183 - 187°C)	Specific Gravity:	0.8 – 0.82 @ 60°F
Solubility in Water:	Insoluble	pH:	Not Applicable
Vapor Pressure:	95-115 PSI @ 70°F	Vapor Density:	Greater than 1
Percent Volatile:	70-75%	VOC:	412 grams/liter (49.5%)
Coefficient of Water/Oil Distribution:	Not Determined	Appearance/Odor	Light amber liquid/mild odor
Flash Point:	122°F (49°C) Tag Open Cup (concentrate)	Flammable Limits: (Solvent Portion)	LEL: 0.6% UEL: 8.0%
Pour Point:	-63°C (-81.4°F) ASTM D-97	Kinematic Viscosity:	2.79-2.96cSt @ 100°F

10 – Stability and Reactivity

Stability: Stable
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.
Incompatibilities: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

The oral toxicity of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.
None of the components of this product is listed as a carcinogen or suspected carcinogen or is considered a reproductive hazard.

12 – Ecological Information

No data is currently available.

13 - Disposal Considerations

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

14 – Transportation Information_

DOT Surface Shipping Description: Consumer Commodity, ORM-D
After 1/1/2014 UN1950, Aerosols, 2.1 Ltd. Qty (Note: Shipping Papers are not required for Limited Quantities unless transported by air or vessel – each package must be marked with the Limited Quantity Mark)
IMDG Shipping Description: UN1950, Aerosols, 2.1, LTD QTY
ICAO Shipping Description: UN1950, Aerosols, flammable, 2.1 NOTE: WD-40 does not test aerosol cans to assure that they meet the pressure and other requirements for transport by air. We do not recommend that our aerosol products be transported by air.

15 – Regulatory Information

U.S. Federal Regulations:
CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.
SARA TITLE III:
Hazard Category For Section 311/312: Acute Health, Fire Hazard, Sudden Release of Pressure
Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
Section 302 Extremely Hazardous Substances (TPQ): None
EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory.
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): This product does not contain chemicals regulated under California Proposition 65.
VOC Regulations: This product complies with the consumer product VOC limits of CARB, the US EPA and states adopting the OTC VOC rules.
Canadian Environmental Protection Act: One of the components is listed on the NDSL. All of the other ingredients are listed on the Canadian Domestic Substances List or exempt from notification.
Canadian WHMIS Classification: Class B-5 (Flammable Aerosol)
This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

16 – Other Information:

HMIS Hazard Rating:
Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Reactivity – 0 (minimal hazard)

SIGNATURE: _____ TITLE: Adm. Scientific Manager

REVISION DATE: June 2012 SUPERSEDES: March 2010

Appendix H.1

Tesoro Savage Vancouver Energy Distribution Terminal
Vancouver, Washington

Biological Resources Report

29 August 2013

Prepared by:

BergerABAM
1111 Main Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.00

TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL
BIOLOGICAL RESOURCES REPORT

TABLE OF CONTENTS

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LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS & ABBREVIATIONS

BMP	best management practice
CALTRANS	California State Department of Transportation
CBFAT	Columbia Basin Fisheries Agencies and Tribes
CRWMB	Columbia River Wetland Mitigation Bank
CWCS	Comprehensive Wildlife Conservation Strategy
dbh	diameter at breast height
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EEZ	Exclusive Economic Zone
EFSEC	Energy Facility Site Evaluation Council (EFSEC)
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FC	federal candidate
FE	federal endangered
FERC	Federal Energy Regulatory Commission
FP	federal proposed
FSC	federal species of concern
FT	federal threatened low
FTA	Federal Transit Authority
LCFRB	Lower Columbia Fish Recovery Board
NMFS	National Marine Fisheries Service
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
ODFW	Oregon Department of Fish and Wildlife
OHWM	ordinary high water mark
PCE	primary constituent element
PHS	Priority Species and Habitat
PSMFC	Pacific States Marine Fisheries Commission
RM	river mile
SE	state endangered
SGCN	species of greatest conservation need

SOC	species of concern
SOPEP	shipboard oil pollution emergency plan
SPCC	spill prevention, control, and countermeasures
SS	state sensitive
ST	state threatened
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WDFW	Washington Department of Fish and Wildlife
WNHP	Washington Natural Heritage Program
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION

1.1 Project Background

Tesoro Savage Petroleum Terminal LLC is proposing to construct a Facility to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast (the proposed project). The project will require a site certification through the Washington State Energy Facility Site Evaluation Council (EFSEC), which requires an analysis of the potential for the proposed project to affect biological resources. The purpose of this biological resources report is 1) to document the extent of the habitat, vegetation, wildlife, fish, and wetland resources that could potentially be affected by the proposed project; 2) describe the impacts that the proposed project could potentially have on the biological resources; and 3) document the mitigation measures that will be employed to avoid minimize and mitigate for adverse impacts.

1.2 Location

The proposed Facility is located within the Port of Vancouver (Port) (Figures 1 and 2). The site is located on the north (Washington) shore of the Columbia River. State Route (SR) 501 (Lower River Road) is located immediately to the north of the site. Interstate 5 (I-5) is located approximately 2.5 miles east. Rail access to the site is available from the east. The site is located in the SE ¼ of Section 18, NW ¼ of Section 19, and the NW and NE ¼ of Section 20, Township 2 North, Range 1 East WM. Berths 13 and 14 are located at approximately Columbia RM 103.5.

1.3 Project Area of Potential Effect

This study included all of the areas that could be affected directly or indirectly by the construction, operation, decommissioning, or abandonment of the proposed project. The analysis was conducted at three scales: the project site, the project vicinity, and the project shipping prism.

1.3.1 Project Site

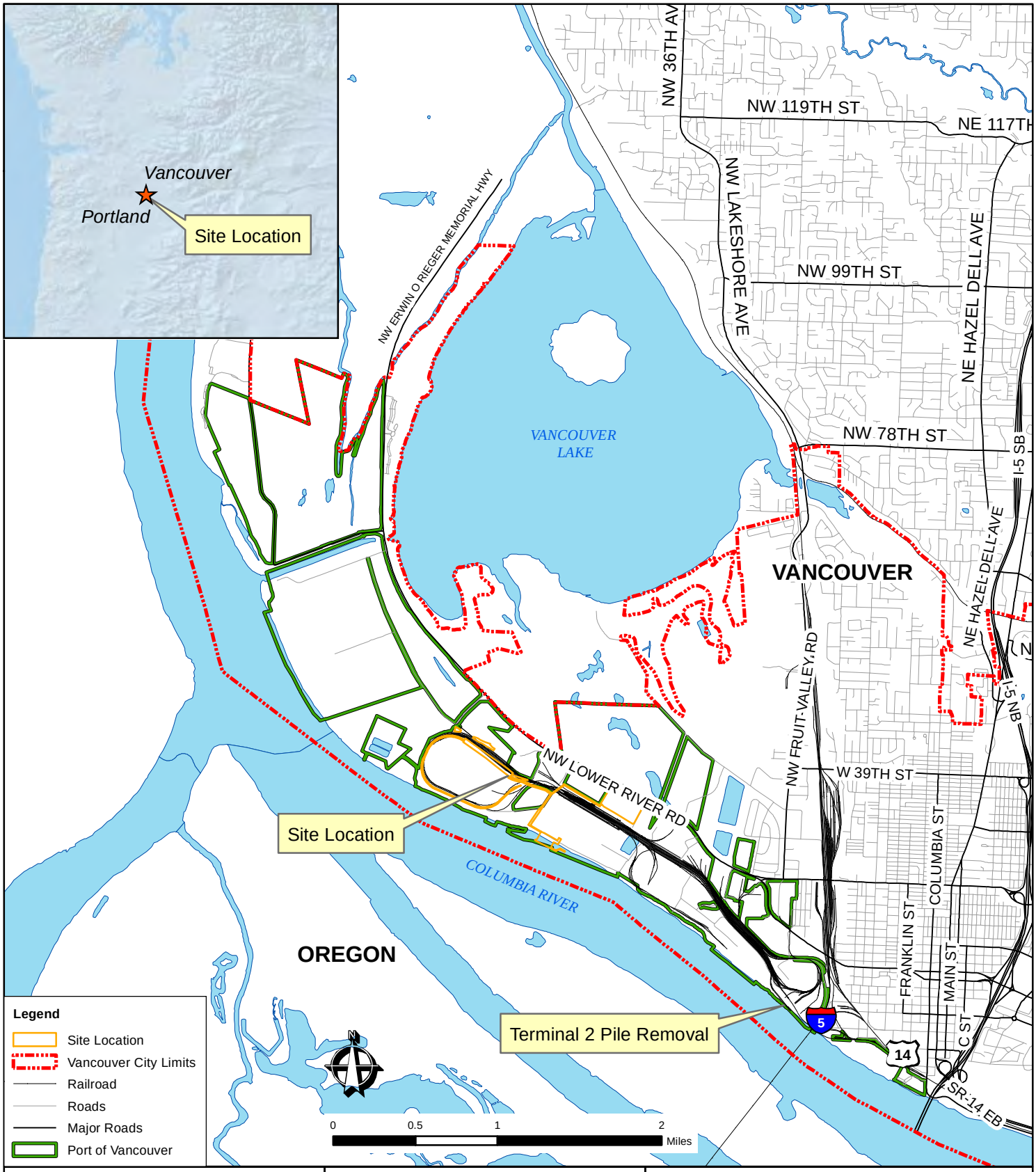
The majority of the analysis in this report is focused at the scale of the project site, as this is the area in which effects to biological resources will have the greatest potential to occur. The project site encompasses approximately 41.5 acres at the Port. Refer to Figures 3 and 4 below for a map of the existing conditions of the site. Ground-disturbing activities associated with project construction will occur only within the area of the project footprint.

1.3.2 Project Vicinity

The project vicinity includes parcels adjacent to the proposed project site as well as biologically important features within approximately 1 mile. Examples of features in the vicinity of the project include the wetland complexes associated with Vancouver Lake and the Shillapoo National Wildlife Refuge (NWR), the Columbia River Wetland Mitigation Bank (CRWMB), the Port's Parcel 1A and Parcel 2 wetland mitigation sites, and the wetlands and agricultural habitats on Port Parcel 3. Biological resources present within the project vicinity will not be directly impacted by the proposed project, but may be subject to effects associated with elevated noise from construction or operation, or from issues related to water quality.

1.3.3 Project Shipping Prism

A third scale of analysis includes the project's shipping prism – the area in which effects associated with increased shipping could occur. This area includes the entirety of the Lower Columbia River downstream of the site, as well as marine habitat off the coasts of Washington, Oregon, and California, out to the extent of the Exclusive Economic Zone (EEZ), a distance of 200 miles offshore. Biological resources that are outside the immediate project site and vicinity could be affected by factors such as increased potential for wake stranding of fish and the other effects discussed in section 5.2.



PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 1
VICINITY MAP

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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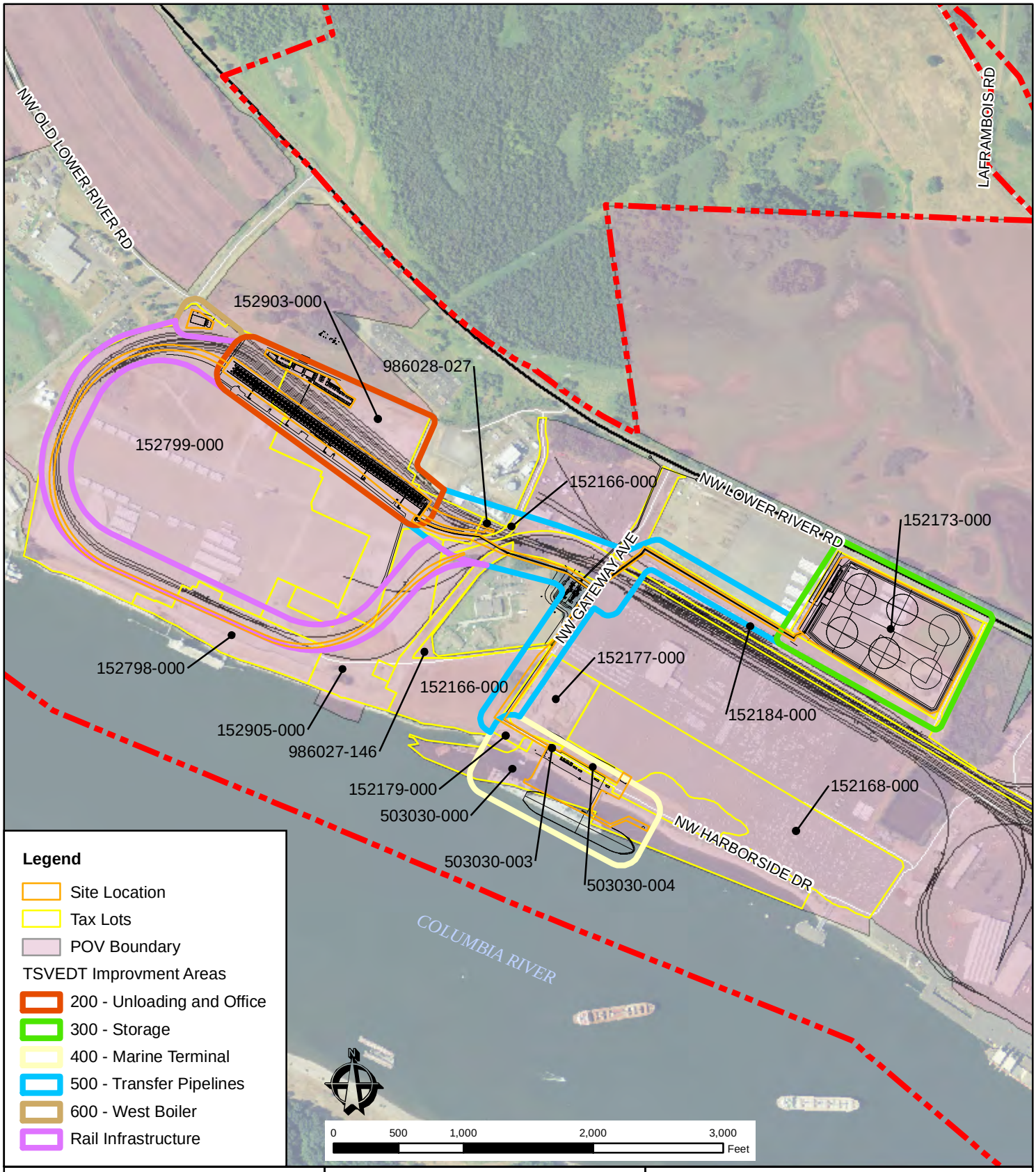

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APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 2
TAX LOTS

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 3
EXISTING CONDITIONS

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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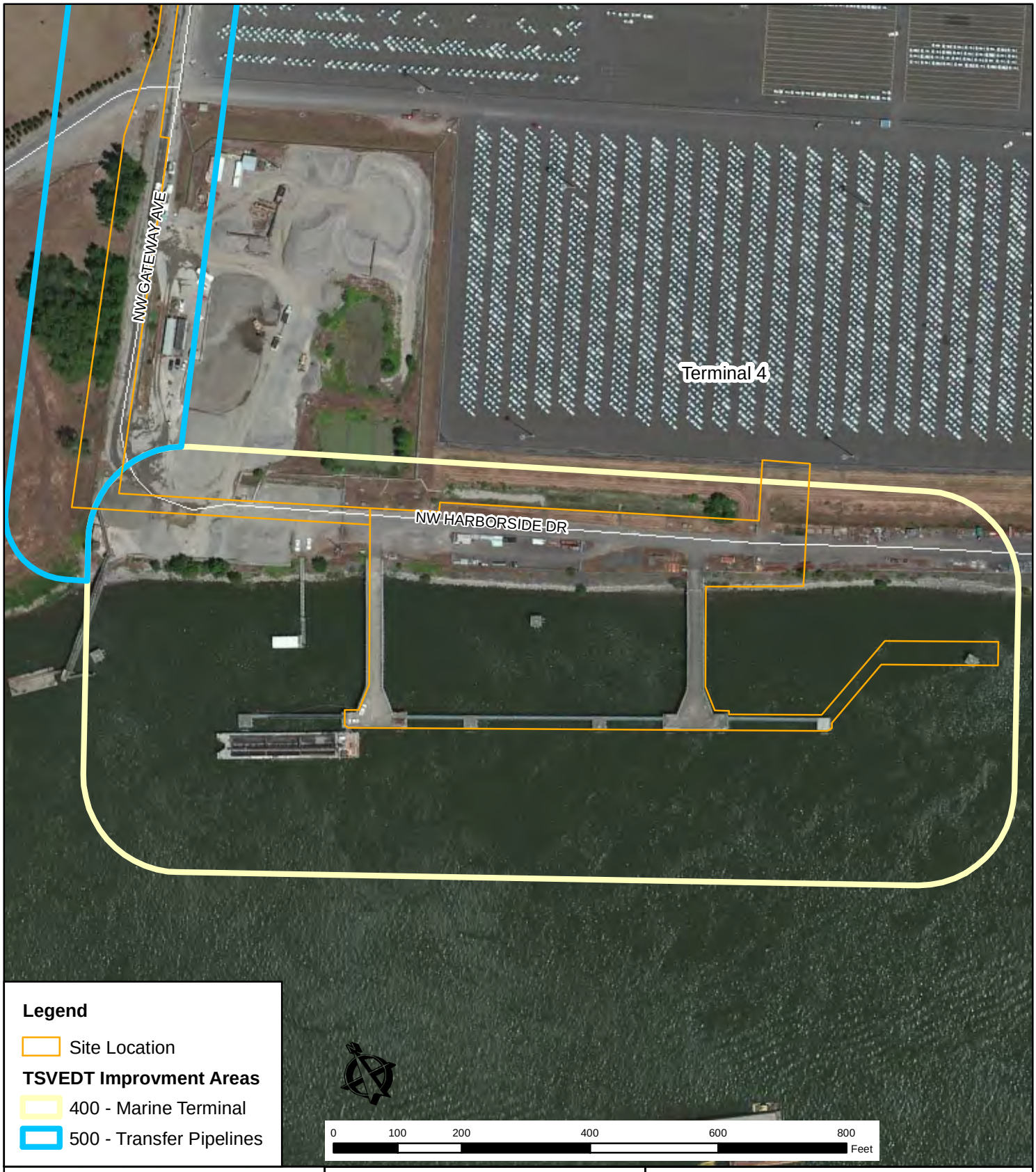

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APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 4
EXISTING CONDITIONS OF
AREA 400 MARINE TERMINAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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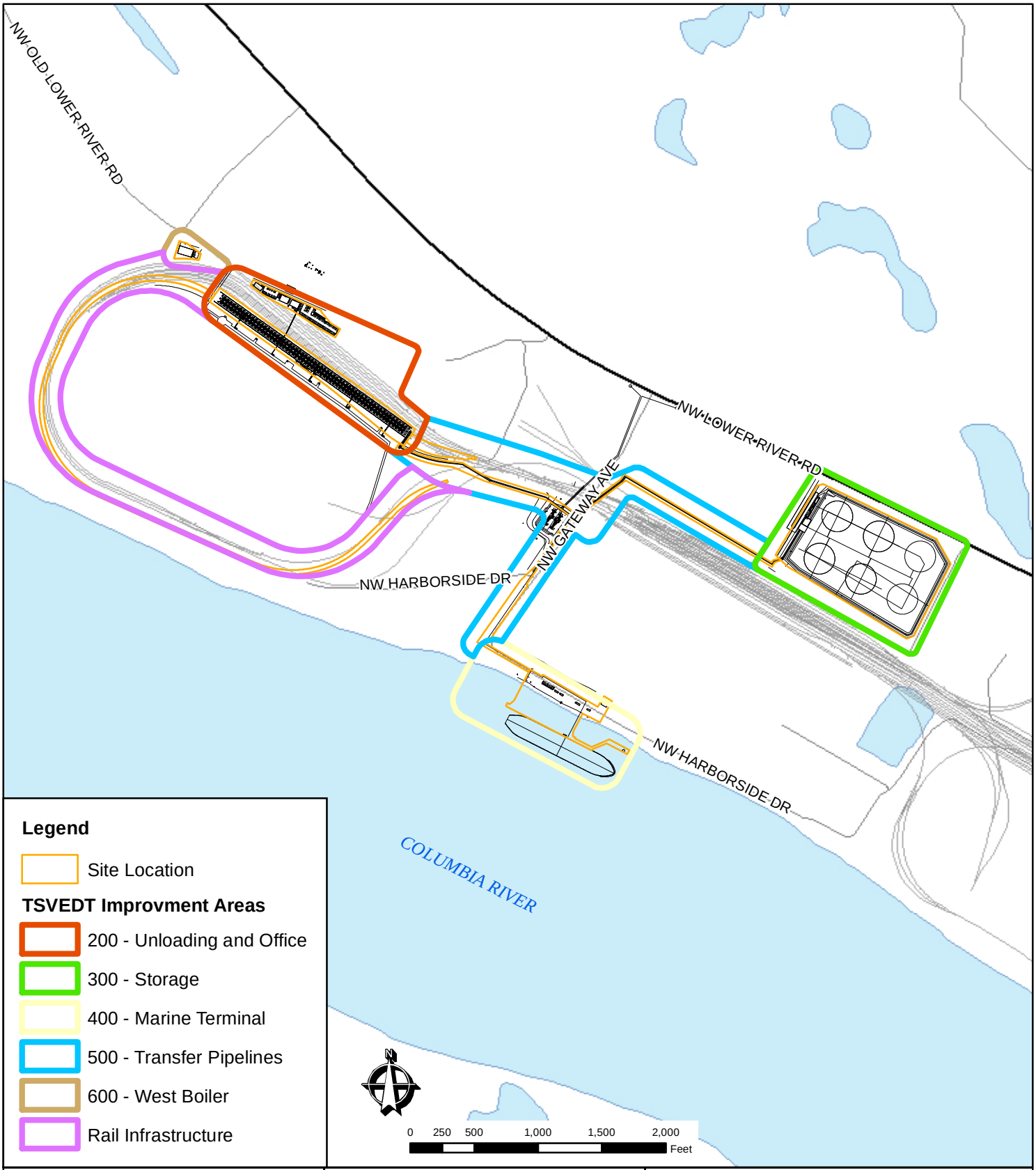
2.0 PROJECT DESCRIPTION

2.1 Project Overview

The Applicant is proposing to construct a Facility to receive crude oil by rail, store it on site, and load it on marine vessels for shipment to various consumers and end users located primarily on the West Coast. Unit trains will arrive at the project site and will be stationed on the Facility rail loops. The trains will be "indexed" through the unloading area (Area 200), where the crude oil will be gravity-drained into the transfer pipeline system (Area 500). The crude oil will be pumped through the transfer pipelines to the crude oil storage tanks (Area 300) where it will be held until the marine vessel loading operation. The storage tanks are also designed to allow blending the various types of crude oil at the Facility to meet customer demands for specific qualities. Marine vessels will arrive and moor at the dock (Area 400) where they will be preboomed. Crude oil will be pumped from the storage tanks to the loading area, and loaded to the marine vessels. See Figure 5 for a site plan of the proposed Facility.



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APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 5
OVERALL SITE PLAN

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

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STATE OF: WA
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TESORO SAVAGE PETROLEUM TERMINAL LLC

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2.2 Project Elements

In addition to the primary components described above, the Facility will include ancillary elements that will support the offloading, storage, and loading operations. The primary and ancillary elements are described in detail below. Table 2-1 summarizes the primary and ancillary project elements by Facility area.

Table 2-1 Summary of Primary and Ancillary Project Elements

Facility Area	Primary and Ancillary Project Elements
Rail Infrastructure	• Rail facility loops
200 – Unloading and Office	• Rail unloading area • Control rooms\E-houses • Fire Pump and Foam Building • Administrative and Support Buildings
300 – Storage	• Crude Oil Storage Tanks • Secondary Containment Berm • Boiler Building • Pump Basin • Control Room/E-House • Fire Pump and Foam Building
400 – Marine Terminal	• Marine Vessel Loading Hoses and Equipment • Control Room/E-House • Crane Control Room • Dock Safety Unit • Marine Vapor Control Unit (MVCU) • Vapor Blower Skid • Spill Prevention, Response and Containment Equipment • Dock Improvements • Fire Pump and Foam Building
500 – Transfer Pipelines	• Transfer Piping from Area 200 to Area 300 • Transfer Piping to/from Area 300 to Area 400 • Piping from vessel loading to MVCU
600 - West Boiler	• West Boiler Building

2.2.1 Area 200 – Administrative/Support and Rail Unloading

Area 200 is located at 5501 NW Lower River Road in Vancouver. The following Facility elements will be located in Area 200: administrative and support buildings, parking, rail access to the rail unloading facility, and the rail unloading facility. Area 200 will be accessible from an unnamed private road owned and maintained by the Port. Area 200 facilities will be constructed on approximately 7.59 acres.

2.2.2 Area 300 – Storage

Area 300 is located at the Port's Parcel 1A on the south side of NW Lower River Road just east of the existing Farwest Steel facility. The following Facility elements will be located in Area 300: product storage tanks and associated secondary containment, the Area 300 Boiler Building, and associated control and ancillary systems. Area 300 will be accessible from NW Gateway Avenue and NW Lower River Road via a shared private drive. Area 300 elements will be constructed on approximately 20.84 acres.

2.2.3 Area 400 – Marine Terminal

Area 400 is located at existing Port berths 13 and 14 on the Columbia River south of the current Subaru facility. The following Facility elements will be located in Area 400: product conveyance and loading facilities located on the dock, the marine vapor combustion units (MVCUs), emergency containment and response equipment, and control and ancillary facilities associated with vessel loading (see Figures 6 and 7) . This area will be accessed from Gateway Avenue and Harborside Drive by a driveway to be constructed with the project. Area 400 will be constructed on approximately 4.97 acres.

2.2.4 Area 500 – Transfer Pipelines

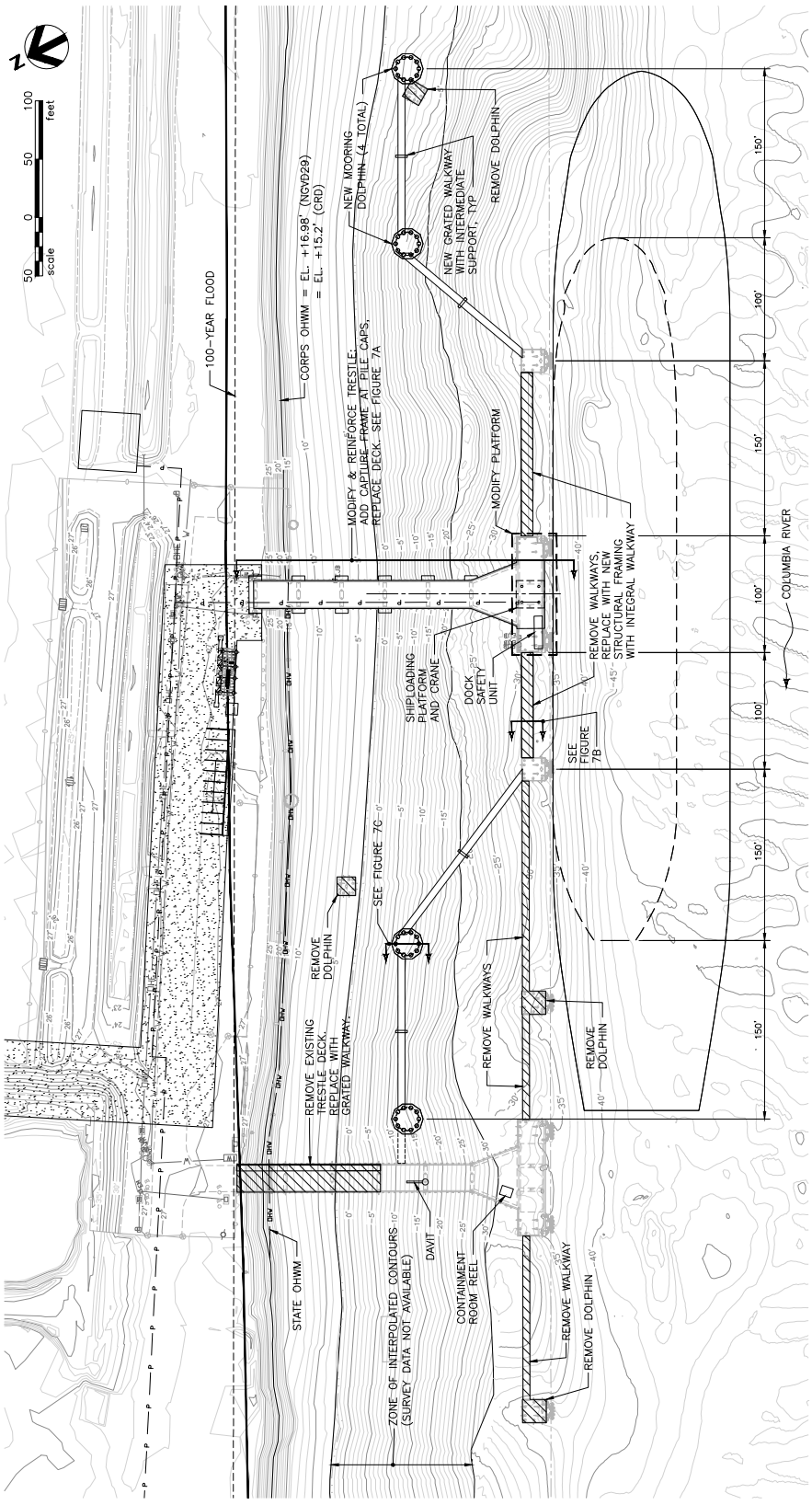
Area 500 consists of a non-exclusive easement located within Terminal 5, Parcel 1A, berths 13 and 14, and corridors adjacent to existing private Port roads. Area 500 includes the corridors for the approximately 38,500 lineal feet of transfer pipelines that will connect the Unloading (Area 200), Storage (Area 300), and Marine Terminal (Area 400) portions of the project. Area 500 will be constructed on approximately 2.20 acres.

2.2.5 Area 600 – West Boiler

Area 600 is located at the northwest corner of Terminal 5. The Area 600 Boiler Building and its associated parking will be constructed at this location. Area 600 will be accessed from Old Lower River Road and a private road owned and maintained by the Port. Area 600 facilities will be constructed on approximately 0.45 acre.

2.2.6 Rail Infrastructure

The project will require the construction of two additional rail loops (tracks 4106 and 4107) consisting of approximately 18,000 linear feet of new rail located on approximately 5.45 acres at Terminal 5. Existing Terminal 5 rail associated with the WVFA will be shifted; the shifting of existing facilities will be performed by others, has been previously permitted, and is not included within this request for Site Certification. A third rail loop (track 4105) is permitted for general Port use. This track will be transferred to exclusive use by the Facility once a sustained volume of 120,000 barrels per day is received by the Facility.



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APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 6
SITE PLAN AREA 400
MARINE TERMINAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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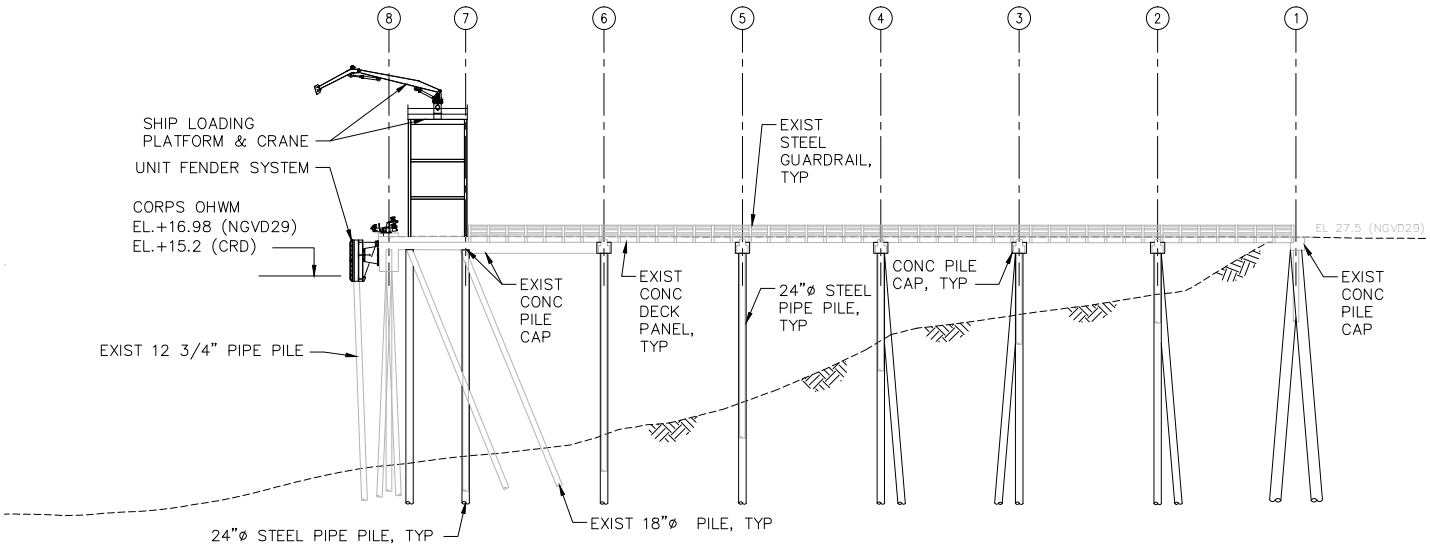
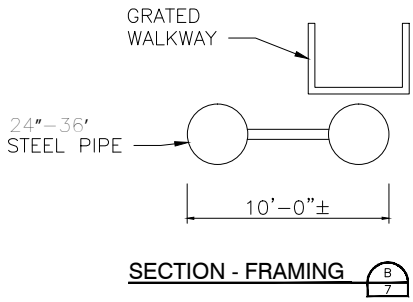
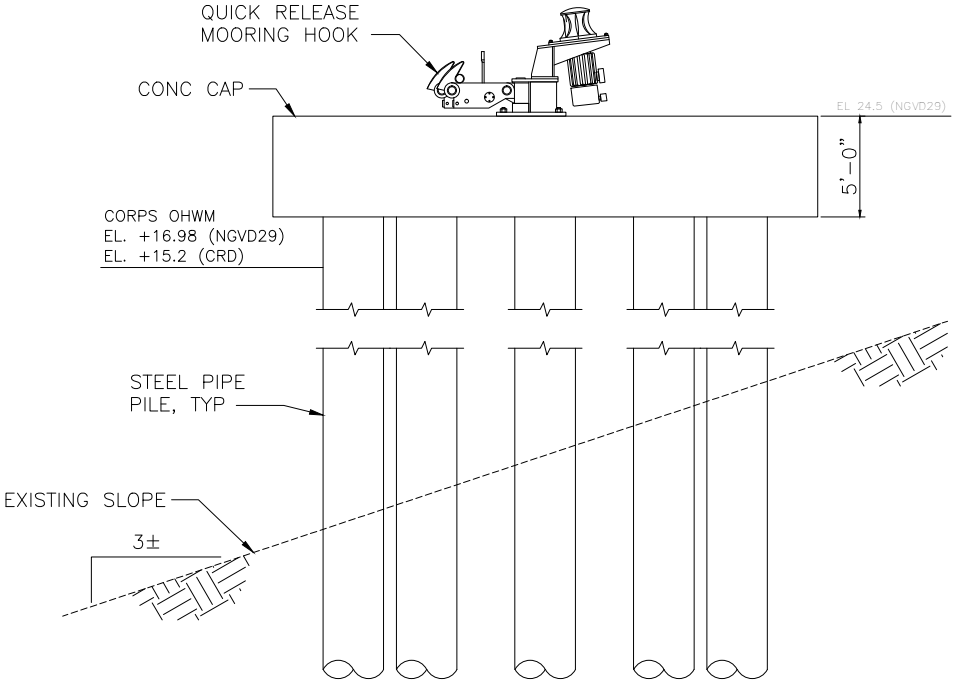


ELEVATION - LOOKING WEST A/7



SECTION - FRAMING B/7



ELEVATION- PLUMB PILE MOORING DOLPHIN C/7

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FIGURE 7
CROSS SECTION AREA 400
MARINE TERMINAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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3.0 METHODOLOGY

This section documents the methods that were used to evaluate the presence of biological resources and the baseline conditions of habitats and species, and to determine the nature and extent of effects that could result from the implementation of the proposed Facility. Project scientists coordinated with regulatory agency biologists, reviewed existing literature and reference material, and conducted field investigations at the project site.

3.1 Agency Coordination

Throughout the development and design of this proposed action, BergerABAM coordinated closely with staff from federal, state, and local regulatory agencies to identify issues of concern.

BergerABAM scientists and other members of the project team met with Jeff Fisher, NMFS on July 19, 2013, to introduce the project and identify NMFS' concerns with regards to ESA consultation. The primary potential issue identified by NMFS during this meeting was the increased potential for wake stranding associated with increased shipping that would result from the project.

BergerABAM scientists also had several email and telephone conversations with Steve Manlow, USACE, regarding the project and the USACE's review as it relates to the ESA consultation with NMFS and USFWS.

BergerABAM scientists and the project team continue to coordinate with federal, state, and local regulatory agencies as the project design is refined.

3.2 Literature and Reference Material Review

Information regarding the potential presence of special status plant species was obtained from the US Fish and Wildlife Service (USFWS) web site (USFWS 2013), and from a review of the Washington Natural Heritage Program (WNHP) database (WNHP 2013a). A list of species documented as occurring within the project vicinity, or with the potential to occur, was generated based on the potential presence or absence of appropriate habitat for each species.

Information regarding the potential presence of special status fish and wildlife species was obtained from the USFWS web site (USFWS 2013) and the National Marine Fisheries Service (NMFS) web site (NMFS 2013) on June 27, 2013. Additional information came from data from the Washington Department of Fish and Wildlife (WDFW) two on-line databases, Priority Habitat and Species (PHS) on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b), as well as from the 2008 PHS list (WDFW 2008).

Information regarding the potential presence of wetlands at the project site included a review of National Wetlands Inventory (NWI) data (USFWS 1989) and soils data (US Department of Agriculture Natural Resources Conservation Service [USDA NRCS] 2013), as well as a review of recent and historic permitting documentation.

3.3 Field Investigation

Biologists from BergerABAM conducted a site visit on May 28, 2013 to delineate the ordinary high water mark (OHWM) of the Columbia River at the project site, and to conduct a riparian habitat assessment and tree inventory. Biologists flagged the OHWM in the field, and this line was later recorded via professional land survey. Biologists also conducted a riparian vegetation inventory and habitat assessment, and measured and marked the locations of trees with diameters at breast height (dbh) of 6 inches or greater.

Biologists from BergerABAM also assessed terrestrial site conditions on June 27, 2013. Biologists visited the project site to evaluate and document habitat conditions and to document the presence/absence of wetlands on terrestrial portions of the site.

4.0 AFFECTED ENVIRONMENT

Figure 8 provides a reference map for the discussion of biological resources that follows. This figure provides a reference for the parcels and important habitat areas and features that are referred to in the discussion within this section. Since biological resources (habitat types, wetlands, surface waters) at the project site are limited, a detailed mapping of biological resources was not undertaken for this analysis.

4.1 Terrestrial Vegetation and Wildlife Habitat Resources

4.1.1 Vegetation and Wildlife Habitat Types

4.1.1.1 *Project Site*

Terrestrial vegetation and wildlife habitat at the project site are of limited quality and quantity. As a result of past development and cleanup activities, there is very little vegetation or wildlife habitat present on the upland portions of the site. Most of the project site has been filled, paved, and/or capped in association with previous development and cleanup activities.

The entirety of the site is within the Urban/Mixed Environs (high density) wildlife habitat classification described in *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neill 2001). The high density zone of the Urban/Mixed Environs habitat type is the habitat type that is the most drastically altered from its native condition. It has the smallest lot size, the tallest buildings, the least amount of total tree canopy cover, the lowest tree density, the highest percentage of exotics, the poorest understory and subcanopy, and the poorest vegetative structure (Johnson and O'Neill 2001).

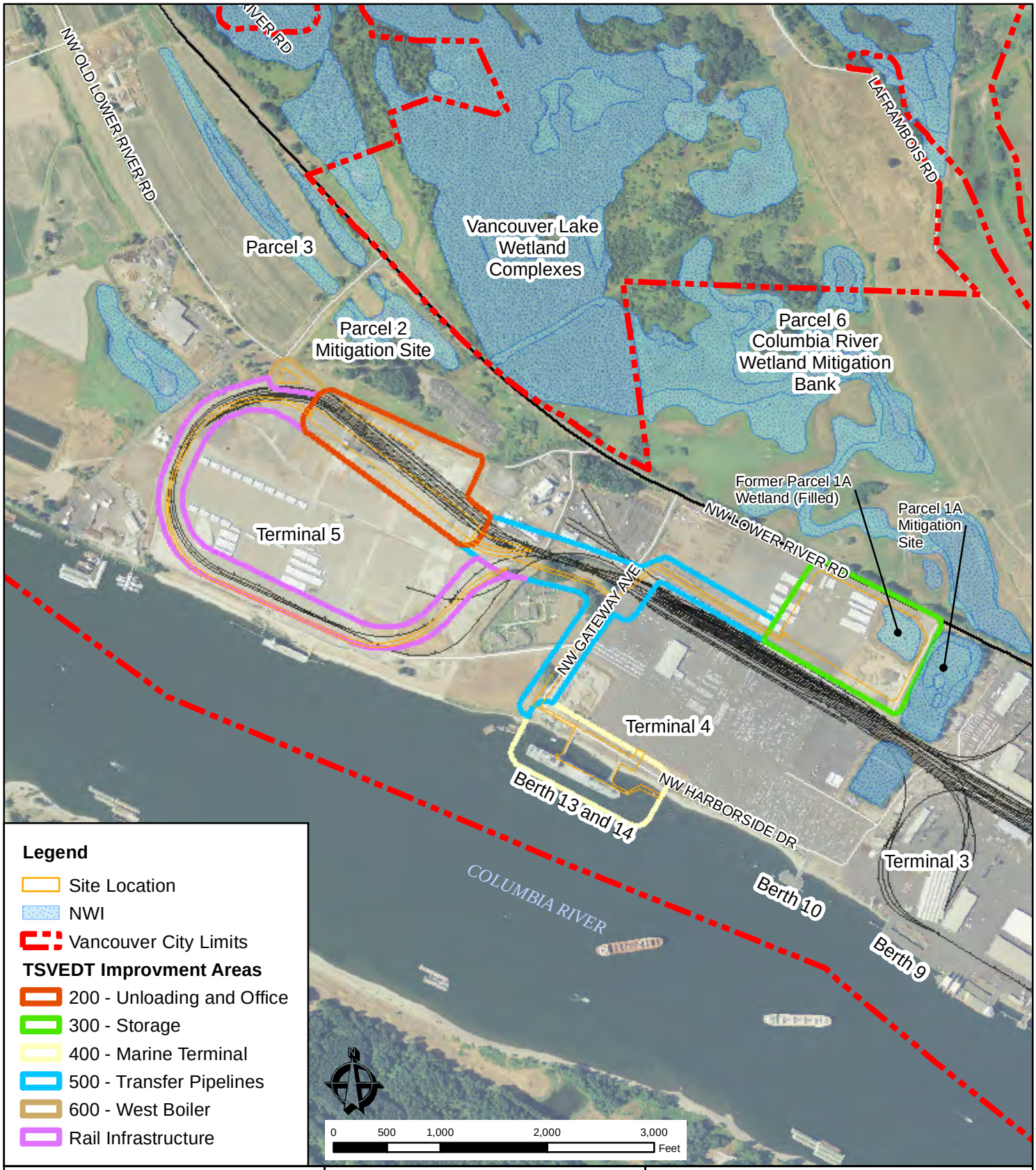
Within this habitat type, terrestrial habitat at the project site can be described according to the following subcategories.

(a) Unvegetated Industrial

The unvegetated industrial habitat type comprises most of the project site, and consists of unvegetated areas that are completely developed with industrial infrastructure such as buildings, rail lines, roads, and other paved and graveled surfaces. These areas are completely or nearly devoid of vegetation, and largely impervious. They provide little to no wildlife habitat function.

(b) Ruderal Upland Grass/Forb

Upland vegetation within the ruderal upland grass/forb habitat type is primarily limited to small patches of grasses and a mix of native and non-native weedy herbaceous species including colonial bentgrass (*Agrostis capillaris*), rabbitfoot clover (*Trifolium arvense*), white sweet clover (*Melilotus alba*), and Canada thistle (*Cirsium arvense*). These areas provide very little vegetation or wildlife habitat function, as they are small, isolated, patches of vegetation with little potential or opportunity to provide significant function.



PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 8
BIOLOGICAL RESOURCES OVERVIEW

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(c) Riparian

The extent of riparian habitat within the project site is very limited, as the bank drops steeply from the upland portion of the property down to the river, and the upland extent of functional riparian habitat is limited by existing impervious surfaces. The riparian area within the proposed project site is mostly devoid of vegetation with the exception of scattered trees and vegetation below the top of the bank. Impervious surfaces include existing roadways, material laydown areas, compacted soil, access trestles, and stormwater facilities.

Vegetation within the functional portion of the riparian habitat at the site consists primarily of small diameter black cottonwood and willows (*Salix* spp.), non-native false indigo bush (*Amorpha fruticosa*), and Himalayan blackberry (*Rubus armeniacus*). The bank is armored with riprap, and above the riprap there is a narrow band of ruderal grass/forb habitat.

The terrestrial portion of the riparian buffer most likely provides some small amount of habitat for wildlife species that can tolerate a wide range of habitat conditions and are conditioned to living in industrialized environments (e.g., ground squirrels, rabbits, opossum, raccoons, coyote, and common rodent species). In addition to these terrestrial mammals, the riparian buffer likely provides a small amount of seasonal foraging habitat for resident and migratory songbirds and shorebirds, as well as raptors.

Riparian habitats are defined by WDFW as a priority habitat because of the important hydrologic, water quality, and habitat functions they provide. However, due to the highly altered nature of the riparian habitat at the site (i.e. riprap armored bank, minimal riparian vegetation, lack of structural complexity), riparian habitat at the project site does not provide any significant hydrologic, water quality or habitat functions.

(d) Upland Cottonwood Stands

Small upland stands of black cottonwood are present on the Clark County Jail Work Center (Jail Work Center) property adjacent to the project site. These are small stands dominated almost exclusively by a closed canopy black cottonwood overstory, with occasional Oregon ash (Fraxinus latifolia) and limited understory vegetation. These stands are isolated from other forested areas in the vicinity by industrial infrastructure including rail tracks, roads, fences, and other paved surfaces. The isolated nature of these stands limits their habitat function and values. However, they do likely provide refuge and foraging habitat for migratory songbirds and small mammals as well as perching and nesting habitat for raptors. It is important to note that a significant portion of this tree stand is approved for the development of an electrical substation as a separate project and the majority of the stand will be removed to accommodate the development.

4.1.1.2 *Project Vicinity*

While there is little habitat present at the project site, there are several areas of relatively higher quality habitat adjacent to the project site, and within the immediate vicinity. These include emergent and forested wetland and forested habitats, and agricultural lands.

(a) Wetlands

The project site is located within the Vancouver Lake Lowlands, an area historically subject to seasonal flooding from Vancouver Lake and the Columbia River. Human activities, including dam construction, floodplain fills, diking, and streambank armoring, have significantly altered the hydrology of the Columbia River. These activities also resulted in a significant reduction in

the quantity and quality of wetland habitats in the Vancouver Lake Lowlands. However, there are still significant portions of the Vancouver Lake Lowlands that remain influenced by seasonal inundation and high groundwater tables, and these wetland habitats provide important water quality, hydrology, and habitat function.

The highest quality forested and emergent wetland habitat in the project vicinity is associated with the southern end of Vancouver Lake. The CRWMB, an approximately 154-acre wetland mitigation bank established in 2010, is located at the southern extent of this wetland complex. These wetlands provide high quality seasonally inundated habitats that most closely resemble the original hydrologic and wetland habitat functions of the Vancouver Lake Lowlands.

There are also two wetland mitigation sites in the vicinity of the project site. These sites were created and/or enhanced from upland sites, as compensatory mitigation for wetland impacts. The Parcel 1A wetland mitigation site, located immediately east of Parcel 1A, was created in 1994. The site is an approximately 7.9-acre depressional, palustrine, forested wetland, vegetated with mature black cottonwood trees and a variety of native shrubs and herbaceous species. The fifth and final year of monitoring was conducted in 2001 (David Evans and Associates 2001). This site is owned and maintained by the Port.

The Parcel 2 wetland mitigation site, also owned and maintained by the Port, is an approximately 16.4-acre mitigation site, situated on an approximately 31.3-acre parcel north of the existing Terminal 5 site. The mitigation site was established in 2000, and received final regulatory approval and release from further monitoring obligation from USACE in 2007. The site is currently a mosaic of forested, scrub-shrub, and emergent vegetation.

Several emergent wetlands also exist on Port parcels 3, 4, and 5, west of the Terminal 5 site. Because of their limited structural diversity, these wetlands primarily provide water quality functions but likely also provide some wildlife habitat functions.

Freshwater wetlands are a WDFW priority habitat, and they provide important habitat functions in addition to water quality and hydrologic functions. Wetlands can provide habitat for several species of waterfowl (i.e., mallard ducks, pintail, wigeon, merganser, gadwalls, green-winged teal, Canada goose, and snow goose), great blue heron, sandhill crane, and a variety of migratory songbird species. Mammals typically found in wetland habitats in the vicinity include beaver, raccoon, and coyote. Various reptile and amphibian species are frequently encountered as well.

(b) Riparian

Riparian habitats throughout most of this industrial reach of the Columbia River are heavily armored, with little native vegetation and little habitat function. While most of the shoreline within the Port is armored, some shoreline areas contain sandy banks, scattered rock, and large woody debris. However, approximately 1 mile downstream, adjacent to Port Parcel 3, there is a section of relatively intact forested riparian habitat that provides a relatively higher level of habitat function. The bank in this portion of the river is unarmored and a stand of mature black cottonwood trees has established itself. This stand of trees provides documented roosting and nesting habitat for bald eagle, and is also used by other raptor species, migratory songbirds, and mammals such as deer, raccoons, and coyote.

(c) Upland Cottonwood Stands

Several upland stands of black cottonwood, similar to those described in section 4.1.1.1 above, are present throughout the immediate project vicinity. These are small stands dominated almost

exclusively by black cottonwood and Oregon ash, typically with limited understory vegetation. These stands are frequently located near wetland and aquatic habitats and, as such, likely provide relatively higher quality habitat than the upland cottonwood stands present at the project site. These stands provide refuge and foraging habitat for migratory songbirds and small mammals, perching and nesting habitat for raptors, and cover and foraging habitat for upland mammals.

(d) Agricultural Lands

The Port's Parcel 3, located east and northeast of the Terminal 5 site, is leased for agricultural activities. Parcel 3, an approximately 517-acre parcel, is used mostly to grow row crops and as pasture for horses and cattle. A few remnant sloughs, oriented roughly parallel to the Columbia River, are present in the eastern portion of the parcel, and the northernmost of these sloughs is hydrologically connected to the Parcel 2 wetland mitigation site. A cottonwood-dominated riparian forest, described in subsection (b) above, borders the river, inland from a sandy beach and levee. Several emergent wetlands have been delineated on this parcel and are described in subsection (a) above. These lands provide significant foraging habitat for geese and cranes as well as for other migratory birds and for a variety of small mammal species.

4.1.1.3 *Shipping Prism*

There are no terrestrial vegetation or terrestrial habitat resources present in the Project Shipping Prism.

4.1.2 Special Status Terrestrial Species

Special status species are defined for purposes of this report as those identified for protection under federal or state laws. They are either (1) listed, proposed for listing, or identified as a candidate species or species of concern under the federal Endangered Species Act of 1973 (ESA), or (2) are plant species identified as endangered, threatened or sensitive by the Washington Natural Heritage Program (WNHP), or (3) are identified as PHS, species of concern (SOC), or species of greatest conservation need (SGCN) by WDFW.

4.1.3 Special Status Plant Species

This section evaluates the potential for special status plant species to occur within the project area. A review of the WNHP database did not identify any documented occurrences of any special status plant species within the township/range/sections in which the project site is located (WNHP 2013a). The potential for these species to occur at the project site was evaluated based on the presence or absence of appropriate habitat for each species. Table 4-1 lists the special status plant species known to occur within Clark County (WNHP 2012).

Table 4-1. Special Status Plant Species and Their Potential to Occur within the Project Site or Vicinity

Species	Federal	State	Potential for Occurrence	
	ESA Listing Status[1]	State Listing Status[2]	Project Site	Project Vicinity
Oregon Bolandra (*Bolandra oregana*)	None	SC	Low – no suitable habitat on site	Low – riparian species requiring deep shade
Dense Sedge (*Carex densa*)	None	ST	Low – no suitable habitat on site	Low – peripheral species of intertidal marshlands
Golden Paintbrush (*Castilleja levisecta*)	FT	SE	Low – no suitable habitat on site	Low – rare species of open grasslands in Puget trough on glacial outwash
Tall Bugbane (*Cimicifuga elata*)	FSC	SS	Low – no suitable habitat on site	Low – understory species of lowland forests
Few-Flowered Collinsia (*Collinsia sparsiflora* var. *brucea*)	None	SS	Low – no suitable habitat on site	Low - thin soils over basalt on a variety of slopes in Columbia Gorge.
Clackamas Corydalis (*Corydalis aquae-gelidae*)	FSC	SS	Low – no suitable habitat on site	Low – mid-elevation riparian species of hemlock and fir forests
Oregon Coyote-Thistle (*Eryngium petiolatum*)	None	ST	Low – no suitable habitat on site	Moderate – rare species of wet prairies and low ground
Western Wahoo (*Euonymus occidentalis*)	None	ST	Low – no suitable habitat on site	Low – shaded forest understory species
Western Sweetvetch (*Hedysarum occidentale*)	None	ST	Low – no suitable habitat on site	Low – high elevation species
Water Howellia (Howellia aquatilis)	FT	ST	Low – no suitable habitat on site	Moderate – aquatic species of small vernal ponds
Nuttall's Quillwort (Isoetes nuttallii)	None	SS	Low – no suitable habitat on site	Low – Terrestrial species of wet ground, seeps, and in mud near vernal pools
Smooth Goldfields (*Lasthenia glaberrima*)	None	SE	Low – no suitable habitat on site	Moderate – rare species of wet streambanks and vernal pools.
Torrey's Peavine (*Lathyrus torreyi*)	FSC	FT	Low – no suitable habitat on site	Low – open areas within Douglas fir-dominated sites
Bradshaw's Lomatium (*Lomatium bradshawi*i)	FE	SE	Low – no suitable habitat on site	Moderate – wet, seasonally flooded prairies and grasslands near creeks and small rivers.
Branching Montia (*Montia diffusa*)	*None*	SS	Low – no suitable habitat on site	Low – moist Douglas fir forests
California Broomrape (*Orobanche californica ssp. grayana*)	None	X	Low – no suitable habitat on site	Low – thought to be extirpated from WA

Species	Federal	State	Potential for Occurrence	
	ESA Listing Status[1]	State Listing Status[2]	Project Site	Project Vicinity
Western Yellow Oxalis (*Oxalis suksdorfii*)	None	ST	Low – no suitable habitat on site	Low - meadows and moist woods, rare in Clark County
Western False Dragonhead (*Physostegia parviflora*)	None	SS	Low – no suitable habitat on site	Low – wet to mesic prairies, damp thickets, and banks of streams and ponds
Wheeler's Bluegrass (*Poa nervosa*)	None	SS	Low – no suitable habitat on site	Low - rock outcrops, cliff crevices, and occasionally in talus
Great Polemonium (*Polemonium carneum*)	None	ST	Low – no suitable habitat on site	Low - woody thickets, open and moist forests, prairie edges, roadsides, fence lines
Idaho Gooseberry (*Ribes oxyacanthoides* ssp. *irriguum*)	None	ST	Low – no suitable habitat on site	Low – streams and canyons in eastern WA
Soft-leaved willow (*Salix sessilifolia*)	None	SS	Low – no suitable habitat on site	Moderate – Variety of lowland riparian habitats
Hairy-Stemmed Checkermallow (*Sidalcea hirtipes*)	None	ST	Low – no suitable habitat on site	Moderate – prairie fragments along fencerows and openings along drainages
Western Ladies Tresses (*Spiranthes porrifolia*)	None	SS	Low – no suitable habitat on site	Moderate – Wet meadows, along streams, in bogs, and on seeps. Have previously been found on the Port's Parcel 3
Hall's Aster (*Symphyotrichum hallii*)	None	ST	Low – no suitable habitat on site	Moderate – dry to moist prairies in valleys and plains
Small-Flowered Trillium (*Trillium parviflorum*)	None	SS	Low – no suitable habitat on site	Moderate – moist forested habitats dominated by hardwoods
California Compassplant (*Wyethia angustifolia*)	None	SS	Low – no suitable habitat on site	Moderate – grasslands, meadows, and other open habitats

[1] ESA Classifications: FE = federal endangered; FT = federal threatened low – no suitable habitat on site; FSC = species of concern; FP = federal proposed; FC = federal candidate.

[2] Washington State Status: SE = state endangered; ST = State threatened; SS = State Sensitive; X = possibly extinct or extirpated;

Source: (WNHP 2012)

State listed threatened or endangered plant species are not protected by state legislation or regulation, but are listed as threatened or endangered to assist with agency management and decision-making. The WNHP also places a management priority on the preservation of high-quality native plant communities; however, no high-quality native plant communities exist on the property.

At the federal level, a listing of species of concern is for advisory and management purposes only, as there may be insufficient information to support listing. The category of threatened is applied to plants that are likely to become endangered within the near future if factors contributing to its population decline, or habitat degradation or loss, continue. Plants listed as federally threatened or endangered are protected under the ESA, which is regulated by the USFWS.

Summaries of the habitat requirements for each species and its likelihood of occurrence within the project site or vicinity are presented below.

4.1.3.1 *Oregon bolandra (Bolandra oregana)*

This species occurs along the Columbia River drainage mostly at low elevations; it is usually found near streams and moist, rocky places in deep shade. Associated species include shooting star (*Dodecatheon dentatum*), western saxifrage (*Saxifraga occidentalis*), streambank spring beauty (*Montia parviflora*), and clasping arnica (*Arnica amplexicaulis*). This species grows in a variety of habitats. Although it usually is found in moist, shady, wooded areas on cliffs near waterfalls, it has also been found in open, rocky areas and on steep, grassy, semi-open slopes (WNHP 2013b). Documented sightings in the region are limited to East Clark County, near the entrance to the Columbia River Gorge.

This species is not documented or expected to occur at the project site or within the vicinity.

4.1.3.2 *Dense sedge (Carex densa)*

This is a peripheral species in Washington, known from only a few documented sightings. The primary habitat in Washington is eroding hummocks in intertidal marshland (WNHP 2013). The species has been reported from small cutbanks along rivers and shaded springs at high elevations (WNHP 2013b). Associated species include coyote willow (*Salix exigua*), riverbank wormwood (*Artemisia lindleyana*), Columbia coreopsis (*Coreopsis atkinsoniana*), sneezeweed (*Helenium autumnale*), awned flatsedge (*Cyperus aristatus*), and conyza (*Conyza* sp.).

This species is not documented or expected to occur at the project site or within the vicinity.

4.1.3.3 *Golden paintbrush (Castilleja levisecta)*

This species occurs in open grasslands in the Puget Trough. The preferred substrate is generally composed of glacial outwash or depositional material. The species prefers sun and can tolerate partial shade, but will not tolerate a closed canopy. The most common associate is, depending on the site, variously Idaho fescue (Festuca idahoensis) or red fescue (*Festuca rubra*). Many weedy species also occur as associated species, as most of these areas have suffered from past disturbances (WNHP 2013b). There are no recent documented occurrences of golden paintbrush in Clark County.

The project site and vicinity do not provide suitable habitat for golden paintbrush, and this species is not documented or expected to occur at the project site or within the vicinity.

4.1.3.4 *Tall bugbane (Cimicifuga elata)*

This species is a tall understory plant of lowland forests. In Washington, it occurs in the Western Cascades, Puget Trough, Olympic Peninsula, and Southwest Washington physiographic provinces (WNHP 2013b). The species grows in or along the margins of mixed, mature or old growth stands of mesic coniferous forest, or mixed coniferous-deciduous forest. Associated species include Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), vine maple (*Acer circinatum*), oceanspray (*Holodiscus discolor*), hazelnut (*Corylus cornuta*), sword fern (*Polystichum munitum*), and snowberry (*Symphoricarpos albus*).

The project site and vicinity do not provide suitable habitat for this species, and it is not documented or expected to occur at the project site or within the vicinity.

4.1.3.5 *Few-flowered collinsia (Collinsia sparsiflora var. bruceae)*

In Washington, this species occurs in thin soils over basalt on a variety of slopes, from almost flat to rather steep, generally south-facing, at elevations ranging from 200 to 1000 feet. The microsites are generally quite open, but may be adjacent to or found within open stands of ponderosa pine (*Pinus ponderosa*) and Oregon white oak (*Quercus garryana*) (WNHP 2013b).

This type of habitat does not occur at the project site or within the project vicinity.

4.1.3.6 *Clackamas corydalis (Corydalis aquae-gelidae)*

This species is a regional endemic species to Clackamas and Multnomah counties in Oregon, and Clark and Skamania counties in Washington. The species occurs primarily in western hemlock (*Tsuga heterophylla*) and Pacific silver fir (*Abies amabilis*) forest habitats at elevations ranging from 2500 to 3800 feet. It is found growing in or near cold flowing water, including seeps and small streams, often occurring within the stream channel itself (WNHP 2013b).

These habitats do not occur at the project site or within the project vicinity.

4.1.3.7 *Oregon coyote-thistle (Eryngium petiolatum)*

This species occurs from the Willamette Valley of Oregon to the eastern end of the Columbia Gorge in Washington and Oregon. In Washington, the taxon is restricted to a very small area within western Klickitat and Clark counties. It occurs in wet prairies and low ground, especially in places submerged in the spring and drier in the summer (WNHP 2013).

There is no potentially suitable habitat at the project site. The greater Vancouver Lake Lowlands, particularly the seasonally inundated habitats south of Vancouver Lake and within the CRWMB may provide potentially suitable habitat for Oregon coyote-thistle. However, this species is rare in Washington, and has not been documented in the vicinity.

4.1.3.8 *Western wahoo (Euonymus occidentalis)*

This species grows in woods on the west side of the Cascade Mountains. It is often found in shaded, moist draws and ravines. In the Puget Trough area it associated with remnant oak savannah. This species prefers moist, wooded/forested areas but is sometimes found in grassy areas with some trees (WNHP 2013b). These habitats do not occur at the project site or within the project vicinity.

4.1.3.9 *Western sweetvetch (Hedysarum occidentale)*

This species is found in meadows, shrubfields, bare rock outcrops, boulder-fields, and talus-slopes at elevations between approximately 3150 and 6500 feet in Washington. These habitats are not present at the project site or within the project vicinity.

4.1.3.10 *Water howellia (Howellia aquatilis)*

This species is a regional endemic species that occurs in low elevation minerotrophic wetland habitats, particularly small vernal ponds. The species apparently requires exposure to air to germinate and inundation for growth in the spring. This restricts the species to the zone within wetlands that is seasonally inundated, but which dries out in late summer or early fall (WNHP 2013b). Documented occurrences in Clark County are located downstream of the project area, in the vicinity of the Ridgefield National Wildlife Refuge.

There is no potentially suitable habitat at the project site. The seasonally inundated habitats south of Vancouver Lake and within the CRWMB may provide potentially suitable habitat for water howellia. However, this species has not been documented in the vicinity of the project.

4.1.3.11 *Nuttall's quillwort (Isoetes nuttallii)*

This species is currently known from Cowlitz, San Juan, and Thurston counties in Washington, but its range may extend into Clark County. It is an inconspicuous plant found from low to middle elevations in wet ground or seepages and in mud near vernal pools. It is known from only a few recent sites. However, it can be rather inconspicuous and may be somewhat more widespread than the data currently suggest (WNHP 2013b).

There is no potentially suitable habitat at the project site. The seasonally inundated habitats south of Vancouver Lake and within the CRWMB may provide potentially suitable habitat for Nuttall's quillwort. However, this species has not been documented in the vicinity of the project.

4.1.3.12 *Smooth goldfields (Lasthenia glaberrima)*

This species is typically found on wet stream banks and in vernal pools. It is a rare species in Washington, known only from one historical occurrence from Clark County and one recent occurrence from Klickitat County. Very little information is known about this species (WNHP 2013b). All moist areas, vernal pools, and wetlands in Clark and Klickitat Counties are considered potentially suitable habitat.

There is no potentially suitable habitat at the project site. Wetlands throughout the Vancouver Lake Lowlands represent potentially suitable habitat for smooth goldfields, particularly the seasonally inundated habitats south of Vancouver Lake and within the CRWMB. However, this species has not been documented in the vicinity of the project.

4.1.3.13 *Torrey's peavine (Lathyrus torreyi)*

This species is rare in Clark County, known only form one historic occurrence in the County (WNHP 2013b). It was thought to have been extirpated from Washington as recently as 1994.The only known extant occurrences in WA are within somewhat open areas within Douglas fir dominated sites. These habitats are not present at the project site or within the project vicinity.

4.1.3.14 *Bradshaw's lomatium (Lomatium bradshawii)*

This species is endemic to the southern portion of western Washington in the Puget Trough physiographic province and to the central and southern portions of the Willamette Valley physiographic province in western Oregon. The species occurs in remnant fragments of the once

widespread low elevation grasslands and prairies. The habitat type is described as wet, seasonally flooded prairies and grasslands common around creeks and small rivers. Associated species include tufted hairgrass (*Deschampsia cespitosa*), slender rush (*Juncus tenuis*), sawbeak sedge (*Carex stipata*), and one-sided sedge (*Carex unilateralis*).

There is no potentially suitable habitat at the project site. Wetlands throughout the Vancouver Lake Lowlands represent potentially suitable habitat for smooth goldfields, particularly the seasonally inundated habitats south of Vancouver Lake and within the CRWMB. However, this species has not been documented in the vicinity of the project.

4.1.3.15 *Branching montia (Montia diffusa)*

This species occurs in moist forests in the lowland and lower montane zones. It is occasionally located in xeric soil or disturbed sites. Associate species include Douglas fir (*Pseudotsuga menziesii*), ocean-spray (*Holodiscus discolor*) and miner's lettuce (*Montia perfoliata*) (WNHP 2013b). These habitats are not present at the project site or within the project vicinity.

4.1.3.16 *California broomrape (Orobanche californica ssp. grayana)*

This species is a parasitic plant that is native to coastal moist meadows/stream bank, primarily in California in the San Francisco Bay area, northern Sierra Nevada, and the Modoc Plateau. It is thought to be extirpated from Washington. Suitable habitat does not occur at the project site or within the project vicinity, and this species is unlikely to be present.

4.1.3.17 *Western yellow oxalis (Oxalis suksdorfii)*

This species ranges from the western slopes of the Cascades to the Pacific Coast from southwestern Washington to northwestern California. It is usually found growing in meadows and moist woods and sometimes on dry open slopes (WNHP 2013b). There has been only one documented historic occurrence in Clark County.

There is no potentially suitable habitat at the project site. Moist meadow habitat in the adjacent Vancouver Lake Lowlands may provide potentially suitable habitat for western yellow oxalis, but its presence within the project vicinity is unlikely.

4.1.3.18 *Western false dragonhead (Physostegia parviflora)*

The WNHP has little information on this species. Its habitat consists of wet to mesic prairies, damp thickets, and banks of streams and ponds. There is no published information about its distribution in Washington, but it appears to be known only from historic records in Washington. It is described in *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973), as occurring primarily east of the Cascades. There is no habitat for this species at the project site, and it is unlikely that this species occurs within the project vicinity.

4.1.3.19 *Wheeler's bluegrass (Poa nervosa)*

This species is a regional endemic species. In Washington, it has been documented in Clark and Cowlitz counties in the Puget Trough physiographic province. Its habitat consists of rock outcrops, cliff crevices, and occasionally in talus near the base of cliffs or outcrops. It occurs on sparsely and well vegetated outcrops, although it is more abundant in sparsely vegetated site (WNHP 2013b). These habitats do not occur at the project site or within the project vicinity, and this species is unlikely to be present.

4.1.3.20 *Great polemonium (Polemonium carneum)*

This species occurs on the western side of the Cascade Mountains in northwestern Washington, south to San Francisco Bay, California. It grows in the lowlands of mountain ranges and in prairies, to moderate elevations in the mountains. It has been documented in Lewis, Clallam, Grays Harbor, Clark, Skamania, and Pacific counties in Washington, though it is known only from historic occurrences in Clark County (WNHP 2013b). It is commonly found in woody thickets, open and moist forests, prairie edges, roadsides, and has been extensively documented along fence lines (WNHP 2013b).

There is no potentially suitable habitat at the project site. Moist meadow habitats, roadsides, and fences in agricultural lands in the adjacent Vancouver Lake Lowlands may provide potentially suitable habitat for great polemonium, but its presence within the project vicinity is unlikely.

4.1.3.21 *Idaho gooseberry (Ribes oxyacanthoides ssp. irriguum)*

This species occurs in north-central Idaho, western Montana, Oregon, and Washington. In Washington, the taxon is currently known from Asotin, Spokane, and Ferry counties in the Columbia Basin and Okanogan Highlands physiographic provinces. There are historical records of the species from Whitman, Stevens, and Clark counties. The historic Clark County record is considered suspect, given the significant disjunction from all other known locations of the taxon (WNHP 2013b). Habitat for this species does not occur at the project site or within the project vicinity, and it is unlikely to be present.

4.1.3.22 *Soft-leaved willow (Salix sessilifolia)*

This species is distributed from British Columbia to Washington, Oregon and northern California. In Washington it has been found in Cowlitz, Klickitat, Wahkiakum, Skagit, and Whatcom counties. It has been found in a number of lowland habitats: a riparian forest, in dredge spoils, and on a silty bank at the upper edge of an intertidal zone. Associated species at one or more sites include: Sitka willow (*Salix sitchensis*), heartleaf willow (*Salix rigida*), black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*) and red-osier dogwood (*Cornus stolonifera*) (WNHP 2013b). It is known from less than 10 occurrences, and has not been documented in Clark County, but Clark County is thought to be within its potential range.

Riparian habitat at the project site and throughout the Vancouver Lake Lowlands may provide potentially suitable habitat for Soft-leaved willow, though its presence is unlikely. Soft-leaved willow has not been documented in Clark County, and riparian habitat within the project vicinity is limited in quantity and quality. The riparian forest habitat on Parcel 3 likely provides the highest quality potential habitat for soft-leaved willow in the vicinity.

4.1.3.23 *Hairy-stemmed checkermallow (Sidalcea hirtipes)*

This species is a regional endemic to Clark, Lewis, and Wahkiakum Counties in Washington, and Clatsop, Lincoln, and Tillamook counties in Oregon. Its habitat includes remnant prairie fragments along fencerows and openings along drainages. Some occurrences are in fairly mesic habitats associated with creeks and streams. Associated species include, large-leaved lupine (*Lupinus polyphyllus*), woolly vetch (*Vicia villosa*), bracken fern (*Pteridium aqualinum*), large-leaved avens (*Geum macrophyllum*), trailing blackberry (*Rubus armeniacus*), and oxeye daisy (*Chrysanthemum leucanthemum*) (WNHP 2013b). There are currently only five known

occurrences in Washington, and documented occurrences in Clark County are primarily in the eastern portion of the County (WNHP 2013b).

4.1.3.24 *Western ladies tresses (Spiranthes porrifolia)*

This species occurs sporadically from Southern Washington to Southern California. In Washington, it has been documented in Chelan, Kittitas, Klickitat, Lincoln, Okanogan, and Skamania counties. It has not been documented in Clark County, but it is considered to be within its range. Its habitat includes wet meadows, areas adjacent to streams, bogs, and seepage slopes. A variety of associated species have been documented depending upon location (WNHP 2013b).

Wet meadow habitat throughout the adjacent Vancouver Lake Lowlands may provide potentially suitable habitat for western ladies-tresses, but its presence within the project vicinity is unlikely due to the fact that it has not been documented within the County. However, western ladies-tresses have been identified previously by Port staff at Parcel 3.

4.1.3.25 *Hall's aster (Symphyotrichum hallii)*

This species is rarely documented in Washington. It is known from two documented occurrences in Washington. Little is known about this species. Its habitat consists of mostly dry, open places in valleys and plains, but it has also been documented in a wet remnant prairie in a floodplain. There is no potentially suitable habitat at the project site. Given the potential habitat variability of this species, the remnant meadows and seasonally flooded habitats south of Vancouver Lake may provide potentially suitable habitat for this species.

4.1.3.26 *Small-flowered trillium (Trillium parviflorum)*

The species is a regional endemic, occurring from Pierce and Thurston counties southward into Lewis and Clark counties, Washington and into the Willamette Valley, Oregon. It is an uncommon species of very local distribution with few, widely scattered populations (WNHP 2013b). It occurs in association with moist areas dominated by hardwoods, most commonly Oregon ash, but sometimes red alder or even Garry oak.

There is no potentially suitable habitat at the project site. Hardwood-dominated forest habitat within the adjacent Vancouver Lake Lowlands, including forested riparian habitat on Parcel 3, and forested habitats at the Parcel 2 and Parcel 1A wetland mitigation sites may provide potentially suitable habitat for small-flowered trillium.

4.1.3.27 *California compassplant (Wyethia angustifolia)*

The WNHP has little information on this species. It is a relatively widely distributed plant in Oregon and California, but it is rarely observed in Washington. Its habitat includes grasslands, meadows, and other open habitats.

There is no potentially suitable habitat at the project site. Most of the open meadow habitat within the adjacent Vancouver Lake Lowlands is likely too wet to provide suitable habitat for California compassplant; however, where dry open habitats occur, these may provide potentially suitable habitat. Given the relative rarity of this species in Washington, its presence is considered unlikely.

4.1.4 Special Status Wildlife Species

Information regarding the potential presence of special status wildlife species was obtained from the USFWS web site (USFWS 2013) and the NMFS web site (NMFS 2013) on June 27, 2013. Additional information came from data from WDFW's two on-line databases, Priority Habitat and Species (PHS) on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b), as well as from the 2008 Priority Habitats and Species List (WDFW 2008).

Several special status wildlife species have the potential to occur within the vicinity of the proposed project. Table 4-2 lists the special status wildlife species that are known or expected to occur in or near in the project vicinity and specifies their likelihood of occurring within the project area.

Table 4-2. Special Status Wildlife Species and Their Potential to Occur within the Project Site or Vicinity

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Birds									
Bald Eagle (*Haliaeetus leucocephalus*)	N/A	None	N/A	SS	1	Y	Moderate – low quality foraging habitat in riparian zone.	High – Documented nesting occurrences in Columbia River riparian forested habitats.	High – Foraging habitat throughout Lower Columbia River.
Aleutian Canada Goose (*Branta canadensis leucopareia*)	N/A	FSC	N/A	None	None	N	Low – No suitable habitat on-site.	Moderate – Potentially suitable migratory habitat in wetlands adjacent to Vancouver Lake and agricultural lands on Parcel 3.	Moderate – potentially suitable habitat throughout Lower Columbia River
Cavity nesting ducks (several species)	N/A	None	N/A	None	3	N	Low – No suitable habitat on-site.	High – Documented breeding areas and suitable habitat for breeding for several species in vicinity of Buckmire Slough.	Moderate – potentially suitable habitat throughout Lower Columbia River
Common Loon (*Gavia immer*)	N/A	None	N/A	SS	1, 2	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences and potentially suitable habitat at Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Great Blue Heron (*Ardea herodias*)	N/A	None	N/A	None	2	Y	Low – No suitable habitat on-site.	High – Documented breeding occurrences and rookeries near Vancouver Lake and Buckmire Slough.	Moderate – potentially suitable habitat throughout Lower Columbia River
Lewis' Woodpecker *(Melanerpes lewis)*	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Low – Potentially suitable habitat throughout lowlands, but not documented extensively in Clark County.	Low – Not in Columbia River mainstem or marine waters.

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Olive-Sided Flycatcher (*Contopus cooperi)*	N/A	FSC	N/A	None	N/A	N	Low – No suitable habitat on-site.	Low – There is no mature coniferous forest habitat present within the project vicinity	Low – Not in Columbia River mainstem or marine waters.
Pileated Woodpecker (*Dryocopus pileatus*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – Riparian cottonwood forests provide potentially suitable foraging habitat.	Low – Not in Columbia River mainstem or marine waters.
Peregrine Falcon (*Falco peregrinus*)	N/A	FSC	N/A	SS	1	Y	Moderate – low quality foraging habitat present.	Moderate – One or more historic documented nesting occurrences in vicinity.	Low – Not in Columbia River mainstem or marine waters.
Purple Martin (*Progne subis*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	High – Documented nesting habitat and regular concentrations near Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Sandhill Crane (*Grus canadensis*)	N/A	None	N/A	SE	1	Y	Low – No suitable habitat on-site.	High – Documented regular concentrations throughout Vancouver Lake Lowlands, particularly on agricultural lands at Parcel 3.	Low – Not in Columbia River mainstem or marine waters.
Shorebird Concentrations (Several species)	N/A	None	N/A	None	2	N	Moderate – riparian and aquatic zone provides opportunities for foraging.	High – Regular concentrations of shorebirds documented on Vancouver Lake	High – potentially suitable habitat throughout Lower Columbia River and marine waters
Slender-Billed White-Breasted Nuthatch (*Sitta carolinensis aculeata*)	N/A	FSC	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences near Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Streaked Horned Lark (*Eremophila alpestris strigata*)	N/A	FP	Not designated	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Documented presence on dredge material placement sites	Documented presence on dredge material placement sites and

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
								and barren lands throughout Lower Columbia River.	barren lands throughout Lower Columbia River.
Marbled Murrelet (*Brachyramphus marmoratus*)	N/A	FT	Designated	ST	1, 2	Y	Low – No suitable habitat.	Low – No suitable habitat.	High – Marine habitats represent foraging habitat
Short-Tailed Albatross (*Phoebastria albatrus*)	N/A	FE	Not Designated	SC	1	Y	Low – No suitable habitat.	Low – No suitable habitat.	Moderate – Marine waters represent foraging habitat, but species is rare
Western Snowy Plover (*Charadrius nivosus nivosus)*	N/A	FT	Designated	SE	1	Y	Low – No suitable habitat.	Low – No suitable habitat.	Moderate – Marine waters and intertidal and estuarine areas are documented habitat
Vaux's Swift (*Chaetura vauxi*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Low – Limited presence of large snags for nesting in vicinity	Low – Not in Columbia River mainstem or marine waters.
Waterfowl Concentrations (several species)	N/A	None	N/A	None	3	N	Moderate – riparian and aquatic zone provides opportunities for foraging.	High – Documented concentrations throughout Vancouver Lake Lowlands.	High – potentially suitable habitat throughout Lower Columbia River and marine waters
Mammals									
Steller Sea Lion (*Eumatopius jubatus*)	Eastern DPS	FT	Designated	ST	1, 2	Y	Moderate – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River is a documented migratory/foraging corridor.	High – Columbia River and adjacent marine habitats are documented habitat.
Whales (Several species)	Varies	Varies	Varies	Varies	Varies	Varies	Low – No habitat	Low – No habitat	High – Marine waters off coast provide documented habitat

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Non-ESA-Listed Marine Mammals	N/A	None	N/A	Varies	Varies	Varies	Moderate – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River is a documented migratory/foraging corridor.	High – Columbia River and adjacent marine habitats are documented habitat.
Columbian White-Tailed Deer (*Odocoileus virginianus leucurus*)	N/A	FE	Not Designated	SE	1	Y	Low – No habitat	Low – No habitat	Moderate – Islands in the Lower Columbia River represent suitable habitat.
Gray-Tailed Vole (*Microtus canicaudus*)	N/A	None	N/A	SC	1, 2	Y	Moderate – Ruderal grass/forb habitat may provide limited habitat.	Moderate – Agricultural lands, pastures, and fields provide suitable habitat.	Low – Not in Columbia River mainstem or marine waters.
Pacific Townsend's Big-Eared Bat (*Corynorhinus townsendii townsendii*)	N/A	FSC	N/A	SC	1, 2	Y	Low – No suitable habitat on-site.	Moderate – potentially suitable foraging habitat throughout Vancouver Lake Lowlands, but limiting roosting habitat.	Low – Not in Columbia River mainstem or marine waters.
Myotis Bats (*Myotis evotis* and *Myotis volans*)	N/A	FSC	N/A	None	N/A	N	Low – No suitable habitat on-site	Moderate – potentially suitable foraging habitat throughout Vancouver Lake Lowlands, but limiting roosting habitat.	Low – Not in Columbia River mainstem or marine waters.
Invertebrates									
California Floater (*Anodonta californiensis*)	N/A	FSC	N/A	SC	1, 2	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences and potentially suitable habitat in Vancouver Lake.	
Amphibians									
Oregon Spotted Frog (*Rana pretiosa*)	N/A	FC	N/A	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Suitable aquatic habitat in vicinity of Vancouver Lake and adjacent wetlands, but no documented occurrences.	Low – Not in Columbia River mainstem or marine waters.

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Western Toad (*Bufo boreas*)	N/A	FSC	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – Potentially suitable habitat throughout Vancouver Lake Lowlands, but no recently documented occurrences.	Low – Not in Columbia River mainstem or marine waters.
Reptiles									
Pacific Pond Turtle (*Actinemys marmorata*)	N/A	FSC	N/A	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Suitable habitat throughout Vancouver Lake Lowlands, but no documented occurrences.	Low – Not in Columbia River mainstem or marine waters.
Sea Turtles (Various species)	Varies	Varies	Varies	Varies	Varies	Varies	Low – No suitable habitat on-site.	Low – No suitable habitat on-site.	High – Marine waters represent documented habitat.

[1] ESU = evolutionarily significant unit; DPS = distinct population segment

[2] ESA Classifications: FE = federal endangered; FT = federal threatened; FSC = species of concern; FP = federal proposed; FC = federal candidate.

[3] Washington State SOC Classifications: SE = state endangered; ST = state threatened; SS = state sensitive; SC = state candidate.

[4] WDFW PHS Listing Criteria: Criterion 1 = state-listed and candidate species; Criterion 2 = vulnerable aggregations; Criterion 3 = species of recreational, commercial, or tribal importance.

[5] SGCN – As defined in WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) (WDFW 2005).

4.1.4.1 *Birds*

(a) Bald eagle (Haliaeetus leucocephalus)

The bald eagle is listed as a state sensitive species, a priority species, and an SGCN by WDFW (WDFW 2008). The species was removed from the federal endangered species list in 2007(72 FR 37346). However, it remains under the protection of the federal Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act.

Bald eagles are closely associated with lakes and large rivers in open areas, forests, and mountains. Breeding bald eagles need large trees near open water with a relatively low level of human activity. In Washington, nearly all bald eagle nests (99%) are within 1 mile of a lake, river, or marine shoreline (Stinson et al. 2007). Perches from which nesting bald eagles forage are distributed throughout their nest territories along shorelines and prominent viewpoints. Nesting bald eagles are opportunistic foragers but feed most consistently on fish and waterfowl which are usually associated with large, open expanses of water (Stalmaster 1987).

The riparian habitat at the project site may provide low quality foraging habitat for bald eagles, as there are no suitable perching trees nearby, and very little functional habitat in which prey items could be encountered. Bald eagles are relatively common within the greater project vicinity, and bald eagles use habitat throughout the greater Vancouver Lake Lowlands extensively. The WDFW PHS database identifies the area in the vicinity of Vancouver Lake as winter roosting habitat, and identifies two documented breeding occurrences (nests) in the riparian forest on Parcel 3 (WDFW 2013a). The nearest eagle nest site documented in the PHS database is approximately 1 mile west of the westernmost portion of the project site. At the scale of the shipping prism, bald eagles are common throughout the Lower Columbia River and adjacent marine waters.

(b) Aleutian Canada goose (*Branta canadensis* ssp. *leucopareia*)

The Aleutian Canada goose was removed from the federal endangered species list in 2001 (66 FR 15643) and from the Washington list in 2005. It is currently listed as a federal SOC (USFWS 2013), but is not considered a special status species in Washington (WDFW 2008).

Although Washington is potentially part of the species' historical wintering range, today the area is considered to be migration habitat (Hays 1997). The Willapa National Wildlife Refuge (NWR) and surrounding fields and farms in Willapa Bay provide the principal stopover habitat in Washington. Occasionally, individuals and small flocks stop briefly in other parts of the state, including the area in the vicinity of the Ridgefield National Wildlife Refuge (Kraege 2005), and as such, they presumably may utilize aquatic and agricultural habitats throughout the Vancouver Lake Lowlands.

The project site does not provide suitable habitat for Aleutian Canada goose. Aquatic and seasonally inundated habitats throughout the Vancouver Lake Lowlands likely do provide suitable habitat for wintering geese, and agricultural lands on Parcel 3 also likely provide suitable winter foraging habitat. At the scale of the shipping prism, Aleutian Canada geese are more common in the Lower Columbia River watershed, and may also occasionally be present in adjacent marine waters.

(c) Cavity-nesting ducks (Several species)

Breeding concentrations of several species of cavity nesting ducks are considered a priority species by WDFW (WDFW 2008). Cavity-nesting duck species considered in the listing include wood duck (*Aix sponsa*), Barrow's goldeneye (*Bucephala islandica*), common goldeneye, *Bucephala clangula*), bufflehead (*Bucephala albeola*), and hooded merganser (*Lophodytes cucullatus*). Of these species, only Barrow's goldeneye and wood ducks are expected or documented as occurring within the project vicinity.

In Washington, cavity-nesting ducks nest primarily in late successional forests and riparian areas adjacent to low gradient rivers, sloughs, lakes, and beaver ponds (Larsen et al. 2004). They are secondary cavity nesters, using cavities created by large woodpeckers, or by decay, or by damage to the tree. Shallow wetlands within approximately 0.5 mile of cavities provide optimal brood habitat (Larsen et al. 2004).

The project site does not provide any suitable habitat for cavity nesting ducks. Wetlands and forested habitats throughout the greater Vancouver Lake Lowlands provides excellent habitat for these ducks, and both wood ducks and Barrow's goldeneye may be present within the vicinity year-round. Breeding concentrations of wood ducks have been documented in forested habitat adjacent to Vancouver Lake and Buckmire Slough.

(d) Common loon (*Gavia immer*)

Common loon is listed as a state sensitive species and an SGCN by WDFW (WDFW 2008). In its PHS listing, WDFW considers breeding sites, migratory stopover points, and documented areas of regular concentration as priority areas (WDFW 2008).

Common loons breed in North America from the coasts of the Aleutian Islands and Bering Sea, east throughout Canada and south to the northern tier of the lower 48 states. In western North America, common loons winter along the Pacific coast from southern Alaska to Baja California. Migrant loons arrive from the north to winter along Washington's coast, the Columbia and Snake rivers, and on lakes in northeastern Washington (Larsen et. al 2004).

Common loons breed on large lakes in forested areas, typically those greater than approximately 30 acres in size. They typically nest on or near shorelines. Nesting also may occur within approximately 5 feet of shore on masses of emergent vegetation (Larsen et. al 2004). Their primary diet is fish, and they require a healthy fish population on which to feed.

The riparian habitat at the project site does not provide any suitable habitat for common loon. The project vicinity does not likely provide any nesting habitat for common loon, but does provide suitable wintering/migratory habitat. WDFW PHS data indicate that common loon have been observed in the vicinity of Vancouver Lake, but no breeding loons or regular concentrations have been observed. At the scale of the shipping prism, common loon may occasionally be present in the watershed, but their presence is uncommon.

(e) Great blue heron (*Ardea herodias*)

Great blue heron is listed as a state priority species and an SGCN by WDFW (WDFW 2008). In its PHS listing, WDFW considers documented breeding areas to be priority areas (WDFW 2008).

Foraging, breeding, and pre-nesting habitats for the great blue heron usually are close to each other. Foraging habitat often is adjacent to or within a few kilometers of the nesting colony

(Azerrad 2012). Prior to establishing nesting colonies, inland great blue herons gather at pre-nesting sites in habitats that include larger lakes, wetlands, and other watercourses. Nesting colonies, also frequently referred to as rookeries, are then established, typically in mature forested stands near foraging habitat. During the breeding season, herons feed in the shallow margins of various coastal and freshwater habitats, including wetland complexes, large rivers and creeks, and small lakes (Azerrad 2012).

There is no suitable habitat for great blue heron pre-nesting, nesting, or foraging at the project site. Within the greater Vancouver Lake Lowlands, great blue heron are quite common. Several rookeries have been documented in the vicinity of Vancouver Lake and Buckmire Slough, as well as further north on the Shillapoo and Ridgefield NWRs. Great blue herons forage extensively in the wetlands and agricultural lands within the project vicinity, including the wetland mitigation sites, the CRWMB, the wetlands and agricultural fields on Parcel 3, and the emergent wetlands on Terminal 5 West. At the scale of the shipping prism, great blue heron are very common throughout the Lower Columbia River and estuarine waters, but they are not likely present in the portion of the river where shipping traffic will occur.

(f) Lewis' woodpecker (*Melanerpes lewis*)

Lewis' woodpecker is listed as a Washington state candidate species, a priority species, and an SGCN by WDFW (WDFW 2008). In its PHS listing, WDFW considers breeding areas as priority areas (WDFW 2008).

This species recently declined in the Western states (Larsen et al. 2004). In Washington, Lewis' woodpecker is only locally abundant as a breeding bird, and its range has contracted within the last half of the 20th century to include only habitats east of the Cascade crest. The Lewis' woodpecker prefers a forested habitat with an open canopy and a shrubby understory, with snags available for nest sites and hawking perches (Bock 1970). The critical features of Lewis' woodpecker habitat are thought to be forest openness, understory composition, and availability of insect fauna (Bock 1970).

The project site does not provide any forested habitat suitable for nesting for Lewis' woodpecker, nor does it provide any natural habitat suitable for feeding or foraging. Snags and forested habitat in the vicinity of Vancouver Lake may provide potentially suitable nesting habitat for Lewis' woodpecker, and foraging habitat is also likely suitable throughout the lowlands, but this species is rare in Southwest Washington and has not been documented in the vicinity. Lewis' woodpeckers are not expected to be present either at the project site, vicinity, or shipping prism scales.

(g) Olive-sided flycatcher (*Contopus cooperi*)

The olive-sided flycatcher is a federal SOC (USFWS 2013). It is not currently listed or otherwise designated as an SOC by Washington.

The olive-sided flycatcher breeds widely across boreal forests of Canada and the northern United States, extending south along riparian, montane, and subalpine forests of the Rockies, the Sierra Nevada, and in isolated areas in southern California and northern Baja (Altman and Sallabanks 2000). The olive-sided flycatcher occurs in virtually all forested areas of Washington (Smith et al. 1997).

The olive-sided flycatcher inhabits primarily mature forest, old-growth forest, and wet conifer forest, especially those forests with an abundance of snags (Ehrlich et al. 1988; Sharp 1992).

This species may also use mixed woodlands near edges and clearings. Nests are often located high in conifer trees, usually on a horizontal branch far from the trunk. Primary forage consists of insects.

Neither the project site nor the project vicinity provide any forested habitat that is suitable for olive-sided flycatcher nesting. This species is not expected to be present at the project site, vicinity, or shipping prism scales.

(h) Pileated woodpecker (*Dryocopus pileatus*)

The pileated woodpecker is a Washington state candidate species. It is also listed as a state priority species and an SGCN by WDFW (WDFW 2008).

The pileated woodpecker occurs from northern British Columbia south through the Pacific states to central California, in the northern Rockies through Idaho and western Montana, across southern Canada to Nova Scotia, and south to the Gulf Coast and Florida. The pileated woodpecker is found throughout the forested areas of Washington, primarily at low to moderate elevations (Smith et al. 1997).

Pileated woodpecker habitat typically consists of mature and old-growth forests and second-growth forests with substantial numbers of large snags and fallen trees. The species excavates large nest holes in snags or living trees with dead wood, generally excavating through hard outer wood into rotten heartwood. Tree cavities are also used for roosting. Pileated woodpeckers forage mainly by excavating wood and chipping bark from large-diameter dead and down logs, stumps, snags, and live trees. They feed primarily on ants, beetle larvae, and other insects (Bull et al. 1993).

Neither the project site nor the immediate project vicinity provides any forested habitat that is suitable for pileated woodpecker nesting or roosting. Pileated woodpeckers may potentially forage in forested habitats within the project vicinity, particularly in riparian cottonwood forests adjacent to the Columbia River or associated with Vancouver Lake. Pileated woodpeckers are not likely to be present within the shipping prism.

(i) Peregrine falcon (Falco peregrinus)

Peregrine falcon is a federal SOC and a state sensitive species. It is also considered a priority species and an SGCN by WDFW (WDFW 2008). Peregrine falcon was downgraded from a state endangered species to a state sensitive species in 2002.

Peregrine falcons occur nearly worldwide. In Washington, nesting may occur in all but the driest parts of the state. Breeding occurrences primarily occur along the outer coast, in the San Juan Islands, and in the Columbia Gorge (Hays and Milner 2004a). Nesting usually occurs on cliffs, typically 150 feet or more in height. The species will also nest on offshore islands and ledges on vegetated slopes, and has also been documented nesting on man-made structures in urban areas. Eggs are laid and young are reared in small caves or on ledges. Nest sites are generally near the water. Peregrines feed on smaller birds that are usually captured on-the-wing (Hays and Milner 2004a). In winter and fall, peregrines spend much of their time foraging in areas with large shorebird or waterfowl concentrations, especially in coastal areas (Dekkar 1995).

The project site does not provide any suitable nesting habitat for peregrine falcon, but does provide open areas that may provide suitable foraging habitat. Within the project vicinity, nesting habitat for peregrine falcon is also extremely limited. There are no large cliffs or ledges,

apart from man-made structures, that will provide suitable nesting platforms. A peregrine falcon nest was documented on the I-5 Bridge in 2009, and peregrine falcons have nested on the Fremont Bridge in Portland, so the project vicinity has been documented as potentially suitable for nesting and foraging. Peregrine falcons are not likely to be present within the shipping prism.

(j) Purple martin (*Progne subis*)

The purple martin is a state candidate species. It is also listed as a state priority species and an SGCN by the WDFW (WDFW 2008).

Purple martins are insectivorous, colonial nesting swallows that nest in cavities (Brown 1997), typically in or near freshwater wetlands or ponds, or saltwater (Hays and Milner 2004b). In Washington, purple martins typically breed near the waters around the Puget Sound, along the Strait of Juan de Fuca, the southern Pacific coastline, and near the Columbia River (Hays and Milner 2004b). They feed in flight on insects (Brown 1997), with preferred foraging habitat consisting of open areas, often located near moist to wet sites, where flying insects are abundant (Hays and Milner 2004b).

The project site does not provide any suitable nesting or foraging habitat for purple martin. The greater project vicinity does likely provide suitable habitat for it. Forested wetland habitats associated with Vancouver Lake and other waterbodies within the Vancouver Lake Lowlands may provide suitable nesting habitat, and these areas, as well as adjacent aquatic habitats, likely provide suitable foraging opportunities. WDFW PHS data indicate that purple martin nests have been documented near Vancouver Lake, and regular concentrations of purple martins have also been documented (WDFW 2013a). Purple martins may also occur within the Lower Columbia and estuarine waters in the shipping prism.

(k) Sandhill crane (*Grus canadensis*)

The sandhill crane is a Washington state listed endangered species. WDFW has also designated the sandhill crane as a priority species and as an SGCN (WDFW 2008). Three subspecies of sandhill crane occur within the Pacific Northwest: the greater sandhill crane, the Canadian sandhill crane, and the lesser sandhill crane. Of these, only the greater sandhill crane is known to breed in the state, and only within Yakima and Klickitat counties. Canadian sandhill cranes breed primarily in coastal British Columbia and winter in Washington or stop en route to wintering areas in California (Littlefield and Ivey 2002). The lesser sandhill cranes belong to the Pacific Flyway Population that stops off during migration to northern breeding grounds in Alaska or wintering areas in California (Littlefield and Ivey 2002).

The fall migration of sandhill cranes through the Vancouver Lake Lowlands typically occurs in late September and early to mid-October. Spring migration through the lowlands generally occurs from mid-March to mid-April. Sandhill cranes use the Vancouver Lowlands as stopover habitat during migration and for foraging by over-wintering birds. The Vancouver Lake Lowlands area is the sole example of a sandhill crane staging area in the U.S. that is adjacent to a major metropolitan area (Littlefield and Ivey 2002).

Sandhill cranes use large and small tracts of open habitat where visibility is good from all vantage points. Wet meadows, marshes, shallow ponds, hayfields, and grainfields are all favored for nesting, feeding, and roosting (Bettinger and Milner 2004). Sandhill cranes migrating and staging within the Lower Columbia region typically use shallow lakes with abundant mudflats and bars for roosting and loafing areas. The diet of sandhill cranes varies seasonally and includes

grains (corn, barley, oats, rice, and wheat), roots, insects, amphibians, reptiles, earthworms, snails, and small rodents (Littlefield and Ivey 2002). In the spring, cranes eat high protein foods such as insects and other macroinvertebrates. Fall and winter foods typically include wheat, corn, barley, and rice.

The project site does not provide any habitat that could be used by sandhill cranes for resting, foraging, or any other wintering activities. The greater Vancouver Lake Lowlands do provide excellent winter foraging habitat for sandhill cranes, and sandhill cranes are frequently observed there. Agricultural habitats, including Port Parcel 3, provide excellent winter foraging habitat for sandhill cranes. Cranes are known to rest and feed on Parcel 3 which approximately 1 mile from the project site. Cranes more commonly use Parcels 4 and 5 further from the project site. Sandhill cranes also utilize habitats adjacent to Vancouver Lake, including the wetland and upland complexes south of the lake and within the CRWMB and the Parcel 2 wetland mitigation site. Sandhill cranes are not expected to use habitats within the Columbia River extensively, nor are they expected to be present in marine waters. For these reasons, they are not expected to be present within the shipping prism.

(l) Shorebird concentrations (Several species)

WDFW designates regular concentrations of several species of shorebirds as priority species. In western Washington, breeding concentrations of cormorants (*Phalacrocoracidae*), storm-petrels (*Hydrobatidae*), terns (*Laridae*), and alcids (*Alcidae*) as well as non-breeding concentrations of loons (*Gaviidae*), grebes (*Podicipedidae*), cormorants, fulmar (*Procellariidae*), shearwaters (*Procellariidae*), storm-petrels, and alcids, are provided priority species status. Regular shorebird concentrations are not provided any other state or federal special status.

There is no suitable terrestrial habitat at the project site for any shorebird species, but these species likely occasionally fly over the site. The riparian and aquatic habitats at the site do provide potential foraging and resting opportunities for shorebirds. At the project vicinity scale, WDFW PHS data identify much of the area adjacent to Vancouver Lake as providing documented habitat for regular concentrations of shorebirds. Shorebirds of several species likely use seasonally ponded and emergent wetland habitats throughout the Vancouver Lake Lowlands and Lower Columbia River for feeding, foraging, and resting habitat. Regular concentrations of one or more shorebird species may potentially be present in the project site, vicinity, and shipping prism at any time during the year.

(m) Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)

The slender-billed white-breasted nuthatch is a federal species of concern (USFWS 2013) and a state candidate species. It is also considered a priority species and an SGCN by WDFW (WDFW 2008).

The slender-billed white-breasted nuthatch is a cavity user and year-round resident in western Washington (Anderson 1970, Anderson 1972). In Washington and Oregon, this species is associated with Oregon white oak west of the Cascade Range and conifer forest, primarily Ponderosa pine, east of the Cascades (Chappell 2005, Hagar 2006). Large decadent oak trees with a sparse understory are of primary habitat importance for both foraging and nesting (Anderson 1976).

There is no Oregon white oak habitat present on the project site, and Oregon white oak habitat within the vicinity is limited as well. There are sporadic white oak trees throughout the

Vancouver Lake lowlands, including along the south end of Vancouver Lake, on the CRWMB, and on Parcel 3. Slender-billed white-breasted nuthatches have been documented near Vancouver Lake, and they may potentially occur within the project vicinity. Slender-billed nuthatches are not expected to use habitats within the Columbia River or adjacent marine waters, and they are unlikely to occur within the shipping prism.

(n) Streaked horned lark (Eremophila alpestris strigata)

The streaked horned lark has been proposed for listing under the federal ESA (77 FR 61937). Critical habitat has also been proposed for the species. It is a state endangered species and a WDFW priority species and SGCN (WDFW 2008).

Along the Willamette and Columbia rivers, nesting habitat for the streaked horned lark historically was found on sandy beaches and spits. Today, the streaked horned lark nests in a broad range of habitats, including native prairies, coastal dunes, fallow and active agricultural fields, wetland mudflats, sparsely vegetated edges of grass fields, recently planted Christmas tree farms with extensive bare ground, moderately to heavily grazed pastures, gravel roads or gravel shoulders of lightly traveled roads, airports, and dredge deposition sites, particularly islands in the Lower Columbia River (77 FR 61937). Wintering streaked horned larks use habitats that are very similar to breeding habitats. On the Columbia River, these habitats are typically adjacent to and in view of open water, which provides the open landscape context this species needs.

Streaked horned larks need expansive areas of flat, open ground to establish breeding territories. Horned larks forage on the ground in low vegetation or on bare ground (77 FR 61937); adults feed mainly on grass and weed seeds but feed insects to their young. Introduced weedy grasses and forb seeds comprise the winter diet. Horned larks form pairs in spring and create shallow nests in shallow depressions on the ground. The nesting season begins in mid-April and ends in the early part of August and streaked horned larks may re-nest in late June or early July. Most streaked horned larks winter in the Willamette Valley (72 percent) and on islands in the Lower Columbia River (20 percent), with the rest wintering on the Washington coast. Birds that breed on the islands of the Lower Columbia River tend to remain on the islands (77 FR 61937).

The project site does not provide any potentially suitable habitat for nesting or wintering streaked horned larks. The terrestrial portions of the site are largely devoid of vegetation, and there is no suitable nesting habitat present nor is there any vegetation that will provide foraging habitat. In the greater project vicinity, dredge material placement sites and other sparsely vegetated lands on and adjacent to the river provide potentially suitable habitat for streaked horned larks. The species has been documented on dredge material placement sites and a dredge material placement site on Port Parcel 3 provides potentially suitable habitat for streaked horned larks, although this site is likely disturbed too routinely to provide sufficient vegetative cover for suitable nesting or wintering habitat. Streaked horned larks do not use the aquatic habitats within the shipping prism, and are unlikely to occur there.

(o) Marbled murrelet (Brachyramphus marmoratus)

The marbled murrelet is a federal threatened species (USFWS 2013). It is also a state threatened species and a WDFW priority species and SGCN (WDFW 2008).

The marbled murrelet is a small sea bird that feeds primarily on fish and invertebrates in nearshore marine waters (City of Seattle 2007). Marbled murrelets nest in mature stands of coastal forest, typically closely associated with the marine environment, although murrelets have

been documented in forested stands at distances of up to 50 miles inland in Washington (Hamer and Cummins 1991). Marbled murrelets require forests with large trees (greater than 30 inches dbh), multi-storied stands, and moderate canopy closure. Murrelets tend to nest in the largest trees in the stand (City of Seattle 2007). Marbled murrelets forage in nearshore marine habitats, generally in waters less than 260 feet deep, on a variety of small fish and invertebrates (FR 61 26256).

There is no habitat for marbled murrelet at the project site or within the vicinity. Marbled murrelets may potentially forage within marine habitats within the shipping prism.

(p) Short-tailed albatross (*Phoebastria albatrus*)

The short-tailed albatross is a federally listed endangered species (USFWS 2013). It is also a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Short-tailed albatross are oceanic birds that occur throughout most of the North Pacific Ocean and are often found close to the Pacific Coast (USFWS 2006). The short-tailed albatross generally breeds in the South Pacific, where it nests on the ground on small oceanic islands (NatureServe 2013). There are no breeding populations of short-tailed albatross in the United States, but attempted nesting has been regularly observed on Midway Atoll in the northwestern Hawaiian Islands (USFWS 2006). Short-tailed albatross forage at sea – typically at the water surface – on squid, fish, shrimp and other crustaceans, and the eggs of flying fish (USFWS 2006). Short-tailed albatross are also known to follow ships and forage on scraps and other refuse (NatureServe 2013).

There is no habitat for short-tailed albatross at the project site or within the vicinity. Short-tailed albatross may potentially forage within marine habitats within the shipping prism.

(q) Western snowy plover (Charadrius nivosus nivosus)

Western snowy plover is a federally listed threatened species (USFWS 2013). Critical habitat has also been designated for western snowy plover. It is also a state endangered species and a WDFW priority species and an SGCN (WDFW 2008).

The Pacific Coast population of western snowy plovers occurs from southern Washington to southern Baja California (Page et al. 1995). This species nests beside or near tidal waters on barren to sparsely vegetated sand beaches, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, levees and flats at salt-evaporation ponds, and river bars (USFWS 2007). Plovers lay their eggs in shallow depressions in sandy or salty areas with sparse vegetation between early March and late September (USFWS 2007). Western snowy plovers forage primarily on invertebrates in the wet sand and among surf-cast kelp within the intertidal zone; in dry, sandy areas above high tide; on salt pans; on spoil sites; and along the edges of salt marshes, salt ponds, and lagoons (USFWS 2007).

There is no habitat for western snowy plover at the project site or within the vicinity. Western snowy plover may potentially be present adjacent to marine habitats within the shipping prism.

(r) Vaux's swift (*Chaetura vauxi*)

Vaux's swifts are a Washington state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

This species nests in late-successional coniferous forests (Manuwal and Huff 1987; Bull and Collins 1993). It requires large, hollow snags or cavities in the broken tops of live trees for

nesting and night roosting (WDNR 1996) and feeds on flying insects, foraging primarily over the forest canopy or open water (Bull and Collins, 1993). In fall, Vaux's swifts congregate in large flocks, and hundreds of swifts may use a single large hollow tree for night roosting.

There is no late successional forest habitat present at the project site, nor within the Vancouver Lake Lowlands, that will provide suitable nesting habitat for Vaux's swifts. There are few large snags of the size or type that will typically be used by Vaux's swifts for nesting. Forested habitats within the Vancouver Lake Lowlands may provide potentially suitable foraging habitats for Vaux's swifts, but this species has not been documented within the project vicinity. Vaux's swifts do not use the aquatic habitats within the shipping prism, and are unlikely to occur there.

(s) Waterfowl concentrations (Several species)

WDFW provides priority species designation to regular concentrations of several species of waterfowl. In western Washington, non-breeding concentrations of Barrow's goldeneye (*Bucephala islandica*), common goldeneye (*Bucephala clangula*), and bufflehead (*Bucephala albeola*) are provided priority species status. Regular waterfowl concentrations are not provided any other state or federal special status.

There is no suitable terrestrial habitat at the project site for any waterfowl species, but these species likely occasionally fly over the site during migration. The riparian and aquatic habitats at the site do provide potential foraging and resting opportunities for waterfowl. At the project vicinity scale, WDFW PHS data identify much of the area adjacent to Vancouver Lake as providing documented habitat for regular concentrations of wintering waterfowl. Waterfowl of several species make extensive use of seasonally ponded and emergent wetland habitats throughout the Vancouver Lake Lowlands – as well as throughout the Lower Columbia River within the shipping prism – for feeding, foraging, and resting habitat during migration as well as for wintering habitat. Non-breeding concentrations of waterfowl may potentially be present at any time during the year, and particularly during the winter months.

4.1.4.2 *Mammals*

(a) Steller sea lion (*Eumatopius jubatus*)

The Steller sea lion is a threatened species under the federal ESA (USFWS 2013). It is also a Washington state-listed threatened species and a WDFW priority species and an SGCN (WDFW 2008).

The range of the Steller sea lion includes the north rim of the Pacific Ocean from California to northern Japan. This sea lion is primarily a coastal and open-ocean species (Oregon Department of Fish and Wildlife [ODFW] 1998), although it does occur in the Rogue River in Oregon and in the estuary of the Columbia River.

Steller sea lions have been sighted as far upriver as Bonneville Dam, but these sightings are relatively rare. USACE has observed small numbers of Steller sea lions present as far upstream in the Columbia River as Bonneville Dam following salmonid runs from January through May (Stansell et al. 2009). In Oregon and Washington, Steller sea lions feed offshore along the coast and in the ocean, although some Steller sea lions make seasonal journeys (usually January through May) into the Lower Columbia River to feed, primarily on sturgeon (personal communication with Brian Wright and Robin Brown, ODFW, March 6, 2010; personal communication with Steve West, WDFW, April 22, 2010).

The project site does not provide significant habitat for Steller sea lion. The species, if present in the project vicinity, is most likely present during the months of January to May, during one of these seasonal feeding journeys. While Steller sea lions do use the Columbia River as a foraging/migration corridor, no Steller sea lion rookeries or documented haulouts occur within the vicinity, so if present, the species will be expected to be moving through, either upstream or downstream. Steller sea lion may potentially be present within one or more portions of the shipping prism during all months of the year.

(b) Whales (Several species)

Seven species of whales are known to occur off the coasts of Oregon and Washington. These include blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus)*, humpback whale (*Megaptera novaeangliae*), North Pacific right whale (*Eubalaena japonica*), sei whale (*Balaenoptera borealis)*, southern resident DPS killer whale (*Orcinus orca*), and sperm whale (*Physeter macrocephalus*). All are federally listed endangered species (NMFS 2013) and are also state-listed endangered species (WDFW 2008).

Whales tend to feed during the summer in the northern latitudes and migrate to the tropical southern latitudes in the winter for breeding. Some whales do not migrate as far north as the rest of the population; therefore, whales can be encountered throughout the year off the coasts of Oregon, Washington, and California.

While the specific migratory patterns and habitat requirements for each whale species differ, it is possible that any of them may potentially be present within the shipping prism of the proposed project during some time of the year. There is no habitat for these species at the project site, or in the project vicinity, or within the freshwater portion of the shipping channel. ESA-listed whale species could potentially be present within the marine portion of the shipping prism for the proposed project.

(c) Non-ESA-Listed Marine Mammals (Several species)

In addition to ESA-listed species described above, the project vicinity and the project's shipping prism represent potentially suitable habitat for several species of non-ESA-listed marine mammals that are also provided special regulatory status. California sea lions (*Zalophus californianus*) and harbor seals (*Phoca vitulina*) forage throughout the Lower Columbia River system.

California sea lions are found from southern Mexico to southeast Alaska. The United States stock is defined geographically for management purposes and is described as comprising animals that breed in US waters. California sea lions may be present in the Lower Columbia River during much of the year, except between mid-June and August when most animals return to breeding rookeries in southern California. However, peak numbers occur during the migration periods in May and September (Scordino 2006).

Pacific harbor seals inhabit coastal and estuarine waters and shoreline areas from Baja California to western Alaska. They are present throughout the year at the mouth of the Columbia River, although they do exhibit seasonal movements and their numbers within the Columbia River upstream of the South Jetty increase from January to April and then decrease from May through August as they move to adjacent bays (e.g., Netarts Bay, Tillamook Bay, Willapa Bay, and Grays Harbor) during the pupping season (FERC 2008).

There are no seal or sea lion haulouts at the project site or within the vicinity, although California sea lion and harbor seals may occasionally migrate through the project vicinity. Within the shipping prism, there are numerous haulouts in the Columbia River estuary and adjacent marine waters, and the species are likely present within portions of the shipping prism at all times of the year.

(d) Columbian white-tailed deer (Odocoileus virginianus leucurus)

The Columbian white-tailed deer is a state and federal endangered species (WDFW 2008; USFWS 2013). It is also a WDFW priority species and an SGCN (WDFW 2008). It is the westernmost subspecies of the white-tailed deer. Currently, there are two Columbian white-tailed deer DPSs; one is located in Douglas County, Oregon, and the other is located along the Lower Columbia River in Oregon and Washington (FR 68 43647).

Most deer within the Columbia River population are included in one of four subpopulations (Washington mainland, Tenasillahe Island, Puget Island, and the Oregon lowlands). Each subpopulation is geographically separated by major channels of the Columbia River (Brookshier 2004). Both the Washington mainland and Tenasillahe Island subpopulations occur within the Julia Butler Hansen NWR, which was established in 1972 as the Columbian White-tailed Deer National Wildlife Refuge, to protect over 5,600 acres of shoreline and island habitat for the preservation of the Columbian white-tailed deer (Brookshier 2004). In early 2013, the USFWS implemented a program to translocate up to 50 Columbian white-tailed deer from the Julia Butler Hansen NWR to the Ridgefield NWR in Clark County. As of June 2013, approximately 37 Columbian white-tailed deer had been successfully translocated.

Columbian white-tailed deer are unlikely to be present within the project site or vicinity. The shipping prism passes through the Lower Columbia River. Since Columbian white-tailed deer are present on islands in the river and are capable of swimming, they could be present occasionally within the shipping prism. They are unlikely to be present with any frequency, however.

(e) Gray-tailed vole (*Microtus canicaudus*)

Gray-tailed vole is a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

The gray-tailed vole is a regionally endemic species, known to occur in lower elevations of the Willamette Valley in Oregon and at least two localities north of the Columbia River in Clark County, Washington. It is associated almost exclusively with agricultural lands, especially with grasses grown for seed, small grains, and permanent pastures of legumes and grasses. It can also be present along grass-dominated highway and railroad rights-of-way. Nests are built either underground or aboveground under boards, bales, or other debris, and intricate runway and burrow systems are also constructed underground (Verts and Carraway 1987).

The project site and vicinity are at the northern end of the range of this species; only a few occurrences are documented in Clark County and it has not been documented within the project site or vicinity. The project site does not provide any suitable habitat for gray-tailed vole, as the terrestrial portions of the site are all paved, graveled, or otherwise developed. The agricultural habitats and grass-dominated fields adjacent to and in the vicinity of the project site do provide potentially suitable habitat for gray-tailed vole, and gray-tailed voles could potentially be present in these habitats. The shipping prism does not provide habitat for gray-tailed vole

(f) Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)

Townsend's big-eared bats are a federal species of concern (USFWS 2013). They are a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Townsend's big-eared bats have been documented in nearly every county in Washington (Woodruff and Ferguson 2005). Within its range, distribution is often linked to the presence of suitable maternity roosts and hibernacula located near suitable foraging habitat (Gruver and Keinath 2006). Townsend's big eared bats occupy a broad range of moist and arid habitats. In Washington, they occur in westside lowland conifer-hardwood forest, montane conifer forest, ponderosa pine forest and woodland, shrub-steppe, riparian habitats, and open fields (Johnson and Cassidy 1997). Caves, lava tubes, mines, old buildings, concrete bunkers, and bridges are commonly used as day roosts in Washington (Woodruff and Ferguson 2005). Temperatures, roost dimensions, sizes of roost openings, light quality, and extent of airflow are important factors in the selection of roosts (Hayes and Wiles 2013). Hibernacula occur mainly in caves, mines, lava tubes, and occasionally in buildings (Hayes and Wiles 2013).

There are no natural or man-made structures present on the project site that could provide suitable roosting or hibernacula habitat for Townsend's big-eared bats, and this species is not expected to be present at the project site. Within the greater project vicinity, roosting and hibernacula habitat is also somewhat limited. There are no natural caves, mines, or lava tubes in the vicinity, and most buildings and structures are in regular use. Bridges in the vicinity could potentially provide roosting habitat, but Townsend's big-eared bats have not been documented in the vicinity. At the project vicinity scale, there may be suitable foraging habitat for Townsend's big-eared bat, but there are likely limited opportunities for roosting or hibernacula. The shipping prism does not provide habitat for Townsend's big-eared bat.

(g) Myotis bats (Myotis evotis and Myotis volans)

Two species of bats (Western long-eared myotis [*Myotis evotis*] and long-legged myotis [*Myotis volans*]) that are known to occur within Clark County are designated as federal SOC (USFWS 2013). These species are not provided any special regulatory status by the state; however, WDFW does identify roosting concentrations of myotis bats as priority species (WDFW 2008). While these species have unique habitat requirements, their similarities allow them to be addressed together in this section.

Western long-eared myotis are most commonly associated with conifer forests ranging from drier ponderosa pine to humid coastal and montane forests (Hayes and Wiles 2013). Day roosts are located beneath loose bark on trees, snags, stumps, and downed logs, as well as in buildings, crevices in ground-level rocks and cliffs, tree cavities, caves, and mines (Hayes and Wiles 2013). Large-diameter conifer snags are typically used as maternity roosts.

Long-legged myotis primarily occur in coniferous forests, but also inhabit riparian forests and dry rangeland. They roost in snags and live trees with loose bark, long vertical cracks, or hollows; cracks and crevices in rocks, stream banks, and the ground; buildings; bridges; caves; and mines. In the Pacific Northwest, maternity sites have been mainly found in snags, but live trees, rock crevices, mines, and buildings are also used (Hayes and Wiles 2013).

There are no natural or man-made structures present on the project site that could provide suitable roosting habitat for any species of myotis bats. As both species are primarily associated with coniferous forest habitat, they are unlikely to be present at the site. Within the greater project vicinity, roosting and foraging habitat is also somewhat limited, as there are few large-

diameter conifer snags or forests with mature habitat characteristics in the vicinity. Riparian forest habitat on Parcel 3 could potentially provide suitable roosting and foraging habitat for one or more species of myotis bats. The wetlands and aquatic habitats associated with Vancouver Lake likely provide suitable foraging habitat, and adjacent forest habitats could potentially provide roosting or maternity sites. The shipping prism does not provide habitat for myotis bats.

4.1.4.3 *Invertebrates*

(a) California floater (Anodonta californiensis)

California floater is a federal SOC (USFWS 2013). It is also a Washington state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

In Washington, the California floater is known to occur in the Columbia River system and in a few other lakes and rivers in eastern Washington. Historic eastern Washington locations included the Snake, Wenatchee (may be extirpated), and Okanogan rivers, and Hangman Creek (formerly Latah Creek) near Spokane (Larsen et al. 1995). In western Washington, the California floater has been reported from Seattle (a doubtful record), and the Columbia River counties of Wahkiakum, Cowlitz, Clark, Skamania, and Klickitat. There are no recent western Washington records of live California floaters (Frest and Johannes 1993).

The California floater lives, feeds, respires, and reproduces in clean freshwater. These clams feed by filtering planktonic organisms (Frest 1992) which also require clean, well oxygenated water (Larsen et al. 1995). Deriving oxygen, nutrients, and a means of reproduction from the water in which it lives, the California floater readily accumulates pollutants.

The larval stage of this clam is parasitic, adhering to a host fish while metamorphosing into a juvenile clam. When metamorphosis is complete, juvenile clams must fall from the host fish where they can attach to gravel or rocks in clean flowing, well-aerated waters. After growing for some time, young clams are washed downstream and settle in sandy or soft, muddy bottoms in the slower waters of lakes and large rivers where they mature (Larsen et al. 1995). The California floater is most commonly reported from rivers or river lakes in relatively stable, oxygenated mud, sand, or fine gravel beds, often located in pools just downstream from rapids. Another favorite habitat for this species is in fine-sediment bars fringing the mouths of large tributaries to rivers (Frest 1992). Submerged alluvium surrounding the mouths of tributary streams or below riffle areas may support juvenile clams and seem to be especially important (Larsen et al. 1995).

The aquatic habitat at the project site likely does not provide suitable habitat for California floater, as neither a stable or well oxygenated substrate suitable for adult clams nor the gravel substrates required by maturing juvenile clams are provided nearby. Within the greater project vicinity and shipping prism habitat is similarly limited for California floater. The mainstem Columbia River provides limited suitable substrate for juveniles or adults. Vancouver Lake provides potentially suitable habitat, and California floater has been documented, at least historically, in the lake. However, substrate conditions, oxygenation, and limited hydraulic exchange with the mainstem Columbia River in Vancouver Lake are likely limiting factors.

4.1.4.4 *Amphibians*

(a) Oregon spotted frog (*Rana pretiosa*)

Oregon spotted frog is a federal candidate for listing under the ESA (USFWS 2013). It is also a state endangered species and a WDFW priority species and an SGCN (WDFW 2008).

The Oregon spotted frog is endemic to the Pacific Northwest. Historically, its range extended from northeast California, through the Puget Trough/Willamette Valley regions of Oregon and Washington, to the lower Fraser River Valley in British Columbia (Nordstrom and Milner 1997a).

In Washington, this frog once occurred throughout the Puget Trough lowlands from the Canadian border as far as Vancouver (Washington), and east into the southern Washington Cascades. Currently, there are only three locations in Washington where these frogs are known to still exist: Dempsey Creek in Thurston County and Trout and Conboy lakes in Klickitat County. Other lowland western Washington populations are believed to have been extirpated (Nordstrom and Milner 1997a).

Oregon spotted frogs are highly aquatic, inhabiting marshes and marshy edges of ponds, streams, and lakes. Spotted frogs usually occur in shallow, slow moving waters with abundant emergent vegetation and a thick layer of dead and decaying vegetation on the bottom. Oregon spotted frogs are active in lowland habitats from February through October, and hibernate in muddy bottoms near their breeding sites in winter. Courtship and breeding occurs between February and March at lower elevations in western Washington and takes place in warm, shallow margins of ponds or rivers or in temporary pools formed by rain or snowmelt. Adult spotted frogs are opportunistic feeders, feeding primarily on invertebrates, generally within one-half meter of shore on dry days (Nordstrom and Milner 1997a).

The project site does not contain any suitable habitat for Oregon spotted frog. There is no marsh habitat within the site that will provide suitable conditions for Oregon spotted frog presence. Within the greater Vancouver Lake Lowlands, emergent wetland and seasonally ponded sites – particularly those associated with the southern end of Vancouver Lake and the CRWMB – do provide potentially suitable habitat for Oregon spotted frog. These habitats are seasonally ponded wetland complexes, with abundant access to adjacent upland foraging habitats.

While there have been no recent documented occurrences in Clark County, the project vicinity does provide potentially suitable habitat for Oregon spotted frog.

(b) Western toad (*Bufo boreas*)

The western toad is a federal SOC (USFWS 2013), a state candidate species, and a WDFW priority species and an SGCN (WDFW 2008).

The western toad occurs from southeast Alaska eastward through British Columbia, western Alberta, and western Montana, south to Baja California and east to northern Colorado. It is found throughout western Washington and in the mountainous portions of eastern Washington (Dvornich et al. 1997). Western toads occur in forested and brushy areas from sea level to high mountains (ODFW 1996). Moist areas with dense cover are considered optimal (ODFW 1996). During dry weather, toads will spend the day under damp, woody debris or in burrows of other animals; they will also bury themselves in loose soil (Leonard et al. 1993). Western toads breed in springs, ponds, shallow areas in lakes, and slow-moving streams, and also use stock ponds and reservoirs in arid areas (ODFW 1996). Tadpoles form huge aggregations, generally in the warmest portion of a particular water body; western toad tadpoles are found in a wider variety of water bodies than the tadpoles of Pacific Northwest frogs (Blaustein et al. 1995). They can be locally abundant, and can live in a relatively wide variety of habitat types (Blaustein et al. 1995).

There is no forested or brushy aquatic habitat present at the site that will provide potentially suitable habitat for western toad. Within the greater project vicinity, forested and scrub-shrub wetland habitats within the Vancouver Lake Lowlands provide potentially suitable habitat for western toad, although these are likely not preferred habitats, as there is not significant forested wetland habitat in the vicinity. The slow-moving backwater habitats at the south end of Vancouver Lake may provide potentially suitable habitat for western toad breeding. This species has not been documented in the vicinity of the project. Western toads could potentially be present in habitats adjacent to the Columbia River downstream on the Columbia River.

4.1.4.5 *Reptiles*

(a) Pacific pond turtle (*Actinemys marmorata*)

The Pacific pond turtle is a federal SOC under the ESA (USFWS 2013). It is also a state endangered species and a WDFW priority species and an SGCN (WDFW 2008).

The range of the western pond turtle follows the Pacific coast of North America, from the Puget Sound region in Washington to northwestern Baja California. Most populations are found west of the Cascades (Nordstrom and Milner 1997b). Populations in Washington are confirmed only in Klickitat and Skamania counties. Individual turtle sightings were recently confirmed in Pierce and King counties, which are part of the turtle's historic range. Historic records also exist for Clark and Thurston counties (McAllister 1995).

Pacific pond turtles have been found in marshes, ponds, sloughs, and small lakes in Washington from sea level to approximately 2,500 feet. The species has also been found in altered habitats such as gravel pits, reservoirs, stock ponds, and sewage treatment plants. They use both permanent and intermittent bodies of water, and have been found using a variety of substrates, including rock, gravel, sand, mud, decaying vegetation and various combinations of these (Nordstrom and Milner 1997b).

Pacific pond turtles also use open, upland habitats, primarily for nesting, but also for dispersal and overwintering. Female turtles leave the water to nest sometime between late May and July. Females usually dig nests and deposit their eggs in compact, dry soil on upland sites. Terrestrial overwintering sites usually have a thick layer of duff into which the turtle will burrow, and have been found up to 1,640 feet away from watercourses. In aquatic habitats, these turtles will winter under banks or in mud. Movement to overwintering sites occurs between September and November, and emergence from these locations occurs between March and June (Nordstrom and Milner 1997b).

The project site does not provide any suitable aquatic or terrestrial habitat for Pacific pond turtle. Aquatic (and adjacent terrestrial) habitats throughout the Vancouver Lake Lowlands do provide potentially suitable habitat for Pacific pond turtle. The mosaic of wetlands at the south end of Vancouver Lake, with its connectivity to a variety of hydrologic regimes and vegetation communities, provides particularly well-suited habitat. However, Pacific pond turtle have not been documented in the vicinity. Pacific pond turtles could potentially be present in habitats adjacent to the Columbia River downstream on the Columbia River within the shipping prism, but they are not known to be strongly associated with the mainstem Columbia River.

(b) Sea turtles (Various species)

Four species of sea turtles have been documented off the coasts of Oregon and Washington. These are the green sea turtle (*Chelonia mydas*), olive Ridley sea turtle (*Lepidochelys olivacea*),

leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*). All four species are federally and state-listed endangered species (NMFS 2013; WDFW 2008) as well as WDFW priority species and SGCNs.

All four species potentially affected by the project are highly migratory. Eastern Pacific populations of sea turtles generally spend the winter months in breeding grounds off southern Mexico and Central America, and although sea turtles have been reported during the summer months as far north as Alaska, occurrences are more common in southern California and northern Mexico (NMFS and USFWS 1998a, 1998b, 1998c, 1998d).

There is no habitat for any species of sea turtles at the project site or within the vicinity. Sea turtles may potentially be present within marine waters within the shipping prism, but these species are relatively rare on the West Coast.

4.2 Fish Habitat Resources

4.2.1 Fish Habitat Resources

In general, the environmental baseline conditions for fish habitat within the reach of the Columbia River that flows through the project site are typical of those associated with an urbanized and industrial reach of the river. At the watershed scale, its natural fluvial processes have been altered dramatically. The main channel of the river is maintained as a navigation channel for deep-draft shipping traffic, limiting the potential for any dynamic migration of the river thalweg. In addition, dam construction and streambank armoring throughout the watershed have limited floodplain connectivity and have reduced the quantity and quality of available backwater and off-channel habitats greatly.

At the scale of the project site, the entire streambank has been armored with riprap, and the entire portion of the site above the OHWM has been isolated from the historic floodplain. A narrow band of vegetation, primarily small diameter black cottonwood, willows, and non-native false indigo bush and Himalayan blackberry, is established in and immediately above the riprapped slope. Above this vegetated habitat, there is a narrow band of ruderal grass/forb habitat. The low quality and quality of riparian habitat at the site provides very little aquatic habitat function.

Water quality conditions at the site are generally appropriate for aquatic life. While this reach of the Columbia River within the action area is not identified on the Ecology 2008 303(d) list for elevated water temperatures (Ecology 2008), data published by the USGS in 2012 indicates that summer water temperatures downstream of Bonneville Dam routinely exceed 70°F (Tanner et al. 2012). These temperatures are significantly higher than those recommended for proper functioning condition in migratory waters. The reach of the Lower Columbia River in the vicinity of the project site has several areas listed on the 2008 Ecology 303(d) list for chemical- and nutrient-related contamination (Ecology 2008).

At the project vicinity scale, in-stream habitat complexity is limited, and there is no overhanging vegetation. As part of the WVFA project, some large woody debris will be installed along the shoreline of Terminal 4 just upriver from the project site. Sediments at the project site are predominantly fine-grained, which is the natural condition for the lower reaches of a large river. No substrate present is adequate for salmonid spawning. Below the riprapped streambank, there is an area of gradual transition to deep water that provides some shallow water nearshore habitat, which many juvenile species of fish prefer. However, the lack of dense riparian vegetative cover and limited in-stream structural diversity limits the function of this nearshore habitat.

At the scale of the shipping prism, the Lower Columbia River and adjacent marine habitats provide high quality habitat for all life stages of Pacific salmon and other anadromous fish as well as for other freshwater and marine species.

In general, the reach of the Columbia River that is within the project site, vicinity, and shipping prism, provides aquatic habitat conditions suitable as a migratory corridor for several species of native Columbia River fish including several native salmonids, trout, sturgeon, lamprey, minnows, and eulachon. Several non-native fish species are also present throughout the Lower Columbia River. Several of these non-native species are present in numbers that may affect native fish populations.

4.2.2 Special Status Fish Species

The Columbia River represents documented and/or potentially suitable habitat for several special status fish species, including species and critical habitats listed or proposed for listing under the federal ESA (NMFS 2013, USFWS 2013), Washington state-listed species, and a WDFW priority species and an SGCN (WDFW 2008). Information regarding the documented or potential presence of special status fish species was obtained from species lists maintained by USFWS (USFWS 2013) and NMFS (NMFS 2013) and data from WDFW's two on-line databases, PHS on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b). Table 4-3 lists the special status fish species that are known or expected to occur in or near in the project vicinity and specifies their likelihood of occurring at the project site or within the vicinity.

Table 4-3. Special Status Fish Species and Their Potential to Occur within the Project Area

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence	
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site and Vicinity[7]	Shipping prism
Salmon and Trout								
Bull Trout (*Salvelinus confluentus*)	Columbia River DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Chinook Salmon (*Oncorhynchus tshawytscha*)	Lower Columbia River ESU	FT	Designated	SC	1, 2, 3	N		
	Upper Willamette River ESU	FT	Designated	SC	1, 2, 3	N		
	Upper Columbia River spring-run ESU	FE	Designated	SC	1, 2, 3	N		
	Snake River spring/ summer-run ESU	FT	Designated	SC	1, 2, 3	N		
	Snake River fall-run ESU	FT	Designated	SC	1, 2, 3	N		
Chum Salmon (*Oncorhynchus keta*)	Columbia River ESU	FT	Designated	SC	1, 2, 3	N		
Coho Salmon (*Oncorhynchus kisutch*)	Lower Columbia River ESU	FT	Proposed	SC	1 ,2, 3	N		
Sockeye Salmon (*Oncorhynchus nerka*)	Snake River ESU	FE	Designated	SC	1, 2, 3	N		
Steelhead (*Oncorhynchus mykiss*)	Lower Columbia River DPS	FT	Designated	SC	1, 2, 3	Y		
	Upper Willamette River DPS	FT	Designated	SC	1, 2, 3	Y		
	Middle Columbia River DPS	FT	Designated	SC	1, 2, 3	Y		
	Upper Columbia River DPS	FT	Designated	SC	1, 2, 3	Y		
	Snake River Basin DPS	FT	Designated	SC	1, 2, 3	Y		
Coastal Resident/Sea-Run Cutthroat Trout (*Oncorhynchus clarkii clarkii*)	Southwest Washington ESU	FSC	N/A	None	3	N	Columbia River is documented migratory corridor	Columbia River and adjacent marine waters are documented habitat
Pink Salmon (*Oncorhynchus gorbuscha*)	N/A	None	N/A	None	2, 3	N		
Sturgeon								
Green Sturgeon (*Acipenser medirostris*)	Southern DPS	FT	Designated	None	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
White Sturgeon (*Acipenser transmontanus*)	N/A	None	N/A	None	2, 3	N	Columbia River is documented migratory corridor	Columbia River and adjacent marine waters are documented habitat
Lamprey								
Pacific Lamprey (*Lampetra tridentata*)	N/A	FSC	N/A	None	3	Y	Columbia River is documented habitat for all life stages	Columbia River and adjacent marine waters are documented habitat
River Lamprey	N/A	FSC	N/A	SC	1	Y		
Minnow								
Leopard Dace (*Rhinichthys falcatus*)	N/A	None	N/A	SC	1	Y	Historic observations in mainstem Columbia River. May provide suitable habitat.	Historic observations in mainstem Columbia River. May provide suitable habitat.
Smelt								
Pacific Eulachon (*Thaleichthys pacificus*)	Southern DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented habitat and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.

[1] ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment

[2] ESA Classifications: FE = federal endangered; FT = federal threatened; FSC = species of concern; FP = federal proposed; FC = federal candidate.

[3] Washington SOC Classifications: SE = state endangered; ST = state threatened; SS = state sensitive; SC = state candidate.

[4] WDFW PHS Listing Criteria: Criterion 1 = State-listed and Candidate Species; Criterion 2 = Vulnerable Aggregations; Criterion 3 = Species of Recreational, Commercial, or Tribal Importance.

[5] SGCN – As defined in WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) (WDFW 2005).

4.2.2.1 *Salmon and Trout*

(a) Bull trout (Salvelinus confluentus)

The proposed project area is located within the range of the Columbia River DPS of bull trout. Excluding one Nevada population, the Columbia River bull trout DPS includes all natural spawning populations in the Columbia River basin and the river's tributaries within the United States. Bull trout in the Columbia River DPS are listed as threatened under the federal ESA, and critical habitat for bull trout has been designated for Columbia River DPS bull trout (USFWS 2013). Bull trout are also a Washington state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Once widely distributed throughout the Pacific Northwest, bull trout have been reduced to approximately 44 percent of their historical range (LCFRB 2004c). Compared to other salmonids, bull trout are thought to have more specific habitat requirements, and are most often associated with undisturbed habitat with diverse cover and structure. Spawning and rearing are thought to be primarily restricted to relatively pristine cold streams, often within headwater reaches (Rieman and McIntyre 1993). Adults can reside in lakes, reservoirs, and coastal areas or they can migrate to saltwater (63 FR 31647). Juveniles are typically associated with shallow backwater or side-channel areas, while older individuals are often found in deeper pools sheltered by large organic debris, vegetation, or undercut banks (63 FR 31467). Water temperature is also a critical factor for bull trout, and areas where water temperature exceeds 59° F are thought to limit distribution (Rieman and McIntyre 1993).

In southwest Washington, bull trout have been reported in the North Fork Lewis, White Salmon, and Klickitat river systems. Historically, bull trout were found in the Cowlitz and Kalama basins but are not believed to be present there today. Bull trout populations occur in two drainages downstream of Bonneville Dam: the Willamette River and the Lewis River (USFWS 1998). Because bull trout in the Lower Columbia River basin are not usually anadromous, they are primarily regulated by local habitat conditions, and are not directly affected by conditions in the mainstem Columbia River and its estuary (LCFRB 2004c).

Adult bull trout may be migrating through the project site and vicinity between approximately April and September, and outmigrating juveniles may be found in the Columbia River year-round. If juvenile or adult bull trout were present within the action area, they will likely be migrating quickly through, as there is no suitable rearing or refuge habitat in the vicinity. Bull trout prefer the upper reaches of cold, clear running streams with clean gravel and cobble substrate for spawning.

(b) Chinook salmon (Oncorhynchus tshawytscha)

The Columbia River is a migratory corridor for five ESU of Chinook salmon: the Lower Columbia River ESU, Upper Willamette River ESU, Upper Columbia River spring-run ESU, Snake River spring/summer run ESU, and Snake River fall-run ESU. These species are all listed as threatened under the federal ESA, with the exception of the Upper Columbia River spring-run ESU, which is listed as endangered (NMFS 2013). The Columbia River has also been designated as critical habitat under the federal ESA for each of these five ESUs. Chinook salmon are also a state candidate species and a WDFW priority species (WDFW 2008).

The Lower Columbia River ESU of Chinook salmon includes all natural spawning populations in river reaches accessible to Chinook salmon in the Columbia River tributaries between the

Grays and White Salmon rivers in Washington and the Willamette and Hood rivers in Oregon (70 FR 37160). The other ESUs that have the potential to occur within the project site and vicinity use the Columbia River as a migratory corridor to spawning and rearing habitats higher in the watershed.

Compared to the other Pacific salmon, Chinook salmon have the most complex life history with a large variety of patterns. The length of freshwater and saltwater residency varies greatly (Myers et al. 1998). Channel size and morphology, substrate size and quality, water quality, and cover type and abundance may influence distribution and abundance of Chinook salmon (LCFRB 2004a). After 3–5 years in the ocean, Columbia River stocks return to spawn in the fall and spring. Spawning occurs in the mainstems of larger tributaries in coarse gravel and cobble (Myers et al. 1998).

Habitat use in the Lower Columbia River is variable, depending on the stock. Adult fish migrate through the lower river almost year-round. Depending on the ESU, adults enter the river between February and November and spawn in tributaries from August through September (Myers et al. 1998, LCFRB 2004b). The portion of the Columbia River that is within the project site and vicinity does not provide any suitable spawning or rearing habitat for Chinook salmon, as suitable spawning substrate is virtually non-existent. If they are present, migrating adults and juveniles are expected to be moving quickly through the deep water portion of the river.

Juvenile movement through the river is also variable depending on the stock. Juveniles often move into the Columbia River and estuary to over-winter (LCFRB 2004c). Spring Chinook tend to rear in tributary streams for a year, and yearlings outmigrate rapidly during the spring freshet (LCFRB 2004b). Fall Chinook tend to outmigrate as sub-yearlings in the late summer and fall of their first year (LCFRB 2004b). Over-wintering and outmigrating Chinook salmon juveniles tend to occupy the nearshore habitat in the lower Columbia River.

The project site and vicinity both represent documented habitat for adult and juvenile Chinook salmon. Adult Chinook of one or more ESUs may be present within the lower river year-round. Juvenile Chinook salmon, if present within the vicinity, will likely be migrating quickly through during peak spring and fall migration periods. No suitable spawning or rearing habitat occurs within the project vicinity, and there is little suitable habitat for foraging or refuge. One or more life stages of Chinook salmon could potentially be present within portions of the shipping prism during any time of year.

(c) Chum salmon (Oncorhynchus keta)

The proposed project area is located within the Columbia River ESU of chum salmon. This ESU includes all naturally spawning populations in all river reaches accessible to chum salmon in the Columbia River downstream from Bonneville Dam (70 FR 37160). Historically, chum salmon were very abundant in the Columbia River. Today, Columbia River ESU chum salmon are essentially extirpated upstream of Bonneville Dam; currently, only three strong populations (Grays River, Hardy Creek, and Hamilton Creek) are found – less than 1 percent of historic levels (Johnson et al. 1991; LCFRB 2004a).

Columbia River ESU chum salmon are listed as threatened under the federal ESA, and the Columbia River has been designated as critical habitat for Columbia River chum salmon (NMFS 2013). Chum salmon are also a state candidate species and a WDFW priority species (WDFW 2008).

Chum salmon have the broadest spawning distribution of Pacific salmon species. They have a very short freshwater residency time, and they require cool, clean water and substrate for spawning. Migration to saltwater occurs immediately after emerging from the gravel; therefore, freshwater rearing habitat is a lesser concern for this species. After 3–5 years in saltwater, Columbia River chum salmon return to spawn in the fall. Spawning typically takes place in the lower mainstems of rivers, including the Columbia River, frequently in locations within the tidal zone where there is an abundance of clean gravel (LCFRB 2004a). Juvenile outmigration to the Columbia River estuary for rearing occurs soon after emergence from spawning gravels from mid-February to mid-June. Some stocks of chum salmon spend a month or more rearing in rivers before migrating to the ocean (LCFRB 2004b).

Adults and juveniles likely use the reach of the Columbia River that is within the project vicinity only as a migration corridor. Adult fish migrate through the project vicinity from October to November. Spawning occurs from November through December within the Columbia River and major tributaries (LCFRB 2004b); however, no spawning habitat exists at the project site, and no chum spawning habitat has been identified within the vicinity. Chum salmon are known to spawn in shallow water within the main channel of the Columbia River at river miles (RMs) 113, 114, 123, between 136 and 139, and near Ives Island at RM 143 (Johnson et al. 1997).

No backwater channels or nearshore habitat suitable for rearing chum salmon occur within the project vicinity, and chum salmon are not likely to rear for significant periods within the vicinity. The shipping prism represents suitable habitat for both outmigrating juvenile chum, migrating adult chum, and estuarine and nearshore marine habitats.

(d) Coho salmon (Oncorhynchus kisutch)

The project site and vicinity are located within the range of the Lower Columbia River ESU of coho salmon. This ESU includes all natural spawning populations in Columbia River tributaries below the Klickitat River in Washington and the Deschutes River in Oregon (including the Willamette River up to Willamette Falls) (70 FR 37160). Lower Columbia River ESU coho salmon are listed as threatened under the federal ESA (NMFS 2013). The portion of the Columbia River that is within the project vicinity has also been proposed to be designated as critical habitat for Lower Columbia River coho salmon. Coho salmon are also state candidate species and a WDFW priority species (WDFW 2008).

Historically, the lower Columbia River reach was the center of coho salmon abundance in the Columbia River basin, with the middle and upper reaches also containing large runs of coho salmon. These two populations have been significantly reduced, with the lower Columbia River reach estimated at 5 percent of historic levels (LCFRB 2004b).

Coho salmon have one of the shortest life cycles of all anadromous salmonids. Different patterns of life history are linked to different populations. Forming large schools, juveniles rear in freshwater for 1 year, migrate to the ocean, and return in 5–20 months to spawn. The distribution and abundance of coho salmon are most likely influenced by water temperature, stream size, flow, channel morphology, vegetation type and abundance, and channel substrate size and quality. Coho salmon return from the ocean to spawn during fall freshets in September and October. Spawning occurs in silt to large gravel of tributaries (LCFRB 2004c). Juvenile coho in the LCR ESU tend to rear in small tributaries, and outmigrate as smolts in the late spring of their second year (LCFRB 2004b).

There are two types of run timing associated with coho: Type S, which are early run, and Type N, which are late run (Myers et al. 2006). Type S fish generally return to the Columbia River from August to October and spawn in October and November. Type N fish return to the Columbia River from October to November/December and spawn in November through January. Some Type N coho can spawn as late as mid-February (Myers et al. 2006).

There is no suitable spawning habitat within the action area for coho salmon, and the Columbia River serves only as a migratory corridor within the project vicinity. Adult Lower Columbia River coho salmon may potentially be migrating through the project vicinity between approximately August and February.

Juveniles rear in smaller tributaries, and likely do not rear in significant numbers within the project vicinity. Juvenile outmigration occurs in the spring and summer of the second year, with the peak occurring in May (LCFRB 2004b). Depending on the degree of maturation, some juveniles may forage in the nearshore during outmigration. Outmigrating juvenile coho likely move quickly through the project site and vicinity, as there is little suitable nearshore foraging or refuge habitat present. One or more life stages of coho salmon could potentially be present within portions of the shipping prism during any time of year.

(e) Sockeye salmon (Oncorhynchus nerka)

The reach of the Columbia River within the project vicinity is located within the range of the Snake River ESU of sockeye salmon. This ESU includes all river reaches and estuary areas presently or historically accessible to sockeye salmon in the Columbia River and is defined as all river reaches east of a straight line connecting the west end of the Clatsop Jetty (Oregon side) and the west end of the Peacock Jetty (Washington side), and extending upstream to the confluence of the Snake River, upstream on the Snake River to the confluence of the Salmon River, and upstream on the Salmon River to the confluence of the Alturas Lake Creek and Stanley, Redfish, Yellow Belly, Pettit, and Alturas lakes (including their inlet and outlet tributaries) (70 FR 37160).

The Snake River ESU of sockeye salmon is extremely close to extinction. Factors cited for the decline include overfishing, water diversion for irrigation, and obstacles to migration including dams (LCFRB 2004c). The only extant sockeye salmon in the Snake River ESU spawn in lakes in the Stanley basin of Idaho.

The Snake River ESU of sockeye salmon is listed as endangered under the federal ESA, and the reach of the Columbia River that is within the project vicinity has been designated as critical habitat for Snake River sockeye salmon. Sockeye salmon are also state candidate species and a WDFW priority species (WDFW 2008).

Historically, adult sockeye salmon in the Snake River ESU enter the Lower Columbia River in June and July and migrate upstream through the Snake and Salmon rivers, arriving at their natal lakes in August and September. Spawning peaks in October and occurs in lakeshore gravels. Fry emerge in late April and May and move immediately to the open waters of the lakes where they feed on plankton for 1–3 years before migrating to the ocean. Juvenile sockeye generally leave Redfish Lake from late April through May and migrate to the Pacific Ocean. Snake River ESU sockeye salmon spend 2–3 years in the Pacific Ocean before returning to their natal lakes to spawn.

In the Columbia River basin, sockeye salmon spawn and rear in lakes in the upper Snake River watershed. Adults typically migrate through the Lower Columbia River in June and July. Juvenile outmigration begins in early spring after ice breakup on the lakes (LCFRB 2004c), and outmigrating juveniles may be present within the project vicinity between approximately April and June.

(f) Steelhead (Oncorhynchus mykiss)

The reach of the Columbia River within the project vicinity represents potential habitat for five DPS of steelhead: Lower Columbia River, Upper Willamette River, Middle Columbia River, Upper Columbia River, and Snake River Basin DPS. These five DPS are all listed as threatened under the federal ESA, and the reach of the Columbia River within the project vicinity has been designated critical habitat for all five DPS (NMFS 2013). Steelhead are also a state candidate species and a WDFW priority species (WDFW 2008).

Steelhead is the most widely distributed anadromous salmonid. The life history pattern of steelhead can be very complex, involving repeated spawnings and continuous reversals of freshwater to ocean phases (LCFRB 2004c). The distribution and abundance of steelhead are thought to be influenced by water temperature, stream size, flow, channel morphology, vegetation type and abundance, and channel substrate size and quality (LCFRB 2004c). Depending upon the specific requirements of a particular life stage, steelhead use a wide range of habitat types from low-order tributaries to river mainstems (61 FR 41541). Steelhead DPS that migrate within the Lower Columbia River return in the spring and fall to spawn. Spawning occurs in small to large gravel of tributaries and smaller rivers (LCFRB 2004b).

Adult and juvenile steelhead primarily use the project vicinity as a migration corridor. Adults migrate through the action area year-round, depending on the run type. Summer steelhead migrate upstream within the Columbia River between roughly May and October, with spawning occurring in tributaries between late February and early April. Winter-run adults enter the Columbia River between December and May, spawning in tributaries in late April and early May.

Peak adult spawning for both summer and winter runs occurs in the spring. Spawning occurs in the tributaries throughout the Columbia River basin (LCFRB 2004b). In streams that support both summer and winter steelhead runs, summer steelhead tend to spawn higher in the watershed. No suitable steelhead spawning habitat occurs within the project site or vicinity, and the reach of the river within the project vicinity serves largely as a migratory corridor.

The peak juvenile outmigration through the Lower Columbia River occurs in the spring. Over-wintering and outmigrating juvenile steelhead occupy the nearshore habitat within the project area. Juvenile steelhead may be present in high numbers during migration periods, but juvenile steelhead likely move quickly through the project site and vicinity, due to the relatively low quality of nearshore habitat. There is very little in-stream or riparian habitat structural complexity that will provide suitable areas for foraging or refugia for outmigrating juvenile steelhead. One or more life stages of steelhead could potentially be present within portions of the shipping prism during any time of year.

(g) Coastal resident/sea-run cutthroat trout (*Oncorhynchus clarkii clarkii*)

The coastal cutthroat trout is one of 13 subspecies of cutthroat trout indigenous to North America. The range of this subspecies extends northward along the Pacific Coast from northern

California to the Prince William Sound region of southeast Alaska, and eastward to the crest of the Cascade Range (Johnson et al. 1994). This subspecies exhibits both resident fluvial and adfluvial life history patterns (resident) and is the only subspecies to also exhibit an anadromous (sea-run) life history pattern (Behnke 1992). Coastal cutthroat trout in the Columbia River system are part of the Southwest Washington ESU, which is a species of concern under the federal ESA (NMFS 2013). Coastal cutthroat trout are also a WDFW priority species (WDFW 2008).

The life history of the coastal cutthroat is probably the most complex and flexible of any Pacific salmonid (Johnson et al. 1994). Cutthroat trout in the Southwest Washington ESU exhibit fluvial, adfluvial, and anadromous life histories. The extent to which individuals expressing these various strategies are isolated from other life history forms is largely unknown, though there is growing evidence that individuals may express multiple life history behaviors in their life time (Johnson et al. 1999).

Coastal cutthroat trout spawn in the smallest headwater streams and tributaries used by any salmonid species, and the young usually remain in these streams about a year before moving down into larger streams (Palmisano et al. 1993). Individuals that migrate to the sea live in these larger streams for another 2 to 5 years before migrating to the Pacific Ocean as smolts, between approximately March and June (Wydoski and Whitney 1979; Johnson et al. 1994). Some stocks, primarily those with limited or no possibility of return migration from the ocean, remain as residents of small headwater tributaries, or migrate only into rivers or lakes (Scott and Crossman 1973; Johnson et al. 1994). Sea-run cutthroat do not migrate to the open ocean; rather, they stay in estuarine habitats near the mouths of their migratory streams for 5-8 months of the year (Palmisano et al. 1993; Johnson et al. 1994). Upstream migration to freshwater feeding/spawning areas occurs from late June through March; re-entry timing is consistent from year to year within streams, but varies widely between streams (Johnson et al. 1994). Spawning generally occurs between December and May in the tails of pools located in streams with low gradient and low flows or in shallow riffles (Wydoski and Whitney 1979; Johnson et al. 1994). Preferred water temperatures for spawning and incubation range from 42°F to 63°F; cutthroat are generally not found in waters above 72°F (Johnson et al. 1994).

Coastal cutthroat in the portion of the mainstem Columbia River that is within the project site and vicinity would be sea-run individuals migrating to or from the estuary. Out-migrating coastal cutthroat trout smolts could potentially be present between approximately March and June, while upstream migrating adults could potentially be present between approximately June and March. For this reason, coastal cutthroat trout could be present within the project vicinity or shipping prism during any time of the year.

(h) Pink salmon (Oncorhynchus gorbuscha)

Pink salmon are the most abundant of the seven Pacific salmon species (Heard 1991). They are not listed under the federal ESA, but they are considered a WDFW priority species (WDFW 2008).

Pink salmon range throughout the North Pacific Ocean and Bering Sea. Populations originating from different coastal regions of the North Pacific occupy distinct ocean nursery areas. The range shifts southward for winter, northward in warmer months (Heard 1991). In Washington, the most significant runs are in streams tributary to Puget Sound. They are relatively uncommon in the Columbia River basin, with fewer than 100 fish counted at the Bonneville Dam fish ladder

in most years. In 2011, however, a record run of 3,828 pink salmon was recorded at the dam (Columbia Basin Fisheries Agencies and Tribes [CBFAT] 2013a).

Pink salmon have the shortest lifespan of all the Pacific salmon found in North America. They mature and complete their entire life cycle in 2 years. This 2-year life cycle has created genetically distinct odd-year and even-year populations of pink salmon in most Puget Sound tributaries. Fish coming in odd years are unrelated to the individuals returning in even years. Odd-year and even-year populations do not interbreed even when they return to the same spawning grounds.

Adult pink salmon spend most of their lives at sea. They return to natal streams in the fall, with spawning occurring in rivers and tributary streams, or in lower tidal areas in some rivers. After juveniles emerge from gravel (in April–May), they immediately move downstream to estuary. Young fish may be found in inshore waters for several months before they move to sea (Scott and Crossman 1973).

Pink salmon are not common in the Columbia River in most years, but large runs have occasionally been recorded. While pink salmon are not expected to be present in significant numbers, it is possible that they may occasionally be present in the project site and/or vicinity in the fall (during adult migration), and spring (during juvenile out-migration). One or more life stages of pink salmon could potentially be present within portions of the shipping prism during any time of year.

4.2.2.2 *Sturgeon*

(a) North American green sturgeon (*Acipenser medirostris*)

North American green sturgeon in the Lower Columbia River are composed of approximately 60 percent northern DPS and 40 percent southern DPS (personal communication with Steve West, WDFW, April 24, 2009), with the southern DPS being listed as threatened under the ESA (USFWS 2013). The Columbia River estuary upstream to Bonneville Dam has also been designated critical habitat. Green sturgeon is a WDFW priority species and an SGCN (WDFW 2008).

The green sturgeon is distributed throughout Alaska, Washington, California, and Oregon (McCabe and Tracy 1994). In the mid-1930s before Bonneville Dam was constructed, green sturgeon were found in the Columbia River up to the Cascades Rapids; today, they occur upriver to Bonneville Dam but are predominantly found in the lower reach of the river. The estuaries of Willapa Bay, the Columbia River, and Grays Harbor are late summer concentration areas (NMFS 2003). The Columbia River does not support spawning populations of green sturgeon (personal communication with Steve West, WDFW, April 24, 2009).

Green sturgeon, which tend to prefer environments that are more saline, typically are not found in the Columbia River upstream of Skamokawa (personal communication with Steve West, WDFW, April 24, 2009). Adult and sub-adult green sturgeon are typically present in the Lower Columbia River from June through August, with August the peak month (McCabe and Tracy 1994). It is possible, but unlikely, that green sturgeon may be present in the project vicinity during the months of June through August. One or more life stages of green sturgeon could potentially be present within portions of the shipping prism during any time of year.

(b) White sturgeon (Acipenser transmontanus)

White sturgeon is a Washington priority species (WDFW 2008). White sturgeon are the largest of North American fishes. They occur from the Pacific slope of North America from the Aleutian Islands to Monterey, California (Lee et al. 1980). In the Columbia River, they spawn at roughly 4 to 11 year intervals, between approximately May and July (Wydoski and Whitney 1979). Larvae hatch from eggs in 1-2 weeks. Males may reach sexual maturity in about 9 years, females in 13-16 years (Wydoski and Whitney 1979). White sturgeon may live over 100 years, and can reach 20 feet in length and weigh over 1,800 pounds.

White sturgeon can be found at sea, usually near shore, as well as in large, cool rivers or streams. Some white sturgeon are anadromous and make extensive saltwater migrations. Many more stay primarily in estuarine waters, moving inland to freshwater to spawn. White sturgeon are bottom feeders. Young sturgeon feed mostly on the larvae of aquatic insects, crustaceans, and mollusks. A significant portion of the diet of larger sturgeon consists of fish.

White sturgeon may potentially be present within the project vicinity and shipping prism at all times of the year.

4.2.2.3 *Lamprey*

(a) Pacific lamprey (*Lampetra tridentata*) and river lamprey (*Lampetra ayresi*)

Two species of lamprey native to the Columbia River basin are provided special regulatory status: Pacific lamprey and river lamprey. Both are species of concern under the federal ESA (NMFS 2013). The river lamprey is currently a candidate for listing in Washington. Both Pacific lamprey and river lamprey are WDFW priority species and an SGCN (WDFW 2008).

The Pacific lamprey is found in coastal streams from southern California to the Gulf of Alaska; in Washington it occurs in most large coastal rivers (Wydoski and Whitney 1979). Larval lampreys (ammocoetes) spend up to 6 years burrowed in the sediment, feeding on diatoms and detritus where they transform into a juvenile stage called macropthalmia. At this stage, the lampreys are silver, develop teeth and a sucker-like disc, and form true eyes. Physiological transformations occur that initiate migratory behaviors and enable them to tolerate sea water (CBFAT 2013b). After a 2-month transformation into adults, Pacific and river lamprey migrate into the ocean where they spend 2 to 3 years parasitizing fishes and mammals (Pacific States Marine Fisheries Commission [PSMFC] 1997). Pacific lampreys enter saltwater between late winter and early spring, while river lampreys enter saltwater between May and July. Lampreys return to freshwater rivers to spawn in the spring, where they lay up to 100,000 eggs in a nest built in gravel or sandy sediments. Adults die after spawning (PSMFC 1997). Juveniles burrow into soft mud substrates and remain there for up to 6 years. Adults then move to marine environments for 2 to 3 years before returning to tributaries to spawn (Bayer and Seelye 1999).

Adult lamprey may be present within the project vicinity in the late winter and early spring. Juvenile lamprey may potentially be present within the project vicinity at all times of the year. The shallow nearshore habitat at the project site may provide suitable substrate conditions for rearing lamprey, though the limited in-stream complexity and lack of riparian cover limit this function of the habitat. One or more life stages of lamprey could potentially be present within portions of the shipping prism during any time of year.

(b) Leopard dace (Rhinichthys falcatus)

Leopard dace is a Washington state candidate for listing and a WDFW priority species and an SGCN (WDFW 2008). It is not provided any special federal regulatory status.

Leopard dace is a species of minnow endemic to the Columbia River system in Oregon, Washington, Idaho, and British Columbia, and to the adjacent Fraser River system in British Columbia (Lee et al. 1980). Its habitat is thought to be similar to that of other species of dace, and includes flowing pools and gravel runs of creeks and small to medium rivers and rocky margins of lakes (Page and Burr 1991). It is usually found in slow-moving current, typically in slower, deeper water than other species of dace (Wydoski and Whitney 1979). Spawning is thought to occur between July and August in slow-moving riffles (Wydoski and Whitney 1979). Young-of-the-year feed mostly on dipterous larvae. Yearlings begin feeding on aquatic insect larvae (e.g., *Ephemeroptera* and *Diptera*); by September, they feed mostly on terrestrial insects. Adults eat aquatic insect larvae and terrestrial insects.

Leopard dace have been documented in the mainstem Columbia River within the project vicinity, and could be present within the project site, project vicinity, and/or project shipping prism at any time of the year. The project site and vicinity likely do not provide suitable spawning habitat for leopard dace, as there is no riffle habitat or suitable substrate.

4.2.2.4 *Eulachon*

(a) Pacific eulachon (Thaleichthys pacificus)

Pacific eulachon are endemic to the eastern Pacific Ocean ranging from northern California to southwest Alaska and into the southeastern Bering Sea. Eulachon in the Columbia River system are part of the Southern DPS, which is listed as threatened under the federal ESA. The Columbia River has also been designated critical habitat for Pacific eulachon. This is also a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Eulachon typically spend 3–5 years in saltwater before returning to freshwater to spawn from late winter through early summer. Typically, spawning grounds are in the lower reaches of larger rivers fed by snowmelt and spawning occurs at night; in the Columbia River, spawning typically occurs at temperatures from 39 to 50° F over sand, coarse gravel, or detrital substrates in January, February, and March. Eulachon eggs hatch in 20–40 days, and then are carried downstream and dispersed by estuarine and ocean currents (NMFS 2010).

According to NMFS (NMFS 2010), most Pacific eulachon production for the southern DPS occurs in the Columbia River basin. In the Columbia River, spawning runs return to the mainstem of the river from RM 25, near the estuary, to immediately downstream of Bonneville Dam (RM 146). While most eulachon production occurs in tributaries downstream of the project vicinity, the Washougal and Sandy rivers, which empty into the Columbia River approximately 15 miles upstream of the action area, are both known to support smelt runs (NMFS 2010). Adult eulachon typically migrate through the project site and vicinity from approximately December through February, with the peak of the run in January and February (personal communication with Brad James, WDFW, January 21, 2010). The incubation period is approximately 1 month, and the peak outmigration of juvenile smelt larvae is February through April (personal communication with Brad James, WDFW, January 21, 2010).

Adult eulachon may begin migrating through the project site, vicinity, and freshwater portions of the shipping prism near the end of December. No spawning has been documented in the action

area and the action area does not represent suitable spawning habitat for Pacific eulachon, and eulachon eggs are not expected to be present in the project vicinity at any time. Larval eulachon may potentially be flowing downstream through the project site, vicinity, and shipping prism between approximately February and April.

4.3 Wetland Resources

The following section describes the extent and condition of wetland resources at the project site and within the project vicinity. This information was compiled from a field review and from a review of existing literature, including NWI and soils data and recent and historic permitting documentation.

4.3.1 Project Site

The NWI map for Vancouver, Washington USGS Quadrangle (USFWS 1989) indicates the presence of numerous wetlands within the project vicinity, including five wetland polygons on the portion of the project site that encompasses Parcel 1A (Figure 8).

Wetland types mapped on Parcel 1A include:

- PEMA – Palustrine Emergent Temporarily Flooded
- PEMC – Palustrine Emergent Seasonally Flooded
- PFOA – Palustrine Forested Temporarily Flooded
- PFOC – Palustrine Forested Seasonally Flooded

It is important to note that NWI mapping is a coarse-scale mapping tool, and does not always reflect the presence or absence of wetland features at a given site. The NWI identifies much of Port Parcel 1A as having wetland characteristics, but wetland delineations conducted on the parcel prior to its initial development in 1996 documented significantly less wetland than identified by the NWI (The JD White Company 1993).

Nine wetlands, totaling approximately 16 acres in size, were present on Parcel 1A prior to development of that parcel (The JD White Company 1993), but these wetlands were all filled through permitted actions. Development on Parcel 1A was initiated in 1996. USACE permit number 96-1850 authorized impacts to 9.92 acres of emergent wetlands on the parcel. Wetland impacts associated with this development activity were mitigated through the establishment of the Port's Parcel 2 wetland mitigation site. A small forested wetland at the extreme eastern property boundary of Parcel 1A was enlarged and enhanced into the existing Parcel 1A wetland mitigation site.

In 2012, the Port applied for and received permission to fill a 1.76-acre isolated emergent wetland in the northeast corner of Parcel 1A, which was hydrologically and functionally isolated and provided little function and was filled in 2012.

The NWI also identified two isolated wetlands located north of the Jail Work Center. The boundaries of these wetlands were delineated in 2006 and 2007 in association with the Port's WVFA project (The JD White Company 2007). These wetlands were filled as part of that project in 2007. Impacts were permitted under a USACE nationwide permit (NWP-2007-721) and an Ecology administrative order (AO # 6902), and mitigation was accomplished through the purchase of credits in the CRWMB.

No other wetlands are present within the project site. Field investigations conducted on May 28 and June 26, 2013 included a visual reconnaissance to document the presence of any potential wetlands. The OHWM of the Columbia River within the vicinity of the dock was also delineated during the May 28, 2013 site visit. All portions of the project site above the OHWM are either impervious, paved, or gravel-covered surfaces, or are upland ruderal grass/forb habitats that are clearly dominated by upland vegetation and have neither the potential to accumulate or detain surface water or precipitation nor any visible hydrologic features that indicate the potential presence of wetlands. It has been determined, therefore, that there are no wetlands present on the project site.

4.3.2 Project Vicinity

Within the greater project vicinity, there are numerous wetlands, including several relatively high-quality wetland complexes. The NWI map (USFWS 1989) identifies a large complex of emergent, scrub-shrub, and forested wetlands north of the project site associated with the south end of Vancouver Lake; emergent and forested wetlands on Port Parcel 2; emergent wetlands to the east and south of Parcel 1A; and emergent wetlands to the west of Port Parcel 5, extending onto Parcel 3 (Figure 8).

Mapped wetland types include the following:

- PEMA – Palustrine Emergent Temporarily Flooded
- PEMC – Palustrine Emergent Seasonally Flooded
- PEMF – Palustrine Emergent Semi-permanently Flooded
- PEMR – Palustrine Emergent Seasonal – Tidal
- PEMT – Palustrine Emergent Semi-permanent – Tidal
- PFOA – Palustrine Forested Temporarily Flooded
- PSSA – Palustrine Scrub-shrub Temporarily Flooded
- PSSC – Palustrine Scrub-shrub Seasonally Flooded
- PSSR – Palustrine Scrub-shrub Seasonal – Tidal
- PSS/EMC – Palustrine Scrub-shrub/Emergent Seasonally Flooded
- PUBH – Palustrine Unconsolidated Bottom Permanently Flooded

As with the project site mapping, the NWI mapping within the project vicinity is only accurate at a coarse scale. Extensive wetland delineations associated with various project proposals and wetland mitigation activities have been conducted throughout the project vicinity, and these defined the actual boundaries of many of the wetlands within the project vicinity more accurately.

There are two wetland mitigation sites present in the vicinity of the project site. The Parcel 1A wetland mitigation site, located immediately east of Parcel 1A, was established in 1994 under USACE permit number 94-00061. This approximately 7.9-acre wetland is a depressional, palustrine forested wetland (PFO), vegetated with mature black cottonwood trees and a variety of native shrubs and herbaceous species.

The Parcel 2 wetland mitigation site is an approximately 16.4-acre mitigation site, situated on an approximately 31.3-acre parcel north of the existing Terminal 5 site. The mitigation site was established in 2000, under USACE permit number 96-1850, for wetland impacts associated with the initial development of Parcel 1A. The mitigation site received final approval from the USACE in 2007. The site is currently a mosaic of forested, scrub-shrub, and emergent vegetation.

The most significant complex of wetlands in the project vicinity is associated with the southern end of Vancouver Lake. These wetlands are a mosaic of emergent, scrub-shrub, and forested wetlands that are hydrologically connected to Vancouver Lake and, by extension, the Columbia River. These wetlands provide high quality seasonally inundated, tidally influenced, and permanently flooded habitats that most closely resemble the original hydrologic and wetland habitat functions of the Vancouver Lake Lowlands. An approximately 154-acre portion of this wetland complex, located on portions of Port Parcels 6 and 7, has been established as the CRWMB.

There are several emergent wetlands west and northwest of the project site as well. The NWI identifies emergent wetlands on property west of the Terminal 5 property, and on Port parcels 3, 4, and 5. A wetland delineation conducted on parcels 3, 4, and 5 in 2001 identified approximately 148 acres of wetland on these parcels (The JD White Company, Inc. 2001). The wetland delineation report documented that these wetlands provide primarily water quality functions, due to their limited vegetative structural diversity, but they also provide some wildlife habitat function.

4.3.3 Project Shipping Prism

The shipping prism includes only the Lower Columbia River and adjacent marine waters. While there are numerous backwater and side channel wetland habitats present on the Lower Columbia River, a detailed analysis of the quantity and/or quality of these wetlands is beyond the scope of this document

5.0 ENVIRONMENTAL CONSEQUENCES

This section describes the impacts that could occur to biological resources from the construction and operation of the proposed project.

5.1 Construction

Construction of the proposed upland facilities and in-water improvements have the potential to affect biological resources through direct permanent and temporary modification of terrestrial and aquatic habitats as well as through the potential for temporarily reduced water quality conditions during construction, and through the generation of temporarily elevated levels of underwater and terrestrial noise during pile installation. These impacts are discussed in greater detail below.

5.1.1 Terrestrial Vegetation and Habitat

The primary effect to terrestrial habitat and vegetation at the project site will be the direct, permanent removal of vegetation during construction of the terrestrial components of the project. There is very little terrestrial vegetation or wildlife habitat present at the project site. Most of the site has been filled, paved, and/or capped in association with previous development and cleanup activities. What little natural vegetation is present is small and isolated, and/or significantly disturbed from its natural condition. As such, construction of the proposed project will have little direct impact to terrestrial vegetation and wildlife habitat.

Construction of the upland portion of the project will occur almost exclusively within the unvegetated industrial habitat type. This vegetation type provides little or no wildlife habitat function, and direct permanent impacts to this vegetation will not result in any impacts to vegetation or habitat resources.

Approximately 42,000 square feet of ruderal upland grass/forb habitat will be permanently impacted by construction in Area 200 related to the office building and Area 500 related to portions of the pipeline. These areas provide very little habitat function because of their isolated and disturbed nature. Impacts to ruderal upland grass/forb habitat will not result in any significant impacts to vegetation or habitat resources.

Construction of portions of the pipeline will result in direct permanent impact to approximately 6,300 square feet of a small, isolated upland cottonwood stand north of the Jail Work Center. This stand contains approximately 273 trees, 171 of which are permitted for removal from 1.1 acres of the stand for the construction of a CPU substation adjacent to that location (BergerABAM, 2012). These areas are primarily grass and weedy herbaceous vegetation, with approximately 25 cottonwood and pine trees. These trees provide only moderate habitat function because of their isolated nature and previously approved development.

While the proposed pipeline will pass through a portion of the riparian area, this will occur primarily in an unvegetated portion. Construction of the pipeline will result in the removal of approximately 4,250 square feet of ruderal upland grass/forb habitat near the marine terminal in Area 400, although no high quality vegetation will be removed and riparian function will not be affected. Vegetation within the riparian area consists primarily of small-diameter black cottonwood (*Populus trichocarpa*) and willows (*Salix* spp.), and non-native false indigo bush (*Amorpha fruticosa*), and Himalayan blackberry (*Rubus armeniacus*). No riparian trees or vegetation will be removed, and no impacts to bank margin habitat are anticipated.

The proposed project would not result in any significant temporary impacts to vegetation or habitat resources.

Construction of the proposed project would not result in any direct or indirect impacts to vegetation or terrestrial habitat resources at either the project vicinity scale, nor within the shipping prism. Construction-related impacts to vegetation will be limited to the direct, permanent impacts to on-site vegetation associated with project construction. In general, construction of the proposed project will have only minor effects to terrestrial vegetation and wildlife habitat.

Operation

Terrestrial vegetation and wildlife habitats will not be affected significantly by any potential water quality impacts associated with operation of the proposed project. Terrestrial habitats that would remain at the project site post-construction could potentially be affected by an increased potential for spills or leaks. A spill to surface water would not be likely to affect terrestrial vegetation or wildlife habitats.

At the project vicinity and project shipping prism scales, terrestrial habitat and vegetation resources are unlikely to be affected by the proposed project. These terrestrial resources would not be directly or indirectly affected by any aspect of operations.

5.1.2 Wildlife Resources

As described above in section 5.1.1, construction of the proposed project will have only minor effects to terrestrial habitat and vegetation at the project site. The only construction-related impacts will be any direct impacts to habitat and vegetation associated with the terrestrial components of the project. Vegetation and habitat within these portions of the project site will be permanently removed.

Direct Habitat Modification – Impacts associated with direct habitat modification are described in section 5.1.1.

The project site provides potentially suitable, relatively low quality, foraging habitat for raptors such as bald eagles and peregrine falcons. Bald eagles have been documented extensively in the project vicinity, and it is likely that they use riparian habitats throughout the project vicinity as foraging habitats. Peregrine falcons have not been documented foraging at the project site, but they may occur in the vicinity. If present, peregrine falcons could forage in upland and riparian habitats at the site. The ruderal grass/forb habitats at the site provide potentially suitable, relatively low quality habitat for gray-tailed vole. The limited quality and quantity of available terrestrial habitat for these species, and the highly industrial nature of the surroundings, likely greatly limit the extent of habitat function. Direct impacts consisting of removal of approximately 46,250 square feet of ruderal grass-forb and approximately 6,300 square feet of upland cottonwood stands are expected to result in only minor potential impacts to bald eagle, peregrine falcon, and gray-tailed vole.

The aquatic portion of the project site represents suitable foraging and resting habitat for shorebirds and wintering waterfowl, which are WDFW priority species. As identified in section 5.1.3 below, the project will not result in any net increase in permanent impacts to the aquatic portion of the project, and is therefore not expected to result in any measurable or significant impact to shorebird or waterfowl habitat suitability.

The aquatic portion of the project site also represents potentially suitable habitat for Steller sea lion. If present, they are expected to be passing through in deep water habitats outside the immediate project site. They are not known or expected to use habitats near the existing dock, and are therefore unlikely to be affected by the relatively small amount of direct habitat impacts associated with new pile footprints or new overwater coverage.

Temporary Water Quality Impacts – As with any construction project, there is a potential for leaks and/or spills from construction equipment. The proposed overwater work creates the potential for construction debris to enter the waterway. Equipment and storage containers associated with the proposed project also create the potential for leaks and spills of fuel, hydraulic fluids, lubricants, and other chemicals.

The proposed project also has the potential to disturb sediments and increase turbidity temporarily at the project site during pile installation and removal activities. These impacts would not affect terrestrial wildlife species or habitats at the site, but could affect wildlife species that use aquatic habitats. Increased levels of turbidity could have temporary negative impacts on aquatic habitats and, if any wildlife species are present in the project vicinity during construction, could affect them directly.

The aquatic portion of the project site represents suitable foraging and resting habitat for shorebirds and wintering waterfowl. The aquatic portion of the project site also represents potentially suitable foraging habitat for Steller sea lion.

The accidental release of construction debris or leaks or spills of fuel or other chemicals into the waters of the project site has the potential to reduce habitat suitability for shorebirds and waterfowl as well as for Steller sea lion.

Similarly, temporarily elevated levels of turbidity that could result during pile-driving and removal activities also have the potential to reduce habitat suitability for these species by reducing visibility and habitat suitability for prey species. However, any temporary elevation of turbidity is expected be short term, and to not exceed the turbidity levels generated by natural events such as high volume flow events.

Impacts to special status wildlife species from temporary water quality impacts are expected to be minor.

Temporary Construction Noise – The proposed project has the potential to result in temporarily elevated terrestrial and underwater noise levels during pile driving activities.

Terrestrial construction noise and noise from other human activity can result in a variety of effects to wildlife species, including displacement from occupied habitats, interference with hearing ability in songbirds and mating and alarm calls in amphibians and ground squirrels, and disruption of raptor foraging activities (Madsen 1985; Van der Zande et al. 1980; Fyfe and Olendorff 1976).

Terrestrial noise levels will be elevated within the vicinity of the project site during impact pile driving, but these sound levels will be expected to decrease to ambient conditions within a relatively short distance from the immediate project site.

Peak terrestrial noise generated during impact pile installation has been estimated at a maximum of approximately 110 decibels (dBA), measured at 50 feet (FTA 2006). Baseline and construction-related noise levels were inferred using an industry-standard technique

recommended by WSDOT (WSDOT 2013). This guidance includes information regarding noise levels associated with typical construction procedures from the City of Boston's noise assessment methodology (Thalheimer 2000) and noise attenuation data from the Federal Transit Administration's construction noise methodology (FTA 2006).

Peak terrestrial noise generated during impact pile installation has been estimated to be approximately 110 decibels (dBA), measured at 50 feet (FTA 2006). As stated above, the baseline noise levels associated with the action area are relatively high, and this terrestrial noise attenuation analysis assumes baseline noise levels similar to those associated with a high density urban area (78 dBA measured at 50 feet). Hard site conditions were assumed for noise attenuation purposes because the surrounding landscape is largely unvegetated, so the linear attenuation rate was estimated to be approximately -6 dBA per doubling of distance. At this rate, terrestrial noise from impact pile driving is expected to attenuate to ambient conditions between approximately 1,600 and 3,200 feet from the location of project activities.

Most of the terrestrial habitat within approximately 3,200 feet of the dock is not suitable for wildlife species, and terrestrial wildlife habitats at the immediate project site are of limited quality and quantity. Species that utilize these industrialized habitats are generally well adjusted to nearly continuous human presence and activity. Terrestrial habitats at the project site represent low-quality foraging habitat for bald eagle, peregrine falcon, and other raptor species. These species may avoid habitats near the pile driving activity temporarily, but the foraging habitat in the vicinity is sufficient so that a significant adverse effect to any species is not anticipated.

Temporarily elevated terrestrial noise levels could extend beyond the project site onto portions of the CRWMB and associated wetlands and forested habitats on the Shillapoo NWR south of Vancouver Lake. In addition to being used extensively by a variety of waterfowl, raptors, migratory birds, small mammals, amphibians, and reptiles, these habitats provide potentially suitable habitat for a number of special status wildlife species. There is potential for these species to be present in these habitats during construction and they could be exposed to elevated terrestrial noise levels. Terrestrial noise from pile driving will have attenuated significantly by the time it reaches these habitats. The noise levels may potentially be of sufficient intensity to generate a behavioral response, but will not be expected to elicit avoidance or other behaviors that could result in adverse effects to any wildlife species such as missed feeding opportunities, nest abandonment, or increased susceptibility to predation that could result in adverse effects to any special status wildlife species.

In addition, the aquatic portion of the action area is suitable foraging and resting habitat for several species of shorebirds and waterfowl and foraging habitat for Steller sea lion. Shorebirds and waterfowl will avoid the area in the immediate vicinity of pile driving activity temporarily, but the foraging and resting habitat in the vicinity is sufficient, and this is not expected to represent a significant adverse effect.

Elevated underwater noise can also affect aquatic wildlife species, particularly marine mammals. The range of effects can range from mild disturbance to severe auditory damage. Direct mortality in marine mammals has not been observed as a result of elevated underwater noise levels. Monitoring for the presence of marine mammals and ceasing pile driving activities when they are within the project are ca reduce the potential for significant impacts to marine mammals, which in any event are not expected to occur in great numbers within the action area during the in-water work period.

Operation

The operation of the proposed project could affect wildlife habitat and special status wildlife species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for catastrophic accidents such as a spill to surface water. Lighting associated with the project could lead to direct and/or indirect impacts to wildlife species because it may affect the nocturnal behavior of animals within the project vicinity, including bird and bat species. Increased shipping traffic also could result in effects associated with the operation of the Facility.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for spills to surface waters during transportation of product by vessel.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. The project will provide both water quality and water quantity treatment.

Terrestrial habitats could be affected by an increased potential for spills or leaks. Accidental leaks or spills of fuel or other chemicals into surface- or groundwater at the project site have the potential to reduce habitat suitability for shorebirds and waterfowl as well as marine mammals.

Spills occurring at time of vessel loading will have the potential to affect wildlife species adversely as well as shorebirds, waterfowl, and marine mammals, as these species occupy aquatic habitats at the project site and within the vicinity. A spill while in transit in the project's shipping prism also has the potential to affect a number of special status species, depending on the location of the spill.

Impacts to special status wildlife species from water quality impacts related to normal operation of the Facility are expected to be minor.

Increased Shipping – The operation of the Facility will result in an increase in the number of ships transiting the Columbia River within the project site, vicinity, and shipping prism. It is estimated that the proposed Facility will result in approximately 140 ship transits per year in 2016 (first full year of operations) up to 365 ship transits per year at full buildout. Marine traffic on the Columbia River has the potential to result in impacts to wildlife through increases in the potential for shoreline erosion associated with propeller wash, through the introduction of exotic species, and (for certain species) through increased potential for direct mortality through ship strikes.

- *Bank Erosion* – Propeller wash from ships in transit, as well as wakes breaking on shore, could cause increased erosion along unarmored sections of shoreline. Erosion can re-suspend eroded material within the water column, increasing turbidity, which can affect habitat suitability for fish and other aquatic organisms. While most of the streambanks in the project vicinity are armored, and thus less susceptible to erosion, unarmored beaches could be susceptible to erosion from prop wash.

  Wildlife habitat and special status wildlife species within the project site, vicinity, and shipping prism may be affected by an increased potential for bank erosion that will result from increased ship traffic. Streambanks at the project site are well armored, and not particularly sensitive to erosion, so these habitats will not likely be affected. Elsewhere in the

project vicinity and shipping prism there are unarmored banks which could potentially be susceptible to increased erosion from prop wash. This could result in temporary degradation of wildlife habitat suitability and could affect special status wildlife species.

- *Exotic Species* – Ships in transit could potentially import exotic and/or invasive species on their hulls and exterior equipment and/or in ballast water. Introduced species often can out-compete native species and have the potential to alter natural habitats by competing with native species.
- *Ship Strikes* – The addition of 140 vessel trips per year in 2016 and up to 365 ship transits per year at full buildout on the Lower Columbia River, as well as in marine waters during transit has the potential to result in collisions of ships with species that include sea turtles, marine mammals, and cetaceans. Although sea turtles and cetaceans will not occur in the immediate vicinity of the project site or its vicinity, they could be affected in marine waters by vessels transiting to/from the Columbia River.

5.1.3 Fish Resources

Construction of the in-water and overwater portions of the proposed dock improvements has the potential to directly and permanently affect fish habitat at the project site through direct modification of aquatic habitats associated with the new pile footprints and a new overwater structure. Fish habitat both at the project site and within the project vicinity also could be temporarily affected by the potential for temporarily reduced water quality conditions during construction and the generation of temporarily elevated levels of underwater and terrestrial noise during pile installation. At the scale of the shipping prism, fish and fish habitat would not be directly or indirectly affected by project construction.

Direct Habitat Modification – The project will not result in any net increase in permanent impacts below the OHWM of the Columbia River (Figure 9). Removal of existing overwater structures and piles will offset the additional overwater coverage and pile placement associated with the project. Approximately 395 square feet of new benthic habitat impacts will be associated with the installation of 76, 24 and 36-inch steel piles for the mooring dolphins and walkways, but this impact will be offset by the proposed removal of 56 steel piles restoring 92 square feet of benthic habitat at the project site and the removal of timber piles at (approximately 220) at the Port's Terminal 2 area restoring approximately 305 square feet of benthic habitat (Figure 10).

The aquatic portion of the project site provides habitat for a number of native fish species, including the 14 special status wildlife species identified in Table 4-2. Nearshore habitats in particular (those less than approximately 20 feet deep) provide suitable migratory and foraging habitat for juvenile salmonids and trout, lamprey, minnows, eulachon, and other native fish species. Deep-water habitats provide these functions to a lesser degree, along with suitable migratory and foraging habitat for sturgeon.

Berth 13/14 Piles and Overwater Coverage Table (for Figue 8 - Aquatic Impacts)

Shoreline Location Description	Area of Overwater Coverage - Solid ft^2	Area of Overwater Coverage - Grated ft^2	# Piles (24 to 36-inch diameter)	Area of Pile Footprint ft^2
Below Corps OHWM (20 ft or less) with Shallow Water				
Trestle Modifications	144	-	12	38
Walkway to Dolphin	-	340	1	3
Berth 14 Walkway	-	430	-	-
Dolphin	535	-	10	71
Subtotal	679	770	23	112
Deep Water (20 ft below Corps OHWM and deeper)				
Trestle/Platform Modifications	48	-	8	25
Framing/Struts	1,380	460	2	6
Dolphins	1,605	-	30	212
Walkways to Dolphins	-	2,540	3	9
Berth 14 Walkway	-	60	-	-
Contingency Piles	-	-	10	31
Subtotal	3,033	3,060	53	283
Total	3,712	3,830	76	395

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 9
AQUATIC IMPACTS
AREA 400 MARINE TERMINAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 10
TERMINAL 2
PILE REMOVAL

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The project will not result in an increase in impacts to benthic habitat or overwater coverage and therefore impacts to fish habitat at the project site are not expected to result in any significant effect on the quality or function of the habitat. The impacts of both new benthic habitat and new overwater coverage will be offset by the removal of existing piles and overwater structure. Because the project will not result in a net increase in impact to either benthic habitat or overwater coverage, the project is not expected to result in any measurable or significant impact to the quality or function of habitat for special status fish species or to any designated or proposed critical habitats for them.

Temporary Water Quality Impacts – As with any construction project, there is a potential for leaks and/or inadvertent releases from construction equipment. The proposed overwater work creates the potential for construction debris to enter the waterway. Equipment and storage containers associated with the proposed project also create slight potential for leaks and inadvertent releases of fuel, hydraulic fluids, lubricants, and other chemicals.

The proposed project also has the potential to disturb sediments and increase turbidity temporarily at the project site during pile installation and removal activities. Increased levels of turbidity could have temporary negative impacts on aquatic habitats and, if any special-status fish species are present during the time of construction, could affect them directly.

These potential temporary water quality impacts have the potential to affect fish habitat function and special status fish species both at the project site and within the project vicinity, by reducing water quality, reducing visibility and increasing potential exposure to predators, and reducing habitat suitability for prey species. These effects would be temporary, and conditions would return to baseline conditions following completion of construction. At the scale of the project shipping prism, fish and fish habitat would not be affected by any temporary water quality impacts associated with construction, as these effects would be localized to the project vicinity.

During the in-water work period (anticipated to be October 1 to February 28), outmigrating juveniles and migrating adult salmon, steelhead, and bull trout could be present within the action area, as could migrating adult Pacific eulachon. Larval and juvenile eulachon are not expected to be present during the in-water work period. Similarly, green sturgeon will not be exposed to any direct effects of temporarily decreased water quality, as they are not expected to be present within the project vicinity during the in-water work period.

Special status salmon, steelhead, bull trout, and Pacific eulachon, if present, likely will be migrating through the project site and vicinity, and are not expected to be present for any significant period. Habitat suitability for adult and juvenile salmonids, steelhead, bull trout, and adult Pacific eulachon is limited at the site, and provides little function aside from a suitable migratory corridor. Fish are expected to move rapidly through the site and vicinity. Exposure to temporarily decreased water quality conditions, including temporarily elevated turbidity levels and/or potential debris contamination, is expected to be limited, and effects to fish habitat and special status fish species will be minor.

Designated and proposed critical habitats within the action area also may experience temporarily increased levels of turbidity during the proposed action. The geographic extent and duration of any potential short-term increases in sedimentation or turbidity are expected to be limited, and are not expected to exceed baseline sedimentation conditions measurably. Any temporarily elevated sedimentation levels will not result in any significant effect to any PCE of designated or proposed critical habitat for any species.

Temporary Construction Noise – The proposed project has the potential to result in temporarily elevated terrestrial and underwater noise levels at the project site and within the project vicinity during pile driving activities.

Elevated underwater noise, particularly percussive sounds such as those generated during impact pile driving, has the potential to affect fish in several ways. The effects can range from the alteration of behavior to physical injury or mortality, depending on the intensity and characteristics of the sound, the distance and location of the fish in the water column relative to the sound source, the size and mass of the fish, and the fish's anatomical characteristics (Hastings and Popper 2005). The effects of temporarily elevated noise levels can range from mild disturbance to severe auditory damage or death.

The project will require the installation of approximately 76, 24- and 36-inch-diameter steel pipe piles below the OHWM of the Columbia River. Pile driving will be completed using a vibratory hammer to drive all of the permanent structural piles to the extent practicable as well as all of the approximately 40 temporary piles. Following vibratory driving to refusal (the point at which the pile will no longer advance with the vibratory hammer), the project will use an impact hammer to drive piles to their final tip elevations. As well, an impact hammer will be needed to proof the structural piles. Proofing is the process of striking piles with an impact hammer to verify their load-bearing capacity. As part of impact minimization, a vibratory hammer will be used to remove approximately 56 piles from below the OHWM of the river at the marine terminal area and an additional 220 timber piles from the Port's Terminal 2. Pile removal is not expected to generate levels of underwater noise that will result in significant effects to fish habitat or species.

The zone of influence for underwater noise has been determined using the practical spreading loss model, currently recognized by both USFWS and NMFS as the best method to determine underwater noise attenuation rates, assumes a 4.5-dB reduction per doubling of distance (WSDOT 2013). The baseline underwater noise level in the portion of the Columbia River that is within the action area is conservatively assumed to be approximately 120 dB_{RMS}[1] (WSDOT 2012), although actual background underwater noise levels may be higher, given the amount of industrial shipping traffic. The impact pile installation of 24- and 36-inch diameter piles (with a bubble curtain providing 5 dB of noise attenuation) has the potential to generate temporary underwater noise levels of approximately 202 dB_{PEAK}, 189 dB_{RMS}, and 173 dB_{SEL} (CALTRANS 2009). To obtain pile capacity, it is anticipated that each pile will require approximately 1,000 blows with an impact hammer. An installation rate of 4 to 6 piles per day is estimated. At a maximum, the total number of blows per day will be approximately 6,000 requiring a total of up to 160 minutes of impact driving, spread out over each day. At a maximum installation rate of 6 piles per day, it is anticipated that 13 working days would be required to install 76 piles below the OHWM of the Columbia River. If pile installation is slower, fewer strikes per day can be struck, and additional days of pile driving may be required. A worst-case estimate is that installing all of the in-water piles to tip elevation could require up to 25 to 30 days of in-water work during the in-water work window.

NMFS has established 206 dBpeak as an underwater noise injury threshold for fish of all sizes. The noise attenuation analysis indicates that peak underwater noise levels could exceed this injury threshold within approximately 30 feet of each pile being driven. Any fish present within

[1] RMS=root mean square

approximately 30 feet of the pile being driven could be injured; therefore, the suitability of fish habitat within the immediate vicinity of the pile driving activities will be significantly degraded while pile driving is being conducted. Fish in the vicinity will be expected to avoid the area temporarily during pile driving activity.

Additionally, the noise attenuation analysis indicates that the worst-case estimate of up to 6,000 strikes per day that may be necessary to drive piles to final elevation will result in exceedances of the cumulative underwater noise injury thresholds for fish greater than 2 grams (187 dBrms) and for fish less than 2 grams (183 dBrms) within approximately 1,200 feet of pile driving activity, respectively. Given the nature and quality of the habitat, however, most fish are expected to be moving through the action area; their exposure to the sound from all 6,000 strikes per day is not expected.

During the in-water work period, it is possible that native fish, including adults and/or juveniles of several ESU/DPS of salmon, steelhead, bull trout, and Pacific eulachon, could be present within the portion of the project site and vicinity where underwater noise could be temporarily elevated. Although run timing within the river is different for each ESU/DPS, it is possible that some individuals could be present in the vicinity, and could be exposed to temporarily elevated underwater noise levels resulting from pile installation.

Special status fish present within the portion of the project site where injury thresholds could be exceeded could be adversely affected, but this is unlikely. Special status fish species that could be present during the in-water work period will be expected to avoid the area within approximately 30 feet of the pile, and therefore will not be exposed to levels of peak underwater noise that would result in injury. Similarly, special status fish species are expected to be moving through the project site and vicinity, and therefore will not be exposed to the maximum 6,000 strikes per day. For this reason, special status fish species will not be exposed to cumulative underwater noise levels that could result in adverse effects.

While the underwater noise is temporarily elevated, fish may avoid the area temporarily, but this is unlikely to affect feeding and/or migratory activities significantly. Any elevated underwater noise levels associated with the proposed project will be temporary and will have no effect on any PCE of designated or proposed critical habitat.

5.1.4 Wetland Resources

Impacts associated with the construction of the proposed upland facilities and in-water improvements have the potential to result in effects associated with direct permanent and temporary modification of terrestrial and aquatic habitats as well as through the potential for temporarily reduced water quality conditions during construction, and through the generation of temporarily elevated levels of underwater and terrestrial noise during pile installation.

None of these impacts are expected to result in any measurable or significant temporary or permanent wetland impacts at the project site, project vicinity, or project shipping prism scales. There are no wetlands present on the project site, and the project will not result in any direct permanent or temporary wetland fills. At the scale of the project vicinity, there is a chance that off-site wetlands would be indirectly permanently and/or temporarily affected by construction or operational water quality impacts. Wetlands within the shipping prism would not be affected by construction-related water quality impacts. Wetland function will not be affected by temporarily elevated noise levels during construction.

5.2 Operation

The operation of the proposed Facility could affect biological resources through operational water quality impacts. The operation of the facility also could result in effects associated with the increase in shipping traffic that will occur in conjunction with the proposed project. These impacts are discussed in greater detail below.

5.2.1 Terrestrial Vegetation and Habitat

Terrestrial vegetation and wildlife habitats will not be affected significantly by any potential water quality impacts associated with operation of the proposed project. Terrestrial habitats that would remain at the project site post-construction could potentially be affected by an increased potential for spills or leaks. A spill to surface water would not be likely to affect terrestrial vegetation or wildlife habitats.

At the project vicinity and project shipping prism scales, terrestrial habitat and vegetation resources are unlikely to be affected by the proposed project. These terrestrial resources would not be directly or indirectly affected by any aspect of operations.

5.2.2 Wildlife Resources

The operation of the proposed project could affect wildlife habitat and special status wildlife species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for catastrophic accidents such as a spill to surface water. Lighting associated with the project could lead to direct and/or indirect impacts to wildlife species because it may affect the nocturnal behavior of animals within the project vicinity, including bird and bat species. Increased shipping traffic also could result in effects associated with the operation of the Facility.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for spills to surface waters during transportation of product by vessel.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. Stormwater from the storage area will be treated to enhanced water quality standards and discharged to the existing Terminal 4 stormwater system. Stormwater from areas 200, 500, and 600 and the rail improvements will be treated to basic levels and discharged to the existing Terminal 5 stormwater system. Stormwater from Area 400 will be treated to an enhanced treatment level and conveyed to existing infiltration swales located immediately north of the site. Stormwater treatment facilities will be sized to accommodate the 6-month, 24-hour event as estimated using Ecology's hydrology model. The proposed stormwater treatment will provide treatment to a level that is consistent with the discharge permits applicable to the Facility and will ensure that fish and fish habitat are not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will minimize the risk of impacts to biological resources.

These impact minimization measures and BMPs fully mitigate for the operational water quality impacts associated with the project.

Increased Shipping – The proposed project will result in approximately 140 ship transits per year in 2016 (first full year of operations) up to 365 ship transits per year at full buildout. Increased marine traffic on the Columbia River has the potential to result in impacts to fish and fish habitat through increases in the potential for fish stranding, increased potential for shoreline erosion associated with propeller wash, and through the introduction of exotic species.

- *Bank Erosion* – The risk of adverse effects to fish and fish habitat from increased bank erosion is low. Streambanks at the site are well armored, and not particularly sensitive to erosion, so these habitats likely will not be affected. Elsewhere in the project vicinity and shipping prism, there are unarmored banks, which could potentially be susceptible to increased erosion from prop wash. Effects associated with bank erosion would be temporary and localized, and would result in only minor negative impacts to fish and fish habitat.
- *Exotic Species* – Operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouled bottom platings result in increased fuel costs and can reduce the vessel's maximum transit speed. To prevent fouling and higher costs, operators preserve and maintain the hulls of their ships aggressively (FERC 2008), greatly reducing the risk of the transport of exotic species. Additionally, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar guidelines. These practices include requirements for ballast water exchange, to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to regularly remove fouling organisms from the hull, piping, and tanks, and to dispose of any removed substances in accordance with local, state, and federal regulations.
- *Ship Strikes* – The addition of approximately 140 to 365 vessel trips per year on the Lower Columbia River, as well as in marine waters during transit has the potential to result in collisions of ships with species that include sea turtles, marine mammals, and cetaceans. Although sea turtles and cetaceans will not occur in the immediate vicinity of the project site or its vicinity, they could be affected in marine waters by vessels transiting to/from the Columbia River.

5.2.3 Fish Resources

The operation of the proposed project could permanently and indirectly affect fish habitat and special status fish species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and through an increased potential for catastrophic accidents such as an inadvertent release to surface water. The operation of the Facility also could result in effects associated with the increase in shipping traffic that will occur in conjunction with the proposed project.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as an inadvertent crude oil release to surface water.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. The entire Facility is located on 41.5 acres, and the proposed construction will result in approximately 38.2 acres of impervious surface. Treatment for stormwater will include enhanced treatment at Area 300 (Storage) and basic treatment at other areas of the Facility, with discharge to existing stormwater systems at Terminal 4 and Terminal 5. The proposed facilities will provide both water quality and water quantity treatment and will be designed to handle the 6-month, 24-hour event as estimated using Ecology's Western Washington Continuous Simulation Hydrology Model (Ecology's hydrology model).

The operation of the Facility also has the potential to increase the risk of catastrophic accidents, such as an inadvertent release of crude oil to the environment. While the likelihood of such an event is exceedingly low, the possibility must be addressed. According to projected volumes, the proposed project will result in approximately 140 shipping trips annually in 2016 (first full year of operations) up to 365 shipping trips per year at full buildout. Spills could occur at the project site or while docking or filling, or in transit downstream on the Columbia River or in marine waters.

The project site and vicinity provide documented habitat for the adult and juvenile forms of several special status populations of salmon, steelhead, and bull trout as well as for Pacific eulachon, green sturgeon, Pacific and river lamprey, and leopard dace. While run timing differs by species and population, these populations may be present within the project site and/or vicinity at various times during the year. Since operational impacts will not be restricted to an in-water work window, each species and its habitat have the potential to be affected by water quality impacts associated with the operation of the Facility.

Habitat suitability for native fish (including special status species) is limited at the site. The project site and vicinity primarily provide habitat as a migratory corridor. For this reason, fish are expected to move rapidly through the vicinity.

Accidental leaks or spills of fuel or other chemicals into surface- or groundwater at the project site have the potential to reduce fish habitat suitability, which also could affect special status fish species. However, the project has implemented several impact minimization measures and BMPs to reduce the potential for any spills or release of materials to occur, and to minimize the extent of any impacts resulting from any accidental spill or release.

Proposed stormwater treatment for new impervious surface at the site will minimize the potential for any adverse effects associated with stormwater. The proposed stormwater treatment will result in an improved water quality condition within the project site in the long term, and will not result in any adverse effects to fish habitat or to special status fish species.

A release to surface water has the potential to result in significant adverse effects to habitat for fish habitat and for special status fish species and their designated or proposed critical habitats. However, the likelihood of a spill is extremely low, and the proposed BMPs and safety and security measures will manage the risk of impacts to fish species and habitats effectively.

Impacts to fish habitat and to special status fish species and their designated or proposed critical habitats from water quality impacts associated with operation of the facility are expected to be minor.

Increased Shipping – The operation of the Facility will result in an increase in the number of ships transiting the Columbia River within the project site, vicinity, and shipping prism. It is estimated that the proposed Facility will result in approximately 140 to 365 ship transits per year. Marine traffic on the Columbia River has the potential to result in impacts to biological resources through increases in the potential for fish stranding and shoreline erosion associated with propeller wash, and through the introduction of exotic species.

- *Wake Stranding* – Recent studies conducted on the Lower Columbia River suggest that, under certain conditions, deep-draft vessels can produce wakes that can strand juvenile fish (Pearson et al. 2006, Entrix 2008, FERC 2008). Stranding can occur when a fish becomes caught in a vessel's wake and is deposited on shore by the wave the wake generates. Stranding typically results in mortality unless another wave carries the fish back into the water. The most recent and comprehensive study on wake strandings on the Lower Columbia River (Pearson et al. 2006) suggests that the specific mechanisms of stranding are still not completely understood. Fish stranding is thought to depend on interlinked factors that include river surface elevation, beach slope, wake characteristics, and species-specific biological factors (FERC 2008). Given these factors, it is not possible to predict accurately the extent to which increased shipping traffic may increase the potential for fish stranding. However, it is safe to assume that the proposed project, over the course of its design life, will likely result in the stranding of some fish, including special status fish species. Juvenile fish, and species that are not strong swimmers, will be most susceptible to increased stranding.
- *Bank Erosion* – Propeller wash from ships in transit, as well as wakes breaking on shore, could cause increased erosion along unarmored sections of the shoreline. Erosion can re-suspend eroded material within the water column, increasing turbidity, which can affect habitat suitability for fish and other aquatic organisms. This could result in degradation of habitat suitability for fish habitat and special status fish species.
- *Exotic Species* – Ships in transit could import exotic and/or invasive species on their hulls and exterior equipment and/or in ballast water. Introduced species can often out-compete native species, and have the potential to alter natural habitats significantly. Once an aggressive exotic species is introduced, it may be nearly impossible to eradicate it. However, the BMPs that will be in place for the proposed operation of the terminal including hull maintenance and ballast water practices (section 6) will greatly minimize the potential for any transport of these species. For these reasons, the proposed project is unlikely to result in a significant risk of the increased transport of exotic and/or invasive species.

5.2.4 Wetlands

Impacts to wetlands associated with operation of the proposed facility would be minor in extent. Wetlands could be affected by impacts associated with operational water quality, including an increased potential for spills or leaks associated with on-site equipment and machinery, and an increased potential for catastrophic accidents such as a spill to surface waters. However, none of these poses a significant risk to the quantity or quality of wetland habitats.

There are no wetlands on the project site that would be affected by water quality-related impacts associated with operation of the facility.

At the scale of the project vicinity, wetlands within the project vicinity have the potential to be affected by impacts associated with construction and operational water quality. Accidental leaks or spills of fuel or other chemicals into groundwater at the project site have the potential to reduce habitat function of wetlands in the vicinity. Increased stormwater associated with new impervious surface also has the potential to indirectly affect wetlands within the project vicinity.

Within the shipping prism, wetlands also have the potential to be affected by impacts associated with construction and operational water quality, and could also potentially be affected by the potential for increased shipping traffic. Wetlands within the shipping prism could be indirectly affected through increased potential for accidental leaks or spills, effects associated with increased stormwater, through the introduction of exotic aquatic plant or animal species, and through the potential for catastrophic events such as a spill to surface waters.

6.0 MITIGATION MEASURES

6.1 Terrestrial Vegetation and Habitat

The project will implement several impact minimization measures and BMPs to minimize the potential for impacts to terrestrial habitats and vegetation.

Direct Habitat Modification

The proposed project has been designed to avoid and/or minimize impacts to biological resources to the greatest extent possible. The upland facilities associated with the project have been located on developed portions of an existing industrial site, which in its current state provides very little habitat function and very little native vegetation. By siting the project in a developed location, impacts to native terrestrial habitats and native species of vegetation, including special status species, have been avoided.

Ground disturbance and vegetation removal will be limited to the minimum amount necessary to construct the project, and construction fencing will be used to protect existing vegetation to be retained. The project will install urban landscaping including trees and shrubs in Area 200 and 300. These landscaped areas will provide wildlife habitat typical in an urban environment.

These impact minimization measures and BMPs fully mitigate for the direct habitat modification effects associated with the project.

Operational Water Quality Impacts

Terrestrial habitats at the project site could potentially be affected by an increased potential for spills or leaks.

As described previously in sections 5.2.2 and 5.2.3, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. The proposed stormwater treatment will provide treatment to a level that is consistent with existing treatment at the site, which will ensure that wildlife habitat is not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material

and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

These impact minimization measures and BMPs fully mitigate for the operational water quality effects associated with the project.

6.2 Wildlife Resources

The project will implement an array of impact minimization measures and BMPs to minimize the potential for construction and operational impacts to wildlife species.

Direct Habitat Modification

The upland facilities associated with the project have been located on developed portions of an existing industrial site, which in its current state provides very little habitat function and very little native vegetation. By siting the project in a developed location, impacts to native terrestrial habitats and native species of vegetation, including special status species, have been avoided. Ground disturbance and vegetation removal will be limited to the minimum amount necessary to construct the project, and construction fencing will be used to protect existing vegetation to be retained.

These impact minimization measures and BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts

The project has the potential to result in temporary water quality impacts during construction including increased potential for spills, and a potential for temporarily elevated levels of turbidity during construction. Construction at the site will be governed by an SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Natural currents and flow patterns in the Lower Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation as well as upstream water management at dams. High volume flow events can result in hydraulic forces that re-suspend benthic sediments, temporarily elevating turbidity locally. Any temporary increase in turbidity as a result of the proposed project is not anticipated to measurably exceed levels caused by these normal periodic increases. Additionally, the volume of flow will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, but also avoids the peak migration timing for marine mammals in the Lower Columbia River.

These impact minimization measures and BMPs fully mitigate for the temporary water quality impacts associated with the project.

Temporary Construction Noise

Terrestrial noise levels will be elevated within the vicinity of the project site during impact pile driving, but these sound levels will be expected to decrease to ambient conditions within a

relatively short distance from the immediate project site. Most of the terrestrial habitat within approximately 3,200 feet of the dock is not suitable for wildlife species, and terrestrial wildlife habitats at the immediate project site are of limited quality and quantity. Species that utilize these industrialized habitats are generally well adjusted to nearly continuous human presence and activity.

The proposed project has the potential to result in elevated underwater noise during construction which can temporarily affect marine mammals and marine mammal habitat quality. The project has been designed to minimize the likelihood of any impacts resulting from underwater noise during pile installation activities. The project will implement a bubble curtain or similarly effective noise attenuation device during all impact pile installation. These devices, when installed and operated properly, typically provide at least 5 dB of noise attenuation (Caltrans 2009). This will result the intensity of underwater noise, and will limit the potential for adverse effects to marine mammals.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, but also avoids the peak migration timing for marine mammals in the Lower Columbia River. Marine mammals are not expected to occur within the action area during the in-water work period.

These impact minimization measures and BMPs fully mitigate for the temporary construction noise impacts associated with the project.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to wildlife through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters. However, the terrestrial habitats at the site provide very little functional habitat, and the impact minimization measures and BMPs that will be implemented will effectively reduce the potential for any adverse effects to the quantity or quality of terrestrial habitats as a result of operation.

As described previously in sections 5.2.2 and 5.2.3, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. The proposed stormwater treatment will provide treatment to a level that is consistent with existing treatment at the site, which will ensure that wildlife are not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs

and safety and security measures will manage the risk of impacts to biological resources effectively.

These impact minimization measures and BMPs fully mitigate for the operational water quality impacts associated with the project.

Increased Shipping

The proposed project will result in approximately 140 to 365ship transits per year through the project shipping prism. Increased marine traffic on the Columbia River has the potential to result in impacts to wildlife and wildlife habitat through increased potential for shoreline erosion associated with propeller wash, through the introduction of exotic species, and through increased potential for ship strikes.

The risk of adverse effects to wildlife from increased bank erosion is low. Streambanks at the site are well armored, and not particularly sensitive to erosion, so these habitats likely will not be affected. Elsewhere in the project vicinity and shipping prism, there are unarmored banks, which could potentially be susceptible to increased erosion from prop wash. Effects associated with bank erosion would be temporary and localized, and would result in only minor negative impacts to marine mammal habitat.

Operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouled bottom platings result in increased fuel costs and can reduce the vessel's maximum transit speed. To prevent fouling and higher costs, operators preserve and maintain the hulls of their ships aggressively (FERC 2008), greatly reducing the risk of the transport of exotic species. Additionally, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar guidelines. These practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to regularly remove fouling organisms from the hull, piping, and tanks, and to dispose of any removed substances in accordance with local, state, and federal regulations.

The potential for vessel strikes to affect sea turtles, marine mammals, and/or cetaceans is relatively low. While sea turtles, marine mammals, and cetaceans all may be at risk for propeller or collision injuries, these injuries are most frequently caused by small, fast-moving vessels (FERC 2008). In contrast, because of their design and large displacement tonnage, the ships that will dock at the Facility produce a considerable bow wave. This wave pushes in-water objects away from the vessel. Therefore, sea turtles, marine mammals, and cetaceans are not likely to be struck by ships as a result of the project.

These impact minimization measures and BMPs fully mitigate for the increased shipping-related impacts associated with the project.

6.3 Fish Resources

The project will implement several impact minimization measures and BMPs to minimize the potential for impacts to fish and fish habitat.

Direct Habitat Modification – The project will result in no net new direct, permanent impacts to fish habitat. The dock configuration has been designed to require the minimum amount of new piling and overwater structure necessary, and has reduced the quantity of direct permanent habitat impacts to the amount practicable. The proposed removal of piles and existing overwater coverage has further minimized the extent of impacts. The no net increase in direct, permanent

impacts to fish habitat at the project site is expected to result in no significant effects on the quality or function of fish habitat within the project site, project vicinity, or project shipping prism.

The impact minimization measures and BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts – The project has the potential to result in temporary water quality impacts during construction including increased potential for spills, and a potential for temporarily elevated levels of turbidity during construction. Construction at the site will be governed by a construction SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Natural currents and flow patterns in the Lower Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation as well as upstream water management at dams. High volume flow events can result in hydraulic forces that re-suspend benthic sediments, temporarily elevating turbidity locally. Any temporary increase in turbidity as a result of the proposed project is not anticipated to measurably exceed levels caused by these normal periodic increases. Additionally, the volume of flow will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, particularly to ESA-listed salmonids and Pacific eulachon. While there is no time when ESA-listed fish are absent from the project vicinity, the window between October 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations.

These impact minimization measures and BMPs fully mitigate for the temporary water quality impacts associated with the project.

Temporary Construction Noise – The proposed project has the potential to result in elevated underwater noise during construction which can temporarily affect fish and fish habitat quality. The project has been designed to minimize the likelihood of any impacts resulting from underwater noise during pile installation activities. The project will implement a bubble curtain or similarly effective noise attenuation device during all impact pile installation. These devices, when installed and operated properly, typically provide at least 5 dB of noise attenuation (Caltrans 2009). This will result the intensity of underwater noise, and will limit the potential for adverse effects to fish.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, particularly to ESA-listed salmonids and Pacific eulachon. While there is no time when ESA-listed fish are absent from the project vicinity, the window between October 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations.

These impact minimization measures and BMPs fully mitigate for the temporary construction noise impacts associated with the project.

Operational Water Quality Impacts – The proposed project has the potential to result in indirect effects to fish and fish habitat through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters. The Facility will discharge to existing Columbia River outfalls through existing manmade conveyance pipelines, and is categorically exempt from the flow control provisions of the Ecology stormwater manual. According to Appendix I-E of the manual, the Columbia River is listed as a flow control-exempt water body.

As described previously in sections 5.2.2 and 5.2.3, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. The proposed stormwater treatment will provide treatment to a level that is consistent with existing treatment at the site, which will ensure that fish are not adversely affected by operational stormwater.

Operations at the site will be governed by an operations SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will manage the risk of impacts to biological resources effectively.

These impact minimization measures and BMPs fully mitigate for the operational water quality impacts associated with the project.

Increased Shipping – The proposed project will result in approximately 140 ship transits per year in 2016 (first full year of operations) up to 365 nship transits per year at full buildout. Increased marine traffic on the Columbia River has the potential to result in impacts to fish and fish habitat through increases in the potential for fish stranding, increased potential for shoreline erosion associated with propeller wash, and through the introduction of exotic species.

The risk of adverse effects to fish and fish habitat from increased bank erosion is low. Streambanks at the site are well armored, and not particularly sensitive to erosion, so these habitats likely will not be affected. Elsewhere in the project vicinity and shipping prism, there are unarmored banks, which could potentially be susceptible to increased erosion from prop wash. Effects associated with bank erosion would be temporary and localized, and would result in only minor negative impacts to fish and fish habitat.

Operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouled bottom platings result in increased fuel costs and can reduce the vessel's maximum transit speed. To prevent fouling and higher costs, operators

preserve and maintain the hulls of their ships aggressively (FERC 2008), greatly reducing the risk of the transport of exotic species. Additionally, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar guidelines. These practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to regularly remove fouling organisms from the hull, piping, and tanks, and to dispose of any removed substances in accordance with local, state, and federal regulations.

These impact minimization measures and BMPs fully mitigate for the increased shipping-related impacts associated with the project.

6.4 Wetland Resources

The proposed project has been designed to avoid and/or minimize impacts to wetlands to the greatest extent possible. The project will implement several impact minimization measures and BMPs during construction to further reduce or mitigate the potential for impacts to wetlands.

Direct Habitat Effects

The upland facilities associated with the project have been located on developed portions of an existing industrial site, and no wetlands are present at the site. By siting the project in a developed location, the project has completely avoided the need to directly impact wetlands.

These impact minimization measures and BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts

The project has the potential to result in temporary water quality impacts during construction which could affect off-site wetlands within the project vicinity or shipping prism. Construction at the site will be governed by a construction SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

These impact minimization measures and BMPs fully mitigate for the temporary water quality impacts associated with the project.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to wetlands through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters.

Operations at the site will be governed by an operations SPCC plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will manage the risk of impacts to wetlands effectively.

These impact minimization measures and BMPs fully mitigate for the operational water quality impacts associated with the project.

Increased Shipping

The proposed project will result in approximately 140 to 365 ship transits per year through the project shipping prism. Increased marine traffic on the Columbia River has the potential to result in impacts to wetlands through the introduction of exotic species

Wetlands are unlikely to be affected by an increase in shipping traffic. Wetland resources within the project vicinity or downstream in the shipping prism could be impacted through the introduction of exotic species, but there is little risk of ships increasing the transport of exotic species.

These impact minimization measures and BMPs fully mitigate for the increased shipping-related impacts associated with the project.

While the project will result in some unavoidable impacts to biological resources, the project includes BMPs, which will be implemented to further reduce or mitigate the effects of the unavoidable impacts.

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WASHINGTON STATE
Joint Aquatic Resources Permit Application (JARPA) Form[1,2]

USE BLACK OR BLUE INK TO ENTER ANSWERS IN THE WHITE SPACES BELOW.

US Army Corps of Engineers ®
Seattle District

AGENCY USE ONLY

Date received:

Agency reference #: _____

Tax Parcel #(s): _____

_____

_____

Part 1–Project Identification

1. Project Name (A name for your project that you create. Examples: Smith's Dock or Seabrook Lane Development) [help]
Tesoro Savage Vancouver Energy Distribution Terminal

Part 2–Applicant

The person and/or organization responsible for the project. [help]

2a. Name (Last, First, Middle)			
Flint, Kelly			
2b. Organization (If applicable)			
Tesoro Savage Petroleum Terminal LLC			
2c. Mailing Address (Street or PO Box)			
6340 South 3000 East, Suite 600			
2d. City, State, Zip			
Salt Lake City UT 84121			
2e. Phone (1)	**2f.** Phone (2)	**2g.** Fax	**2h.** E-mail
(801) 944-6600	( )	(801) 944-6554	generalcounsel@savageservices.com

[1]Additional forms may be required for the following permits:

- If your project may qualify for Department of the Army authorization through a Regional General Permit (RGP), contact the U.S. Army Corps of Engineers for application information (206) 764-3495.
- If your project might affect species listed under the Endangered Species Act, you will need to fill out a Specific Project Information Form (SPIF) or prepare a Biological Evaluation. Forms can be found at http://www.nws.usace.army.mil/Missions/CivilWorks/Regulatory/PermitGuidebook/EndangeredSpecies.aspx.
- Not all cities and counties accept the JARPA for their local Shoreline permits. If you need a Shoreline permit, contact the appropriate city or county government to make sure they accept the JARPA.

[2]To access an online JARPA form with [help] screens, go to http://www.epermitting.wa.gov/site/alias__resourcecenter/jarpa_jarpa_form/9984/jarpa_form.aspx.

For other help, contact the Governor's Office of Regulatory Assistance at 1-800-917-0043 or help@ora.wa.gov.

Part 3–Authorized Agent or Contact

Person authorized to represent the applicant about the project. (Note: Authorized agent(s) must sign 11b of this application.) [help]

3a. Name (Last, First, Middle)			
3b. Organization (If applicable)			
3c. Mailing Address (Street or PO Box)			
3d. City, State, Zip			
3e. Phone (1)	**3f.** Phone (2)	**3g.** Fax	**3h.** E-mail
( )	( )	( )	

Part 4–Property Owner(s)

Contact information for people or organizations owning the property(ies) where the project will occur. Consider both **upland and aquatic** ownership because the upland owners may not own the adjacent aquatic land. [help]

☐ Same as applicant. (Skip to Part 5.)

☐ Repair or maintenance activities on existing rights-of-way or easements. (Skip to Part 5.)

☐ There are multiple upland property owners. Complete the section below and fill out JARPA Attachment A for each additional property owner.

☐ Your project is on Department of Natural Resources (DNR)-managed aquatic lands. If you don't know, contact the DNR at (360) 902-1100 to determine aquatic land ownership. If yes, complete JARPA Attachment E to apply for the Aquatic Use Authorization.

4a. Name (Last, First, Middle)			
Boyden, Patty			
4b. Organization (If applicable)			
Port of Vancouver, USA			
4c. Mailing Address (Street or PO Box)			
3103 NW Lower River Road			
4d. City, State, Zip			
Vancouver, WA 98660			
4e. Phone (1)	**4f.** Phone (2)	**4g.** Fax	**4h.** E-mail
(360) 693-3611	( )	(360) 735-1565	pboyden@portvanusa.com

Part 5–Project Location(s)

Identifying information about the property or properties where the project will occur. [help]

☐ There are multiple project locations (e.g. linear projects). Complete the section below and use JARPA Attachment B for each additional project location.

5a. Indicate the type of ownership of the property. (Check all that apply.) [help]

☐ Private
☐ Federal
☒ Publicly owned (state, county, city, special districts like schools, ports, etc.)
☐ Tribal
☒ Department of Natural Resources (DNR) – managed aquatic lands (Complete JARPA Attachment E)

5b. Street Address (Cannot be a PO Box. If there is no address, provide other location information in 5p.) [help]

5501 NW Lower River Road

5c. City, State, Zip (If the project is not in a city or town, provide the name of the nearest city or town.) [help]

Vancouver, WA 98660

5d. County [help]

Clark

5e. Provide the section, township, and range for the project location. [help]

¼ Section	Section	Township	Range
S ½	18	2N	1E WM
N 1/2 , SW ¼	19	2N	1E WM
N 1/2	20	2N	1E WM

5f. Provide the latitude and longitude of the project location. [help]

- Example: 47.03922 N lat. / -122.89142 W long. (Use decimal degrees - NAD 83)

45.651778 N. lat / 122.731161 W. long

5g. List the tax parcel number(s) for the project location. [help]

- The local county assessor's office can provide this information.

152799-000, 152903-000,152173-000, 152168-000, 152166-000, 503030-000, 503030-003, 503030-004, 152184-000, 152177-000, 152179-000, 986027-146, 986027-027, 50303-001, 152905-000, 152798-000

5h. Contact information for all adjoining property owners. (If you need more space, use JARPA Attachment C.) [help]

Name	Mailing Address	Tax Parcel # (if known)
Port of Vancouver USA	3103 NW Lower River Road Vancouver WA 98660	153109-000, 152174-000,152185-000, 152172-000
Farwest Steel Properties	2000 Henderson Ave Eugene OR 97440	152167-000
Clark Public Utilities	1200 Fort Vancouver Vancouver, WA 98666	152169-000, 152906-000

Clark County	PO Box 5000 Vancouver WA 98666	152169-000
Hickey Family Company	16420 SE McGillivray Suite 103, PMB #193 Vancouver WA 98683	152804-000
Washington State Department of Natural Resources	PO Box 47027 Olympia WA 98504-7027	No number

5i. List all wetlands on or adjacent to the project location. [help]

There are no wetlands on the project site. There are wetland mitigation sites located on the parcel north of Area 200 (Parcel 153109-000) and east of Area 300 (Parcel 152185-000). The Columbia River Wetland Mitigation Bank is located north of Area 300.

5j. List all waterbodies (other than wetlands) on or adjacent to the project location. [help]

Columbia River

5k. Is any part of the project area within a 100-year floodplain? [help]

☒ Yes ☐ No ☐ Don't know

5l. Briefly describe the vegetation and habitat conditions on the property. [help]

The majority of the areas proposed for the project are devoid of vegetation. Vegetation is limited to grassy areas on portions of the pipeline route near berths 13 and 14, near the Clark County Jail Work Center, and areas of the riprap bank of the Columbia River. These areas are primarily grass and weedy herbaceous vegetation, with approximately 25 cottonwood (*Populus trichocarpa*) and Lodgepole pine (*Pinus contorta*) trees at the Jail Work Center.

The riparian area within the proposed Facility is mostly devoid of vegetation with the exception of scattered trees and vegetation below the top of the bank. Vegetation within the riparian habitat at the site consists primarily of small-diameter black cottonwood (*Populus trichocarpa*) and willows (*Salix* spp.), non-native false indigo bush (*Amorpha fruticosa*), and Himalayan blackberry (*Rubus armeniacus*). The bank is armored with riprap, and above the riprap there is a narrow band of ruderal grass/forb habitat. A guardrail is located at the top of the bank and areas landward of the top of the bank are devoted to paving, parking and storage. No riparian trees or vegetation will be removed, and no impacts to bank margin habitat are anticipated.

Habitat improvements were conducted in 2009 along the East Landfill shoreline, downstream of berths 13 and 14. This restoration activity included the construction of a riparian planting area, placement of large woody debris, and riparian plantings along the length of the East Landfill revetment. The Port will install large woody debris on the Terminal 4 shoreline east of the project site as part of mitigation efforts for the West Vancouver Freight Access (WVFA) project.

The Columbia River, a Type 1 water/Type S shoreline of the state, supports resident and anadromous fish species. Within the project vicinity, the Washington State Department of Fish & Wildlife (WDFW) has designated riparian priority habitat under its PHS program. The designated area includes the Columbia River and the land adjacent to it. As noted above, the shoreline is primarily riprap, leading to a gently sloping sand and silt substrate, before dropping off to the berth and channel. Aquatic habitat conditions within the area of the Facility are consistent with those associated with an urbanized and industrial reach of the Columbia River. The navigation channel of the river in this area is maintained artificially at a depth of approximately 43 feet. As a result, the natural fluvial processes of the river have been altered dramatically. The nearshore habitat drops off rapidly and, as a result, there is little shallow water habitat or transition zone. Columbia River water volumes are managed by upstream dams, and

there is no functioning floodplain within the site. Sediments in the area of the project are predominantly silts, sands, and clays, with very little gravel or cobble present. There is limited in-stream large woody debris nor any backwater or side channel habitat at the site.

5m. Describe how the property is currently used. [help]

All Facility areas are located within the Port of Vancouver (Port) and are in various states of industrial development. The current uses of each of the Facility areas are described below:

Area 200 is in the northern portion of the area of the Port that is generally defined as Terminal 5. Terminal 5 is the former location of aluminum processing facilities owned and operated by Evergreen Aluminum LLC (Evergreen) and the Aluminum Company of America (Alcoa). The site has been the location of intensive historic industrial use, dating back to the 1940s when Alcoa first developed the site for aluminum smelting operations, through the early 2000s, when aluminum processing activities on the property ended. The Port completed the purchase of the Evergreen and Alcoa properties in 2009 and, with the exception of the onsite water tower and the dock structure in the Columbia River, all structures of the former aluminum processing plants have been removed and remediation has been conducted at the site in accordance with Washington State Department of Ecology (Ecology) approvals.

The Terminal 5 site is currently developed and used for the outdoor storage of wind turbine components and other cargoes and contains multiple rail lines for Port operations. The rail on the site represents the westernmost segment of the WVFA project, a rail improvement project that is under construction at the Port. Remediation was conducted at the site in accordance with Washington State Department of Ecology (Ecology) approvals. There are several locations within the boundary of the proposed Facility, that are deed restricted areas, including the Vanexco cap, North/North 2 landfills, the SPL cap, and the Ingot Plant Cap.

Area 300 is located at the Port's Parcel 1A on the south side of NW Lower River Road just east of the existing Farwest Steel facility. This site was developed by the Port for laydown and industrial development and is currently partially occupied by a temporary steel scrap storage yard.

Area 400 is located at existing Port berths 13 and 14 on the Columbia River south of the current Subaru facility. Berths 13 and 14 were developed by the Port in the early 1990s and most recently have been used as vessel layberths.

Area 500 is located within Terminal 5, Parcel 1A, berths 13 and 14, and corridors adjacent to existing private port roads.

Area 600 is located at the northwest corner of Terminal 5. Area 600 was part of the Alcoa/Evergreen site and is currently vacant.

5n. Describe how the adjacent properties are currently used. [help]

The project site and its surroundings are heavily modified from their original natural state and are typified by industrial facilities including large industrial buildings, large expanses of impervious surfacing, utility and railroad corridors, fencing, and open storage. The stormwater and mitigation sites operated by the Port adjacent to the project site offer some vegetation; however, these limited sites are generally visually and physically disconnected from the surrounding landscape.

Area 200 – Uses immediately surrounding Area 200 are as follows:

- North: Old Alcoa Facility Access Road (Port private road), Port Parcel 2 used for wetland, habitat and tree mitigation and a Bonneville Power Administration electrical substation

- East: Keyera Energy propane distribution facility (Keyera), Jail Work Center (approximately 600 feet to the east), and the Clark Public Utilities (CPU) River Road Generating Plant (100 feet to the northeast)
- South: Cargo laydown and BHP Billiton bulk potash handling facility (under construction)
- West: Tidewater Barge Lines and Tidewater Terminal Company (Tidewater)

The Keyera propane facility is located on an approximately 4-acre parcel consisting of rail unloading, three 80,000-gallon storage tanks, truck loading racks, and a small office building. The Jail Work Center is located on approximately 18.3 acres and has three buildings. The in-custody and work release buildings are housing units with a total of 224 beds. The kitchen and warehouse building contains food and laundry service equipment and a jail industries warehouse. The CPU River Road Generating Plant is a combined-cycle combustion natural gas turbine located on approximately 16 acres that can generate 248 megawatts of electricity.

The bulk potash handling facility will include rail unloading, a storage building, dock and shiploader and accessory structures and facilities. Initial site grading and ground improvement work has been completed for this project.

Tidewater Terminal Company occupies approximately 23 acres, including an office building for the corporate headquarter for and Tidewater Barge Lines operates a marine terminal. The terminal handles containers and serves as a tug and barge maintenance and operations facility including marine and upland facilities.

Area 300 – Uses immediately surrounding Area 300 are as follows:

- North: Lower River Road (SR 501) and Columbia River Wetland Mitigation Bank
- East: Parcel 1A wetland
- South: Port rail system and the Subaru of America automobile import facility
- West: Farwest Steel

The Columbia River Wetland Mitigation Bank is a 154-acre mitigation bank developed in partnership with the Port. It includes 78 acres of enhanced wetlands and 25.5 acres of created wetlands. Credits from the wetland work on site are available for purchase to off-set wetland impacts on other properties. The Parcel 1A wetland is an approximately 10-acre parcel previously enhanced by the Port to mitigate for wetland impacts on other properties. The Subaru facility is a port of entry for automobiles and consists of an approximately 70-acre parking and storage facility, a processing building, and facilities for rail car and truck loading. Farwest Steel is a steel fabricator and distributor and occupies an approximately 20-acre parcel which was purchased from the Port in 2011. The site includes an office building and fabrication/warehouse building.

Area 400 – Uses immediately surrounding Area 400 are as follows:

- North and East: Subaru of America automobile import facility
- South: Columbia River
- West: CalPortland Aggregate Yard

The Subaru site is described above and the CalPortland site is an approximately 8-acre aggregate yard where various sand and gravels are received by barge and truck, stored on-site and shipped by truck.

Area 500 – Properties adjacent to the pipeline routes are all industrial, with the exception of the Jail Work Center, previously described above, which is located immediately south and west of the pipeline routes.

Area 600 – Uses immediately surrounding Area 600 are as follows:

- North: Old Alcoa Facility Access Road and Parcel 2 mitigation site
- East and South: Terminal 5 rail loop

- West: Tidewater

These areas are described above.

Rail infrastructure – The rail improvements are located on Terminal 5. Surrounding land uses are industrial with the exception of the Jail Work Center located to the east of the existing rail loop.

5o. Describe the structures (above and below ground) on the property, including their purpose(s) and current condition. [help]

The only structures within the limits of the project are the Gateway Avenue Overpass, fencing and the dock constituting berths 13 and 14.

The Gateway Avenue Overpass is currently under construction and will provide a grade separated crossing for Gateway Avenue over the main port rail lines replacing the existing at grade crossing.

Berths 13 and 14 were constructed in 1993 and 1994 in a T-dock configuration consisting of two trestles with platforms and mooring structures. The docks consist of steel pile supported concrete decks with a steel pile fender system. Four steel pile-supported concrete breasting dolphins are connected to the T docks by steel grated walkways. Three steel pile-supported concrete mooring dolphins are located waterward of the T docks. The structures were developed for short and long term moorage of ocean going vessels.

5p. Provide driving directions from the closest highway to the project location, and attach a map. [help]

From Interstate 5 north or southbound take the Fourth Plain Exit (Exit 1D). Follow Fourth Plain Boulevard west approximately 1.5 miles to where it merges into NW Lower River Road. Continue west approximately 2 miles to Old Lower River Road. Travel south on Old Lower River Road to a four-way intersection. Turn left and continue east on an unnamed private Port road approximately 1,000 feet to the proposed Facility location.

Part 6–Project Description

6a. Briefly summarize the overall project. You can provide more detail in 6b. [help]

Tesoro Savage Petroleum Terminal LLC (the Applicant) is proposing to construct a facility to receive crude oil by rail, store it on site, and load it on vessels for shipment to refineries located primarily on the West Coast. Unit trains will arrive at the Facility and will be stationed on the Facility rail loops. The trains will be “indexed” through the unloading area (Area 200), where the crude oil will be gravity-drained into the transfer pipeline system (Area 500). The crude oil will be pumped through the transfer pipelines to the crude oil storage tanks (Area 300) where it will be held until the marine vessel loading operation. The unloading and conveyance system is also designed to allow blending the various types of crude oil at the Facility to meet customer demands for specific qualities. Marine vessels will arrive and moor at the dock (Area 400) where they will be preboomed. Crude oil will be pumped from the storage tanks to the loading area, and loaded to the marine vessels.

In addition to the primary components described above, the Facility will include ancillary elements that will support the unloading, storage, and loading operations. The following Table summarizes the primary and ancillary project elements by Facility area.

Facility Area	Primary and Ancillary Project Elements
Rail Infrastructure	• Rail facility loops
200 – Unloading and Office	• Rail unloading area • Control rooms\E-houses • Administrative and Support Buildings • Fire Pump and Foam Building
300 – Storage	• Crude oil Storage Tanks • Secondary Containment Berm

	• Boiler Building • Pump Basin • Control Room/E-House • Fire Pump and Foam Building
400 – Marine Terminal	• Marine Vessel Loading Hoses and Equipment • Control Room/E-House • Crane Control Room • Dock Safety Unit • Marine Vapor Combustion Unit • Vapor Blower Skid • Dock Improvements • Spill Prevention, Response and Containment Equipment • Fire Pump and Foam Building
500 – Transfer Pipelines	• Transfer Piping from Area 200 to Area 300 • Transfer Piping to/from Area 300 to Area 400 • Piping from vessel loading to Vapor Control Unit
600 – West Boiler	• West Boiler Building

6b. Describe the purpose of the project and why you want or need to perform it. [help]

The Facility's principal purpose is to provide North American crude oil to U.S. refineries to offset or replace declining Alaska North Slope crude reserves, California crude production, and more expensive foreign crude-oil imports. The crude oil handled by and shipped through the Facility will largely offset other sources of crude oil used by U.S. refineries that choose to source a portion of their crude through the Facility. In accordance with current federal law, crude oil extracted in the United States generally cannot be exported to foreign countries.

The Port represents the closest deep water port to the primary sources of the increased domestic production. The Port is already served by Class 1 railroads that provide service from the source regions, thereby providing the necessary transportation infrastructure to allow transportation of crude oil to U.S. West Coast refineries.

6c. Indicate the project category. (Check all that apply) [help]

☒ Commercial ☐ Residential ☐ Institutional ☐ Transportation ☐ Recreational
☐ Maintenance ☐ Environmental Enhancement

6d. Indicate the major elements of your project. (Check all that apply) [help]

☐ Aquaculture	☐ Culvert	☐ Float	☐ Retaining Wall (upland)
☐ Bank Stabilization	☐ Dam / Weir	☐ Floating Home	☐ Road
☐ Boat House	☐ Dike/Levee/Jetty	☐ Geotechnical Survey	☐ Scientific Measurement Device
☐ Boat Launch	☐ Ditch	☐ Land Clearing	☐ Stairs
☐ Boat Lift	☒ Dock/Pier	☐ Marina / Moorage	☐ Stormwater facility
☐ Bridge	☐ Dredging	☐ Mining	☐ Swimming Pool
☐ Bulkhead	☐ Fence	☐ Outfall Structure	☐ Utility Line
☐ Buoy	☐ Ferry Terminal	☒ Piling/Dolphin	
☐ Channel Modification	☐ Fishway	☐ Raft	

☐ Other:

6e. Describe how you plan to construct each project element checked in 6d. Include specific construction methods and equipment to be used. [help]

- Identify where each element will occur in relation to the nearest waterbody.
- Indicate which activities are within the 100-year floodplain.

The proposed Facility consists of both upland and marine components. While the focus of the JARPA is the construction of the Facility elements located below the ordinary high water mark (OHWM), as this is the component of the Facility that has the potential to impact aquatic resources, the upland portions of the Facility are also described briefly. This response also describes the construction methods that will be employed by the Facility.

Facility Overview

The proposed Facility will consist of the following elements:

Rail Infrastructure: Construction of two additional loop tracks on Terminal 5

Area 200 – Unloading and Office

- Rail Unloading Area
- Administrative and Support Buildings
- Fire Pump and Foam Building

Area 300 – Storage

- Crude Oil Storage Tanks
- Secondary Containment Berm
- Boiler Building
- Pump Basin
- Control Room/E-House
- Fire Pump and Foam Building

Area 400 – Marine Terminal

- Marine Vessel Loading Hoses and Equipment
- Control Room/E-House
- Crane Control Room
- Dock Safety Unit
- Marine Vapor Combustion Unit (MVCU)
- Vapor Blower Skid
- Dock Improvements
- Spill Prevention and Response Equipment. Fire Pump and Foam Building

Area 500 – Transfer Pipelines

- Transfer Piping from Area 200 to Area 300
- Transfer Piping to/from Area 300 to Area 400
- Piping from vessel Loading to MVCU

Area 600 – West Boiler

- West Boiler Building

Rail Infrastructure: Up to four unit trains per day on average will be delivered onto the Port's rail network via Class I railroad lines for staging on the rail infrastructure serving the Facility. Trains will arrive at Terminal 5 from the east where they will exit the Class 1 mainlines and enter the Port's industrial rail network and travel to the rail offloading building located on the north side of the Terminal 5 rail loop. The design of the rail infrastructure will accommodate complete unit trains, eliminating the need to break trains into smaller segments requiring multiple switching movements during the unloading process.

To support the staging of unit trains, two new rail lines (track numbers 4106 and 4107), each approximately 7,700 feet in length, will be added to the Terminal 5 rail infrastructure. As shown in Figure 2.3-3, the additional lines will form two complete loops inside the existing rail loops and will begin and end near the Gateway Avenue grade separation. The rail loops will be designed to comply with railroad and federal requirements.

In order to accommodate the two additional rail loops, the configuration of permitted (existing and to be built) WVFA rail facilities and the adjacent loop road will be shifted: the shifting of existing facilities will be performed by others, has been previously permitted. The rail loops will be designed to comply with railroad and federal requirements. Standard rail construction techniques will be used to modify existing rail lines and install the new rail loops. The southern portion of the rail loops will be approximately 150 feet from the OHWM of the Columbia River.

Areas 200: Unloading and Office

The rail unloading elements (Area 200) will be located south of the Administrative and Support Buildings. The rail unloading building will span tracks 4105, 4106, and 4107. Existing rail lines will separate the unloading elements from the Administrative/Support Buildings. These existing rail lines are not part of the Facility. A pedestrian bridge will provide access from the Administrative/Support Buildings to the rail unloading building.

Two of the unloading tracks will accommodate trains carrying crude oil that can be drained and conveyed without being heated; the third unloading track will accommodate trains carrying crude oil that can be drained and conveyed without being heated as well as crude oil that may need to be heated prior to draining and conveyance to storage. Each unit train will include approximately 100 to 120 tank cars. Typical unit train length will be approximately 7,800 feet. Tank cars typically hold between 650 and 750 barrels of crude oil.[3] A typical unit train will deliver between 65,000 and 90,000 barrels of crude oil.

The rail car unloading facility is composed of a covered structure through which the trains will be pulled and safely secured where the unloading will occur. The building that houses the rail car unloading functions will be approximately 1,850 feet long by 91 feet wide, with a maximum height of approximately 50 feet. The structure will consist of a steel frame with sheet metal walls. The exterior walls of the offloading facility will be painted a neutral color. The structure will be open on both ends and have sides that stop short of the roofline to allow continuous venting. The structure will have translucent panels for natural lighting as well as interior lighting.

Unloading Piping

The unloading area is designed to accommodate three parallel tracks. Each track will include 30 unloading stations for a total of 90 stations, 30 stations per track. Track 4105 will be able to heat the rail cars by steam, as described in more detail below.

The 30 unloading stations for each track are subdivided into five groups of six unloading stations. Each unloading station will accommodate one rail car. Each unloading station will include:

- Hoses equipped with dry fit connectors used to gravity drain the crude oil from the tank car to a collection header pipe

[3] A barrel of crude oil contains 42 gallons.

- Walkway (gangway) grating to serve as the unloading work platform
- Mezzanine catwalks to access the top of the tank cars
- Collection pans between rails that are piped to a separate line that conveys inadvertent releases to the rail unloading facility containment tanks;
- Paved or asphalted ground surfaces between the unloading rail tracks
- A vent line that allows the tank car to maintain atmospheric pressure as its contents drain

The 30 unloading stations dedicated to heated non-pipeline quality crude unit trains also will be equipped with steam connections to heat the crude oil to decrease its viscosity and allow it to flow more easily. Steam will be produced in the Area 600 Boiler Building and piped to the unloading facility. Tank cars that receive steam will be fitted with permanent internal steam manifolds at the bottom of the car. Inlet steam hoses will be connected to each car to allow steam to circulate in the manifold, thereby warming the contents of the tank car. Steam condensate exiting the manifolds will be collected via condensate hoses, and piped back to the steam boilers in a closed loop system.

The unloading process will be conducted with the following elements:

- Unloading will be accomplished with a closed-loop system, i.e., the crude oil will be contained in an enclosed system at all times from when it leaves the rail car to when it enters the storage tanks. During the entire unloading process, neither the crude oil nor crude oil vapors will be exposed to the atmosphere.
- Flexible vent hoses will be manually connected to a valve at the top of the car accessed by a movable gangway. The vent hoses will connect to the collection header. Vapors leaving the collection header as oil flows into the header will travel through the vent hose to the car as the crude oil drains from the car. This prevents vapors from being vented to the atmosphere.
- Unloading hoses will be manually connected to the valves on the cars using dry fit connectors, one hose per tank car. Dry fit connectors are designed so that the crude oil in the hose cannot come into contact with the atmosphere. The connector is designed such that crude oil will not flow without a secure connection. Each hose will be equipped with an automatic shutoff valve. Once the dry fit connector has been secured, the crude oil will gravity-drain from the cars to a collection header. The hoses will also have an emergency shut down (ESD) valve before the collection header. The valve will automatically close during a fire or if an ESD button is depressed in the building. Buttons are located at the bottom of all the stair landings and in between stations on the upper mezzanine.
- The collection header collects the flow from a grouping of six cars. The collection headers will be housed in below-grade trenches running parallel to the rail tracks. A single 9-foot-wide by 5-foot-deep trench will serve tracks 4106 and 4107; a 9-foot-wide by 5-foot-deep trench will serve track 4105. Although the primary purpose of the trench is to house the product collection header, spill collection line and electrical and data lines, the trench will also act as secondary containment.

Each collection header is directly connected to a dedicated pumping station which transfers the crude oil into a 24-inch-diameter transfer pipeline (one per track) which will collect the flow from all five pump basins on that track. As the crude oil flows from the collection header to the pumping stations, it will pass through a basket strainer to remove solids that may be present. The pumping stations monitor volumetric flow rate, crude oil density, and contaminants (sediment and water), and collect regular samples of the crude oil for analysis. The pumps are housed in pump basins beneath the rail unloading building. Each of the five pump basins serving Tracks 4106 and 4107 will measure approximately 15 feet wide by 34 feet long and 15 feet deep. The five pump basins serving track 4105 will measure 10 feet wide by 34 feet long and 15 feet deep. Two pumps will serve each offloading header, with one acting as a primary and the second as an on-line spare on standby. During pumping, the crude oil will not come into contact with the vaults; however, the pump basins will serve as secondary containment. The trenches and pump basins will be constructed of concrete, coated with sealant and include

chemical resistant joint sealant.

The discharge of all five unloading pumping stations will be combined into one 24-inch-diameter transfer pipeline per track, which will convey the crude oil to the storage tanks in Area 400. This transfer pipeline is part of Area 500 and is described in detail below. There will be a total of two non-heated 24-inch transfer pipelines, one per track, from the non-heated unloading stations to the storage area inlet manifold. The discharge from the pumping stations with the potential for heating will be combined into a separate heat-traced and insulated, 24-inch transfer pipe to the storage area heated inlet manifold.

Unloading Facility Pedestrian Access
One pedestrian bridge will provide access for workers from the Administrative/Support Buildings, over the existing Terminal 5 rail loops, and to the interior of the rail loop. An additional four pedestrian bridges will allow workers to pass over the unit trains once they are inside the rail car unloading facility. The pedestrian bridges will be grated and a minimum of 3 feet wide to facilitate emergency access.

Rail Car Unloading Facility Holding Tanks
Approximately five holding tanks, with a total capacity of approximately 1,000 barrels, will be constructed adjacent to the administrative/support area. These tanks will be connected, and will provide secondary containment, to a piping system that will receive inadvertent releases captured in the collection pans. The combined volume of the tanks is sized to contain the entire contents of a single tank car. Crude oil captured in a collection pan will flow by gravity into a dedicated line, and will be conveyed from the unloading facility to the containment tanks. The tanks will be covered, constructed of steel, and anchored in accordance with applicable seismic design requirements. The tank contents will be disposed of or recycled at an offsite facility with the ability to handle the waste.

E-Houses, Transformer, Air Compressor, and Fire Pump and Foam Building
The unloading process will be controlled from six control rooms/E-houses, one associated with two pumping basins (non-heated and heated). Each of these E-houses will be approximately 825 square feet with a maximum height of 15 feet. Two transformers will regulate electrical output to the unloading facility. Both will be pad- mounted on 225-square foot pads. A fire pump and foam building will house a diesel fire pump and fire protection systems associated with the unloading facility. The single story building will have an approximate footprint of 750 square feet.

Administrative and Support Buildings
The proposed Facility will require three approximately 3,400-square foot office buildings for administrative functions, lockers, restrooms, and other employee support facilities. These elements will be located on the north side of the Terminal 5 loop south of the existing private road. Parking and landscaping will be provided per City standards.

Area 300 – Storage

The crude oil will be stored in up to six double-bottom, internal floating-roof ASTs, aboveground storage tanks (ASTs) located in Area 300, approximately 1,700 feet north of the Columbia River and approximately 1 mile southeast of Vancouver Lake. These tanks will be approximately 48 feet in height and 240 feet in diameter, with a shell capacity of approximately 380,000 barrels each. The maximum amount of crude oil stored in each tank will be approximately 360,000 barrels, to take into account the presence of the internal floating roof and the additional head space required to allow product movement in the event of seismic conditions.

The ASTs will be erected in the field and constructed per American Petroleum Institute (API) Standard 650. AST features include a uniformly supported flat bottom, welded carbon steel construction, and control of crude oil temperature and internal tank pressure to API specifications, and will use appropriate live load characteristics for roof design. Two of the tanks may be equipped with steam manifolds constructed into the bottom of the tanks so that the contents of the tanks can be heated to maintain temperature to control viscosity during loading and unloading viscosity of oils that may require

heating. All of the tanks will be equipped with mixers to prevent crude oil from stratifying during storage.

Each tank will have a fixed roof to keep precipitation from reaching the inside of the tank and an internal floating roof with dual seals to control vapor emissions from the tank to the atmosphere. The floating roof will be designed to avoid tipping during operations.

The double-bottomed tanks will include a leak detection system between the tank floors, and will be cathodically protected to prevent corrosion.

Containment Berm
The tanks will be enclosed by a containment berm approximately 6 feet in height. The containment area will be designed with a capacity at least equal to 110 percent of the volume of the largest tank plus precipitation from a 24-hour, 100-year storm event. This capacity reflects the most stringent of Washington spill prevention and control and National Fire Protection Association (NFPA) requirements and exceeds the requirements for secondary containment under 40 CFR 112.7. Intermediate berms will be installed within the larger containment area to separate each tank area from the larger containment area.

The entire tank containment area will be lined with an impervious membrane to prevent any spills from leaving the containment area via the ground. Stormwater collected in the bottom of the berm will gravity-drain to the berm area sump. The sump will house three pumps to convey the stormwater through a treatment system before it discharges to the existing Port stormwater system. Treatment will consist of a hydrodynamic separator, an oil-water separator, and finally a water quality vault. Prior to pumping water out of the sump to the treatment and stormwater system, a visual inspection will be conducted to detect the presence of an oil sheen. If no oil sheen is detected, the sump pumps will be started manually; the pumps will shut off automatically when the low level is reached. If oil products are identified through visual inspection, the sump will be emptied to vacuum trucks, and the oily water disposed of or recycled off-site at a permitted location.

Tank to Dock Crude Oil Conveyance Pumps
Crude oil stored in the tanks will be pumped to the dock for transfer to a ship or barge. Four variable speed pumps will pump the crude, with three pumps in operation and one on standby. The pumps will be housed in the tank storage pump basin located on the west side of the storage tank area; the basin will measure approximately 58 by 58 feet square and 12 feet deep. It will be equipped with two sump pumps to evacuate any stormwater that collects in it. Stormwater evacuated from the pit will be routed through the treatment and discharge system associated with the containment berm sump described above.

E-Houses, Transformer, Air Compressor, Fire Pump and Foam, and Boiler Buildings
The storage and pumping of crude oil to vessel loading in Area 400 operations will be controlled from a control room/E-house. This E-house will have a footprint of approximately 1,250 square feet and will be single story.

Two transformers will regulate electrical output to the storage area. Both will be pad-mounted on approximately 210-square-foot concrete pads.

A fire foam skid and fire water pump house will contain the diesel fire pump and fire protection systems associated with the storage operations. The fire foam skid will have a footprint of approximately 180 square feet; the fire water pump house will have a footprint of approximately 325 square feet and will be single-story.

A building will house a primary and a standby natural gas fired boilers, each with a capacity of 10,040 MMBTU/hr to provide up to 10,350 lbs steam/ hour (one boiler operating) for the heating of two storage tanks. Boilers will be field-erected with a watertube design, where water circulates through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and radiant heat transfer. Natural gas will be supplied to the boiler buildings from the existing

pipeline serving the area. Steam from the boilers will be delivered to the point of use via insulated pipelines. The gas-fired boiler may also provide steam to pipes and ancillary equipment and potential space heating.

Area 400 – Marine Terminal

Crude oil will be transferred to vessels at berths 13 and 14. The berths are existing steel pile-supported docks consisting of two concrete decked access trestles and T-docks, four breasting dolphins connected to the trestles by catwalks, and three mooring dolphins. To obtain an optimal mooring configuration and to meet current seismic standards, a number of modifications will be required at the existing dock to accommodate the Facility.

These modifications include in and overwater construction as follows:

- Remove two mooring dolphins, and two breasting dolphins including forty-seven 18-inch steel pipe piles, eight 12-3/4-inch steel fender piles and approximately 1,330 square feet of existing concrete pile cap.
- Remove approximately 3,250 square feet of grated walkway associated with existing breasting dolphins to be removed. One existing 18-inch steel pipe pile supporting the walkways will also be removed.
- Install four new 27-foot-diameter mooring dolphins (approximately 2,140 square feet combined new, solid overwater coverage), including 40, 36-inch steel pipe piles.
- Add four to eight 24–inch steel pipe piles to Berth 13 dock platform.
- Add sixteen 24-inch steel pipe piles (all below OHWM) to existing bents at Berth 13 access trestle.
- Add six to twelve 36-inch steel pipe piles at the existing trestle abutment at Berth 13, all above OHWM, including pile cap modifications resulting in an additional 192 square feet of overwater coverage.
- Install structural connection framing consisting of two 24 to 36-inch-diameter steel pipes between the Berth 13 platform and the adjacent upstream and downstream breasting dolphins totaling 920 square feet. Install grated walkways on top of one of the steel pipes adding approximately 690 square feet of new grated walkways (beyond the pile footprint). Install two 24-inch steel pipe piles to support the structural framing system.
- Add approximately 4,035 square feet new grated walkways between mooring and breasting dolphins with four 24-inch steel piles to support the walkways. Grated walkways will mostly be reused portions of the existing walkways that were removed.

Mooring and Breasting Dolphins and Walkways
The project will remove two existing mooring dolphins and install four new mooring dolphins. The existing mooring dolphins are supported by a combined total of 23, 18-inch-diameter steel pipe piles. One of the existing mooring dolphins that will be removed is located in relatively shallow water, at an elevation of approximately +3 feet CRD. The new mooring dolphins will be located in water depths ranging from approximately -4 feet to -17 feet CRD. Each new mooring dolphin will consist of up to ten 36-inch-diameter steel piles supporting a 27-foot-diameter, cast-in-place concrete pile cap and mooring equipment. The mooring system will incorporate a load monitoring system for the physical tensioning of the mooring lines so that they operate within optimum design considerations and do not stress or break while a vessel is berthed. The new mooring dolphins will be connected to the main structure of the dock by approximately 5-foot-wide grated walkways to allow safe access during vessel mooring; each walkway will be supported by a single 24-inch-diameter steel pipe pile.

Two existing breasting dolphins at Berth 14 will be removed, along with approximately 650 linear feet of existing 5-foot-wide steel grated walkways. The grated walkways that are removed will mostly be reused and reinstalled if they are determined to be structurally appropriate. The existing breasting dolphins are supported by a combined total of twenty-four 18-inch-diameter steel pipe piles. One

section of the walkway is also supported by a single 18-inch-diameter steel pipe pile, which will also be removed.

The existing grated walkways that connect the breasting dolphins east and west of the Berth 13 dock will be replaced with structural framing to physically connect the structures. This framing will be an open design element (not solid) consisting of two interconnected 24-inch pipes. This framing will result in an additional 920 square feet of overwater shading. A length of 5-foot-wide grated walkway will be aligned over one of the pipes. The east span framing will be supported on two 24-inch-diameter steel pipe piles.

Berth 13 Access Trestle

The bents supporting the Berth 13 access trestle will be supplemented with piles for structural support to meet seismic provisions of current building code. The abutment (above the OHWM of the Columbia River) will be supplemented with six to twelve 36-inch-diameter steel pipe piles, while the waterward bents will be supplemented with two or four 24-inch-diameter steel pipe piles at each bent, depending on location. A total of 22 to 28 new piles will be installed to reinforce the trestle, with 16 of these new piles located below the OHWM. To incorporate the new pipe piles at each bent, an additional 192 square feet of shading will result from new concrete pile cap. Additionally, the central platform at the end of the Berth 13 trestle will be supplemented with four to eight 24-inch-diameter steel pipe piles.

In order to drive piles within the footprint of the existing platform, the concrete topping and precast concrete deck panels will be removed to provide sufficient clearance to drive the piles, then reconstructed with cast-in-place concrete.

Construction Sequencing

Mobilization

During this task, the contractor will mobilize labor and equipment to the site. Laydown areas for materials and equipment will be located landward of the OHWM. During installation activities, the contractor will most likely use barges for cranes, pile driving equipment, and construction materials for in-water work, but may also use land-based equipment located on the existing structures.

Demolition

Following mobilization, demolition activities would commence. In-water and overwater demolition will consist of removal of the two existing mooring dolphins, two existing breasting dolphins, and associated walkways. Demolition will generally proceed by removing existing concrete caps, and then removing the associated piles for each structure. Pile removal at the Terminal 5 dock and at Port Terminal 2 for habitat mitigation will also likely proceed at this time. Approximately 250 piles will be removed from below the OHWM of the Columbia River. Piles will be removed by vibratory extraction or by pulling them directly with a crane mounted on a barge. If a pile breaks above or below the mudline, it will be cut off consistent with agency-approved BMPs. Any voids left in the river bottom following pile removal are expected to collapse and fill in rapidly due to the sandy/silty nature of the substrates at the site and natural sediment transport activities in the river. The removed piles will be stored temporarily on a barge before being sent to an approved recycling center or disposal in a landfill. All activities conducted below the OHWM will be conducted within the in-water work window.

Pile Installation

The project requires the installation of approximately 76, 24- to 36-inch steel piles (66 planned and 10 contingency) below the OHWM of the Columbia River. The diameter of the piles is based on structural and geotechnical design considerations. Pile installation activities will occur via a combination of impact and vibratory methods.

The in-water piles will most likely be installed by a crane located on a derrick barge with piles and materials stored on a supply barge; a tugboat will also likely be required. Shoreline piles at the Berth

13 abutment are expected to be installed from shore by land-based equipment.

To the greatest extent possible, piles will be driven using a vibratory hammer; however, piles will be driven to final tip elevations with an impact hammer. Temporary piles are expected to be used to support the guides that will position and align the permanent piles and for the concrete formwork. It is estimated that up to approximately 40 temporary piles may be required. These temporary piles will be 18- to 24-inch-diameter open-ended steel pipe or H-piles and will be installed with a vibratory hammer.

Vibratory Driving

The vibratory hammer method is a common technique used to drive piles where the type of sediment allows it. This process begins by placing a choker around the pile and lifting it into vertical position with the crane. The pile is then lowered into position and set in place at the mudline. The pile is held steady while the vibratory hammer drives it to the required tip elevation. For this project, it is expected that the vibratory hammer will be used to drive all of the permanent structural piles to the extent practicable as well as all of the approximately 40 temporary piles.

Impact Driving

Following vibratory driving to refusal (the point at which the pile will no longer advance with the vibratory hammer), an impact hammer will be used to drive piles to their final tip elevations. An impact hammer will also be needed to proof the structural piles. Proofing is the process of striking piles with an impact hammer to verify their load-bearing capacity.

An impact hammer is a large steel device that works with a hydraulic or diesel piston. Impact hammers have guides (called a lead) that hold the hammer in alignment with the pile while the heavy piston moves up and down, striking the top of the pile and driving it into the substrate from the downward force of the hammer on the top of the pile. Where the impact hammer is used, a bubble curtain or other similar noise attenuation method (such as sound attenuation pile caps, increased hammer size, etc.) will be employed.

Temporary piles may be necessary to support concrete forms or for pile driving templates during pile driving. These will be installed with a vibratory hammer to the greatest extent possible.

Overwater Construction

The overwater construction portions of the project will generally proceed immediately after pile installation operations. Concrete pile caps will be formed and constructed, and walkways and access trestle decking will be installed. Other overwater portions of the project will include installation of associated on deck infrastructure such as the hanging fendering system, bollards, handrails, etc.

Overwater activities would be conducted according to the BMPs established for the project, which will minimize any potential for impacts to water quality such as inadvertent releases or release of construction debris into the waters at the site. Overwater construction would not be limited to the in-water work window.

Upland Access Trestle Improvements

The project may require some ground improvement or other structural activities at the upland end of the access trestle. This component of the design has not yet been finalized, but if these activities are necessary, they would be conducted entirely above the OHWM and will not impact aquatic resources.

Dock-Side Loading Equipment

Piping, jib cranes, a moveable gangway, an observation and control platform, dock safety unit, pipe trays, and lighting will be installed on the existing Berth 13 trestle and dock. The two 24- to 36-inch pipelines from the tank storage will be located on the trestle where they will connect with a manifold on the dock. High velocity hoses will be connected to the manifold and used to transfer the crude oil from the piping system to the marine vessel being loaded. The high velocity hoses will be supported by a pulley or crane system and connected to the grounding grid to protect from the buildup of static

electricity. The loading system will incorporate automatic shutoff valves with a maximum 30-second shutoff time.

Marine Vapor Combustion Unit (MVCU)

Marine vessels will generally arrive at the berth empty with inert (nonexplosive) gases occupying the tank. When the vessel tanks are filled with crude oil, the vapors from previous cargo, vapors from the crude being added to the tank, and the inert gases will be forced from the tank. These vapors will be sent to the MVCU, which will combust the hydrocarbons in the vapors. Piping from the dock will convey the vapors to the MVCUs located north of the access trestle and roadway. Up to eight units will be installed on a 100- by 50-foot concrete slab housing equipment including eight, 8-foot-diameter steel stacks approximately 25 feet in height.

Area 500: Transfer Pipelines

A combination of above- and belowground steel transfer pipelines will convey crude oil from the rail unloading building in Area 200 to the storage tanks in Area 300 and from the storage tanks to the marine vessel loading system in Area 400. At full build-out, the system will include the following:

- Up to three 24-inch-diameter, approximately 1,800-foot-long pipelines will collect the crude oil unloaded at the rail unloading stations; one of these pipelines will be electrically heat-traced to ensure that the viscosity of the crude oil requiring heating will be maintained as it is conveyed out of the unloading building.
- Three 24-inch-diameter, approximately 5,500-foot-long pipelines will connect the rail car unloading facility to the storage tanks in Area 300; one of these pipes will be electrically heat-traced to ensure that the viscosity of the crude oil requiring heating will be maintained from the unloading facility to the storage area.
- Two 24- to 30 inch-diameter, approximately 5,300-foot-long pipelines will connect the storage tanks with the vessel loading system in Area 400.
- One 6-inch-diameter, approximately 5,300-foot-long pipe will return crude oil from the marine vessel loading system back to the storage tanks. This pipe is provided to handle loading process shutdowns and provide pressure relief and prevent pipe hammer in the pipe conveyance system.
- One 16- to 22-inch-diameter, approximately 600-foot-long pipe will deliver hydrocarbon vapor generated during loading of vessels to the MVCU.

Piping will be constructed of ASTM A36 steel pipe. Aboveground runs of piping will be supported so that the bottom of the piping is approximately 2 feet off the ground on vertical supports located every 20 to 25 feet. The vertical supports will be fixed on small concrete foundations. Where multiple pipes are placed within the routing pipelines may be either laid side-to-side, or stacked. Expansion loops will be constructed throughout the transfer pipeline runs to accommodate for thermal expansion of the pipelines during operation. Where road or rail crossings occur and in other limited areas, the piping will be housed in underground steel casings or raised above ground for standard American Railway Engineering and Maintenance-of-Way Association (AREMA) clearances. If installed underground, the piping will be placed in casings with incorporated leak detection. Runs of aboveground pipeline will be standard walled, to ensure ease of inspection and maintenance, and in accordance with the applicable requirements of WAC 173-180-340, and 49 CFR 195.246 through 49 CFR 195.254. Cathodic protection will be provided for piping to prevent corrosion and piping will be wrapped and coated.

The piping system and associated supports and foundations will be designed to applicable seismic protection standards, and will be electrically grounded to protect against the buildup of static electricity during crude oil conveyance. Manual isolation valves will be located on the piping system at the exit of the rail car unloading facility and at the entrance to the storage tank area. The pipeline system will be inspected on a routine basis.

Area 600 – West Boiler

The Area 600 West Boiler Building will be located west of the Administration and Support Buildings. This building will have a footprint of approximately 6,000 square feet, and will be approximately 45 feet high. The building will house two primary and one standby natural gas fired boilers, each with a capacity of 50,208 MMBTU/hr, to provide up to 103,500 lbs steam/per hour (two boilers operating) for the heating of tank cars during unloading. Boilers will be field-erected with a watertube design, where water circulates through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and radiant heat transfer. Natural gas will be supplied to the building from the existing pipeline serving the area. Steam from the boilers will be delivered to the point of use via insulated pipelines. The gas-fired boiler may also provide steam to pipes and ancillary equipment and potential space heating.

6f. What are the anticipated start and end dates for project construction? (Month/Year) [help]

- If the project will be constructed in phases or stages, use JARPA Attachment D to list the start and end dates of each phase or stage.

Start date: October 2014 End date: October 2015 ☐ See JARPA Attachment D

6g. Fair market value of the project, including materials, labor, machine rentals, etc. [help]

$100 Million

6h. Will any portion of the project receive federal funding? [help]

- **If yes**, list each agency providing funds.

☐ Yes ☒ No ☐ Don't know

Part 7–Wetlands: Impacts and Mitigation

☐ Check here if there are wetlands or wetland buffers on or adjacent to the project area. (If there are none, skip to Part 8.) [help]

7a. Describe how the project has been designed to avoid and minimize adverse impacts to wetlands. [help]

☐ Not applicable

As noted in Section 5i, the project site contains no wetlands.

7b. Will the project impact wetlands? [help]

☐ Yes ☐ No ☐ Don't know

7c. Will the project impact wetland buffers? [help]

☐ Yes ☐ No ☐ Don't know

7d. Has a wetland delineation report been prepared? [help]

- **If Yes**, submit the report, including data sheets, with the JARPA package.

☐ Yes ☐ No

7e. Have the wetlands been rated using the Western Washington or Eastern Washington Wetland Rating System? [help]

- **If Yes**, submit the wetland rating forms and figures with the JARPA package.

☐ Yes ☐ No ☐ Don't know

7f. Have you prepared a mitigation plan to compensate for any adverse impacts to wetlands? [help]

- **If Yes**, submit the plan with the JARPA package and answer 7g.
- **If No, or Not applicable**, explain below why a mitigation plan should not be required.

☐ Yes ☐ No ☐ Not applicable

7g. Summarize what the mitigation plan is meant to accomplish, and describe how a watershed approach was used to design the plan. [help]

7h. Use the table below to list the type and rating of each wetland impacted, the extent and duration of the impact, and the type and amount of mitigation proposed. Or if you are submitting a mitigation plan with a similar table, you can state (below) where we can find this information in the plan. [help]

Activity (fill, drain, excavate, flood, etc.)	Wetland Name[1]	Wetland type and rating category[2]	Impact area (sq. ft. or Acres)	Duration of impact[3]	Proposed mitigation type[4]	Wetland mitigation area (sq. ft. or acres)

[1] If no official name for the wetland exists, create a unique name (such as "Wetland 1"). The name should be consistent with other project documents, such as a wetland delineation report.
[2] Ecology wetland category based on current Western Washington or Eastern Washington Wetland Rating System. Provide the wetland rating forms with the JARPA package.
[3] Indicate the days, months or years the wetland will be measurably impacted by the activity. Enter "permanent" if applicable.
[4] Creation (C), Re-establishment/Rehabilitation (R), Enhancement (E), Preservation (P), Mitigation Bank/In-lieu fee (B)

Page number(s) for similar information in the mitigation plan, if available: _____

7i. For all filling activities identified in 7h, describe the source and nature of the fill material, the amount in cubic yards that will be used, and how and where it will be placed into the wetland. [help]

7j. For all excavating activities identified in 7h, describe the excavation method, type and amount of material in cubic yards you will remove, and where the material will be disposed. [help]

Part 8–Waterbodies (other than wetlands): Impacts and Mitigation

In Part 8, "waterbodies" refers to non-wetland waterbodies. (See Part 7 for information related to wetlands.) [help]

☒ Check here if there are waterbodies on or adjacent to the project area. (If there are none, skip to Part 9.)

8a. Describe how the project is designed to avoid and minimize adverse impacts to the aquatic environment. [help]

☐ Not applicable

As noted in Section 5j, the project includes work within and above the Columbia River. Potential adverse impacts of the Facility would be limited to temporarily elevated underwater noise levels during pile installation and removal, temporary water quality impairment during in-water and overwater construction, and permanent direct habitat impacts associated with the pile installation, and overwater shading in functional nearshore habitat.

Facility elements located within the aquatic environment are necessary to transfer crude oil to vessels and have been designed to reduce disturbance and impacts. The project includes minimization measures and best management practices (BMPs) to minimize the extent of potential effects to the aquatic environment and to mitigate for any unavoidable impacts. The minimization measures and BMPs listed below will be implemented throughout the project.

Minimization Measures

- The existing structures at berths 13 and 14 will be used for loading and vessel mooring. The face of the berth is located beyond the shallow water zone (i.e., between the OHWM and 20 feet below the OHWM) to minimize impacts to shallow-water habitat.
- New mooring dolphins will primarily be located in deeper water further from shore than the existing dolphins.
- Portions of the trestle serving Berth 14 will be removed in the shallow water zone.
- Grating has been used on all walkway surfaces to allow light penetration.
- The structures will have sufficient clearance between the surface and the water surface at the OHWM elevation to allow for light penetration under the berth surfaces.
- Crude oil will be transferred in a manner that has no direct exposure to the environment. Automatic shut off valves and other safety measures are incorporated into the loading process to minimize the risk of inadvertent releases.
- Timing restrictions are used to avoid in-water work when listed species are most likely to be present. The current WDFW and U.S. Army Corps of Engineers (USACE) recommended work window for this area is October 1 through February 28 annually.
- Project construction will be completed in compliance with Washington State Water Quality Standards (Washington Administrative Code [WAC] 173-201A) including:
    - No petroleum products, fresh cement, lime, concrete, chemicals, or other toxic or deleterious materials will be allowed to enter surface waters.
    - There will be no discharge of oil, fuels, or chemicals to surface waters, or onto land where there is a potential for reentry into surface waters.
    - Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. will be checked regularly for leaks, and materials will be maintained and stored properly to prevent inadvertent releases.
    - A construction spill prevention, control, and countermeasures (SPCC) plan will be prepared for use during construction and operation of the project. A copy of the plan with any updates will be maintained at the work site.
- The construction SPCC plan will outline BMPs, responsive actions in the event of a release, and notification and reporting procedures. The SPCC plan also will outline management elements

such as personnel responsibilities, project site security, site inspections, and training.

- The construction SPCC plan will outline measures to be taken to prevent the release or spread of hazardous materials, either found on site and encountered during construction but not identified in contract documents, or any hazardous material that is stored, used, or generated on the construction site during construction activities. These items include, but are not limited to, gasoline, oils, and chemicals.
- Applicable spill response equipment and material designated in the construction SPCC plan will be maintained at the job site.

General BMPs

Typical construction BMPs for working in, over, and near water will be applied, including:

- Checking equipment for leaks and/or other problems that could result in discharge of petroleum-based products or other material into the Columbia River.
- Corrective actions, including those listed below, will be taken in the event of any release of oil, fuel, or chemicals into the water.
- In the event of inadvertent release, containment and cleanup efforts will begin immediately and be completed in an expeditious manner, in accordance with all local, state, and federal regulations, and taking precedence over normal work. Cleanup will include proper disposal of any inadvertently released material and used cleanup material.
- The cause of the inadvertent release will be assessed and appropriate action will be taken to prevent further incidents or environmental damage.
- Inadvertent releases will be reported to Ecology's Southwest Regional Spill Response Office at 360-407-6300.
- Work barges will not be allowed to ground out on the river bottom.
- Excess or waste materials will not be disposed of or abandoned waterward of the OHWM or allowed to enter waters of the state. Waste materials will be disposed of in an appropriate landfill.
- Demolition and construction materials will not be stored where wave action or upland runoff can cause materials to enter surface waters.
- Oil-absorbent materials will be present on site to be used in the event of an inadvertent release or if any oil product is observed in the water.

Pile Removal BMPs

- While creosote-treated piles are being removed, a containment boom will surround the work area to contain and collect any floating debris and sheen. Also, any debris will be retrieved and disposed of properly.
- The piles will be dislodged with a vibratory hammer, when possible, and will not be intentionally broken by twisting or bending.
- The piles will be removed in a single, slow, and continuous motion to minimize sediment disturbance and turbidity in the water column.
- If a pile breaks above or below the mudline or is unable to be removed with the vibratory hammer, it will be cut or pushed in the sediment consistent with agency approved BMPs.
- Removed piles, stubs, and associated sediments (if any) will be contained on a barge. If piles are placed directly on the barge and not in a container, the storage area will consist of a row of hay or straw bales, filter fabric, or similar material placed around the perimeter of the storage area.
- All creosote-treated material, pile stubs, and associated sediments (if any) will be disposed of in a landfill or other method approved to accept those types of materials.

Pile Installation BMPs

- The vibratory hammer method will be used to drive steel piles, to the extent possible, to minimize noise levels.
- A bubble curtain or other similar noise attenuation method (such as sound attenuation pile caps, increased hammer size, etc.) will be employed during impact pile driving.
- If necessary, a marine mammal monitoring plan will be implemented during pile driving activities to reduce the risk of potential marine mammal impacts.

Overwater Concrete BMPs

- Wet concrete will not come into contact with surface waters.
- Forms for any concrete structure will be constructed to prevent leaching of wet concrete.
- Concrete process water shall not enter waters of the US. Any process water/contact water will be routed to a contained area for treatment and disposed of at an upland location.

Operational BMPs

The following describes elements and practices during operations. Upload measures are included as they will minimize the risk of an unintended release reaching the water.

Rail Unloading Facilities
Crude oil unloading will be accomplished within an entirely enclosed system so that under normal operations, the crude oil never comes into contact with the open atmosphere or unprotected ground surfaces.

Design elements aimed at preventing discharges of oil during unloading will include:

- The use of dry fit connectors on hoses connected to the rail car for unloading. Dry fit connectors require the operator to lock the connector into place to allow product flow to begin. When disconnected, all product on either side of the connector remains within the transfer hose or rail car.
- All conveyance of transferred oil occurs within enclosed piping and pumps.

The unloading area incorporates the following containment systems:

- Containment pans between rails will capture unanticipated leaks from rail cars stationed in the unloading facility and from any unanticipated discharges from the unloading operations.
- Materials captured in the containment pans will drain to a dedicated piping system that will convey the liquids to a series of five secondary containment tanks located in Area 200. The five secondary containment tanks will have a total capacity of 1,000 barrels, enough to contain the 110 percent of the contents of a single rail tank car. Should a discharge to these tanks occur, the contents of the tanks would be transferred to vacuum truck(s) to be disposed of at an approved location off site.
- Piping and pumping systems associated with the unloading area will be contained within concrete trenches and concrete pump basins. These trenches and basins can serve as secondary containment in the event of a release from the piping and pumping equipment. Should a release occur, discharged materials would be removed from the trenches and basins using vacuum truck(s) to be disposed of at an approved location off-site.
- Ground surfaces between rail tracks in the unloading building will be asphalt or concrete to facilitate material recovery in the event of an unanticipated discharge.

Storage Tanks
Following unloading, crude oil will be conveyed in transfer pipeline to the storage area (Area 300). Design elements aimed at preventing discharges of oil during unloading will include:

- The storage tanks will be designed in conformance with applicable industry standards.
- The storage tanks will be constructed to meet the NFPA 30 requirements of WAC 173-18-330 and associated manufacturing standards, and will include the necessary measures to prevent tank overfill.
- During construction of the tanks industry standard testing techniques will be implemented to ensure the tanks are constructed to the required specifications.
- Cathodic protection of the tank components will be implemented to prevent corrosion.
- Hydrostatic testing of the tanks will be conducted to ensure they will meet operational stresses and loads prior to their receiving any crude oil.

Design elements related to containing unanticipated discharges will include:

- The tanks will be constructed with a double tank bottom, with interstitial monitoring to detect leaks should they occur
- Constructing the tanks in a fully lined bermed area with the capacity to contain 110 percent of the largest tank and precipitation from a 24-hour, 100 year storm.

Transfer Pipelines and Pumping Systems
Crude oil will be conveyed between the unloading area, the storage area, and the vessel marine loading area using a system of transfer pipelines and pumps. Design elements aimed at preventing discharges of oil during conveyance will include:

- The transfer pipelines will be designed in conformance with applicable industry standards.
- All conveyance of crude oil will occur in a fully enclosed system.
- Transfer pipelines and the associated pumping systems will be equipped with flow and pressure sensors to identify out of the ordinary operating conditions that could be the result of a pipeline or pump failure and potential risk of crude oil discharge.
- Transfer pipelines will be equipped with valves at the exit of and entry to the unloading area, the storage area, and the marine vessel loading area. These valves will include 30 second shut-offs to stop the flow of product should anomalous flow and pressure conditions related to a product spill occur, or in response to operations personnel triggering the shutoff.
- Transfer piping will be for the most part installed aboveground to facilitate inspections and maintenance. Where road or rail crossings occur, the piping will be housed in underground steel casings or raised aboveground using standard American Railway Engineering and Maintenance-of-Way Association (AREMA) clearances. Pipelines at each railroad, highway, or road crossing will be designed and installed to adequately withstand the dynamic forces exerted by anticipated traffic or rail loads.
- Transfer pipelines will be coated and cathodically protected to prevent corrosion.
- Sections of transfer pipelines constructed underground will be installed so that they are not in electrical contact with any metallic structures. This requirement will not preclude the use of electrical bonding to facilitate the application of cathodic protection. Tests will be carried out to determine the presence of stray currents and protective measures provided when stray currents are present.
- Transfer pipelines will be equipped with leak detection systems meeting regulatory standards.

Design elements related to containing unanticipated discharges will include:

- Piping systems associated with the unloading of crude oil in Area 200 will be placed in concrete trenches; these trenches can serve as secondary containment in the event of a product discharge. Should a discharge occur in the trench, the materials would be removed by vacuum truck and recycled or disposed off site at an approved location.
- Pumps will be located in concrete basins; the concrete basins can serve as secondary containment in the event of a product discharge. Should a discharge occur in the pump basins, the materials would be removed by vacuum truck and recycled or disposed off site at an approved location.

Marine Terminal
The trestle at Berth 13 will be equipped with piping and hoses to transfer the crude oil from the transfer pipeline system to the receiving marine vessel. In accordance with 33 C.F.R. § 154.530 a facility transferring oil or hazardous materials to or from a vessel with a capacity equal to or greater than 250 barrels, must have fixed catchments, curbing, or other fixed means for small discharge containment of materials at the hose handling and loading arm area, each hose connection manifold area, and under each hose connection that will be coupled or uncoupled as part of the transfer operation. For this facility, it is anticipated that the hose diameter will be between 6 and 12 inches, requiring that discharge containment capacity must be at least three barrels.

At Berth 13, a catchment and sump will be constructed at or below the deck level of sufficient capacity to hold the small discharge containment in addition to stormwater that may fall in the catchment area. The containment will be discharged within one hour of completion of any transfer by pumping into the return line.

In addition the design elements aimed at preventing discharges of oil during conveyance will include:

- Hoses and their supporting equipment will be designed to meet the applicable hose protection requirements of WAC 173-180 Part B and 40 CFR 156.
- Vessel mooring systems will meet the applicable requirements of 40 CFR 156.

Spill Prevention and Contingency Plans
The Applicant will prepare and implement the following plans to comply with state and federal requirements:

- An operations SPCC plan, prepared under 40 CFR 112 and WAC 173-180, Part F
- A safe and effective threshold determination report, prepared under WAC 173-180-224
- A pre-loading transfer plan according to WAC 173-180-230
- A facility operations manual in compliance with WAC 173-180 400 to -435
- An oil transfer training program in compliance with WAC 173-180, Part E
- A certification program in compliance with WAC 173-180, Part E
- A spill contingency plan in compliance with WAC 173-182, 40 CFR 112, Subpart D and 33 CFR 154, Subpart F

These plans will comprehensively address spill prevention, control and response for activities conducted both upland and over-water.

8b. Will your project impact a waterbody or the area around a waterbody? [help]

☒ Yes ☐ No

8c. Have you prepared a mitigation plan to compensate for the project's adverse impacts to non-wetland waterbodies? [help]

- **If Yes**, submit the plan with the JARPA package and answer 8d.
- **If No, or Not applicable,** explain below why a mitigation plan should not be required.

☐ Yes ☒ No ☐ Not applicable

The project design minimizes impacts to the aquatic environment and proposes to remove existing structural elements and piles to offset new pile area and overwater coverage. These actions do not require monitoring to determine the long term performance of the mitigation and a mitigation plan is not provided.

As described in Section 8a above, a number of impact minimizing measures and BMPs will be implemented to reduce the extent and amount of impacts to the aquatic environment during construction and operation of the Facility. For unavoidable impacts (mentioned in Section 8a above), a variety of measures will be implemented to offset the effects to aquatic resources.

The modifications to the existing structures will require the placement of up to 76, 24 to 36-inch steel pipe piles below the OHWM of the Columbia River (15.2 CRD [16.74 NGVD-29]) and an additional 3,252 square feet of solid overwater structure. To accommodate the project modifications to Berths 13 and 14, existing overwater structure and existing steel pipe piles will be removed partially offsetting the proposed new piles and overwater structure. These actions will remove two mooring dolphins and two breasting dolphins, totaling 1,330 square feet and 56 steel piles restoring 92 square feet of benthic habitat. It will also remove 3,250 sq. ft. of grated walkways To offset the remaining 1,925 square feet of solid overwater coverage, portions of the Berth 14 trestle, totaling approximately 2,220 square feet will be removed. The project will also remove approximately 220 timber piles at the Port's Terminal 2 area to restore benthic habitat. The actual number of piles removed will be determined based on the final number and size of piles installed.

Based on the above measures the project will restore an area equivalent to the benthic impacts from pile placement. Solid overwater coverage is reduced by approximately 295 square feet, including removal from shallow water zones. Grated overwater coverage is increased by approximately 785 square feet. This increase is off set by the additional solid overwater coverage being removed. The solid coverage has greater impacts than grated structures and the added grated structures are narrow and located outside the shallow water habitat. The combination of these mitigation and project elements will more than offset the additional overwater coverage and pile placement associated with the project. Removal of the overwater structure and piles will result in immediate improvements to aquatic habitat by restoring habitat previously occupied by structures.

8d. Summarize what the mitigation plan is meant to accomplish. Describe how a watershed approach was used to design the plan.

- If you already completed 7g you do not need to restate your answer here. [help]

8e. Summarize impact(s) to each waterbody in the table below. [help]

Activity (clear, dredge, fill, pile drive, etc.)	Waterbody name[1]	Impact location[2]	Duration of impact[3]	Amount of material (cubic yards) to be placed in or removed from waterbody	Area (sq ft or lf) of waterbody directly affected
Pile Installation	Columbia River	In-water (deeper than 20 feet below OHWM)	Permanent	30, 36-inch and 23, 24-inch steel pipe piles	283 sq ft benthic area
Pile Installation	Columbia River	In-water (to 20 feet below OHWM)	Permanent	10, 36-inch and 13, 24-inch steel pipe piles	112 sq ft benthic area
Overwater Structure	Columbia River	In-water (deeper than 20 feet below OHWM)	Permanent	N/A	2,573 sq ft (solid) 3,290 sq. ft (grated)
Overwater Structure	Columbia River	In-water (to 20 feet below OHWM)	Permanent	N/A	679 sq ft (solid) 770 sq. ft. (grated)
Temporary Pile Installation	Columbia River	In-Water	Temporary	Forty 18- to 24-in steel pipe or H steel piles	126 sq ft benthic area
Overwater Structure Removal	Columbia River	In-Water	Permanent	56 steel and approximately 220 wood piles	396 sq ft benthic area 3,547 sq. ft (solid) 3,250 sq. ft. (grated)

[1] If no official name for the waterbody exists, create a unique name (such as "Stream 1") The name should be consistent with other documents provided.
[2] Indicate whether the impact will occur in or adjacent to the waterbody. If adjacent, provide the distance between the impact and the waterbody and indicate whether the impact will occur within the 100-year flood plain.
[3] Indicate the days, months or years the waterbody will be measurably impacted by the work. Enter "permanent" if applicable.

8f. For all activities identified in 8e, describe the source and nature of the fill material, amount (in cubic yards) you will use, and how and where it will be placed into the waterbody. [help]

No fill will be placed below OHWM or in the 100-year floodplain

8g. For all excavating or dredging activities identified in 8e, describe the method for excavating or dredging, type and amount of material you will remove, and where the material will be disposed. [help]

No new dredging is planned or proposed with the facility. The Port maintains Berths 13 and 14 under existing maintenance dredging permits.

Part 9–Additional Information

Any additional information you can provide helps the reviewer(s) understand your project. Complete as much of this section as you can. It is ok if you cannot answer a question.

9a. If you have already worked with any government agencies on this project, list them below. [help]

Agency Name	Contact Name	Phone	Most Recent Date of Contact
USACE	Steve Manlow, Muffy Walker	(206) 316-3047	August 15, 2013
Washington Department of Fish & Wildlife	Anne Friesz	(360) 906-6764	June 27, 2013
National Marine Fisheries Service	Jeff Fisher, Steve Landino	(360) 534-9342	August 15, 2013
Ecology	Hedia Adelsman	(360) 407-6222	August 7, 2013
City of Vancouver	Jon Wagner	(360) 487-7885	June 27, 2013
Energy Facility Site Evaluation Council	Stephen Posner	(360) 664-1903	August 7, 2013

The applicant has coordinated extensively with regulatory agencies. The contacts listed above are intended to reflect those with jurisdictional authority for the in-water elements.

9b. Are any of the wetlands or waterbodies identified in Part 7 or Part 8 of this JARPA on the Washington Department of Ecology's 303(d) List? [help]

- **If Yes,** list the parameter(s) below.
- If you don't know, use Washington Department of Ecology's Water Quality Assessment tools at: http://www.ecy.wa.gov/programs/wq/303d/.

☒ Yes ☐ No

Columbia River within WRIA #28 is listed on Ecology's 303(d) list for temperature, sediment bioassay, fecal coliform, dissolved oxygen, and PCBs. There is no listed 303(d) parameter at the project site. Downstream of the project site the Columbia is on the 303(d)-list for polychlorinated biphenyls (PCBs) in nearshore sediments.

9c. What U.S. Geological Survey Hydrological Unit Code (HUC) is the project in? [help]

- Go to http://cfpub.epa.gov/surf/locate/index.cfm to help identify the HUC.

Lower Columbia – Sandy (17080001)

9d. What Water Resource Inventory Area Number (WRIA #) is the project in? [help]

- Go to http://www.ecy.wa.gov/services/gis/maps/wria/wria.htm to find the WRIA #.

WRIA #28, Salmon - Washougal

9e. Will the in-water construction work comply with the State of Washington water quality standards for turbidity? [help]

- Go to http://www.ecy.wa.gov/programs/wq/swqs/criteria.html for the standards.

☒ Yes ☐ No ☐ Not applicable

9f. If the project is within the jurisdiction of the Shoreline Management Act, what is the local shoreline environment designation? [help]

- If you don't know, contact the local planning department.
- For more information, go to: http://www.ecy.wa.gov/programs/sea/sma/laws_rules/173-26/211_designations.html.

☐ Rural ☒ Urban ☐ Natural ☐ Aquatic ☐ Conservancy ☐ Other _____

9g. What is the Washington Department of Natural Resources Water Type? [help]

- Go to http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesApplications/Pages/fp_watertyping.aspx for the Forest Practices Water Typing System.

☒ Shoreline ☐ Fish ☐ Non-Fish Perennial ☐ Non-Fish Seasonal

9h. Will this project be designed to meet the Washington Department of Ecology's most current stormwater manual? [help]

- **If No**, provide the name of the manual your project is designed to meet.

☒ Yes ☐ No

Name of manual: 2012 Stormwater Management Manual for Western Washington

9i. Does the project site have known contaminated sediment? [help]

- **If Yes**, please describe below.

☒ Yes ☐ No

The Port conducted sediment characterization at berths 13 and 14 in 2013 as part of their ongoing maintenance dredging activities. Chemicals of concern were not detected in samples collected from Berth 13 at concentrations greater than the Sediment Evaluation Framework (SEF) toxicity screening levels (SL). Chromium and nickel were detected in a sample collected from Berth 14 at concentrations greater than SEF SLs; however chromium and nickel concentrations were less than SEF SLs in subsequent reanalyses of the sample. No other chemicals of concern were not detected at concentrations greater than SEF SLs in the sample from Berth 14. Material dredged from Berths 13 and 14 would be considered suitable for upland disposal. (PSET Memorandum, NWP-2007-916, April 19, 2013)

9j. If you know what the property was used for in the past, describe below. [help]

Between the 1940s and the 2000s, the Terminal 5 area was used as an industrial site for aluminum smelting and the fabrication and outdoor storage of aluminum ingots. Remediation was conducted at the site in accordance with Ecology approvals, and the site is currently used for the storage of large wind turbine components.

Parcel 1A was used for cargo laydown and prior to that it was vacant land and was likely used for agriculture in the past.

The Berth 13 and 14 area was created with dredged material prior to its use for industrial activities.

9k. Has a cultural resource (archaeological) survey been performed on the project area? [help]

- **If Yes**, attach it to your JARPA package.

☒ Yes ☐ No

9l. Name each species listed under the federal Endangered Species Act that occurs in the vicinity of the project area or might be affected by the proposed work. [help]

Species Name			ESA Listing Status	Critical Habitat
Common Name	**Scientific Name**	**ESU or DPS***		
Chinook Salmon	*(Oncorhynchus tshawytscha)*	Lower Columbia River ESU	Threatened	Designated
		Upper Willamette River ESU	Threatened	Designated
		Upper Columbia River spring-run ESU	Endangered	Designated
		Snake River spring/ summer-run ESU	Threatened	Designated
		Snake River fall-run ESU	Threatened	Designated
Chum Salmon	*(Oncorhynchus keta)*	Columbia River ESU	Threatened	Designated
Coho Salmon	*(Oncorhynchus kisutch)*	Lower Columbia River ESU	Threatened	Proposed
Sockeye Salmon	*(Oncorhynchus nerka)*	Snake River ESU	Endangered	Designated
Steelhead	*(Oncorhynchus mykiss)*	Lower Columbia River DPS	Threatened	Designated
		Upper Willamette River DPS	Threatened	Designated
		Middle Columbia River DPS	Threatened	Designated
		Upper Columbia River DPS	Endangered	Designated
		Snake River Basin DPS	Threatened	Designated
Bull Trout	*(Salvelinus confluentus)*	Columbia River DPS	Threatened	Designated
Pacific Eulachon (Smelt)	*(Thaleichthys pacificus)*	Southern DPS	Threatened	Designated
Steller Sea Lion	*(Eumatopius jubatus)*	Eastern DPS	Threatened	Designated
North American Green Sturgeon	*(Acipenser medirostris)*	Southern DPS	Threatened	Designated

*ESU =Evolutionarily Significant Unit and DPS=Distinct Population Segment

9m. Name each species or habitat on the Washington Department of Fish and Wildlife's Priority Habitats and Species List that might be affected by the proposed work. [help]

The Columbia River, a Type 1 water/Type S shoreline of the state, supports resident and anadromous fish species. Within the project vicinity, WDFW has designated riparian priority habitat under its Priority Habitat and Species program. The designated area includes the Columbia River and land adjacent to the river.

WDFW recognizes priority habitats as having unique or significant value to many species requiring protective measures and/or management guidelines to ensure their perpetuation (Knutson and Naef 1997). Federal listed, proposed for listed, and/or WDFW priority fish that occur in the Columbia River include Chinook, chum, coho, sockeye salmon, eulachon/smelt, bull trout, steelhead trout, resident/sea-run cutthroat trout (*O. clarki clarki*), white (*Acipenser transmontanus*) and green sturgeon, and Pacific

(*Lampetra tridentata*) and river lamprey (*L. ayresi*). Priority mammals that occur in the river include Steller sea lions, California sea lions (*Zalophus californianus*), and harbor seals (*Phoca vitulina*). No priority species are mapped within the area of the project by WDFW, but the river and land directly adjacent to the river are considered riparian priority habitat.

Sandhill cranes (*Grus canadensis*) are listed as endangered in Washington, but are not listed by the federal government. Sandhill cranes are known to occur in the vicinity of the site, in the Vancouver Lake Lowlands. WDFW has mapped migratory occurrence locations of sandhill cranes on the Port's agricultural land west of the site. Cranes also occur in the surrounding area. Fall migration of cranes in the Vancouver Lowlands typically occurs in late September and early- to mid-October. Spring migration through the Lowlands generally occurs from mid-March to mid-April. The Lowlands are used as stopover habitat during migration and for foraging by over-wintering birds.

The site of the proposed Facility does not contain habitat suitable for over-wintering cranes. Cranes are known to rest and feed on Parcel 3, but more commonly use parcels 4 and 5.

Part 10–SEPA Compliance and Permits

Use the resources and checklist below to identify the permits you are applying for.

- Online Project Questionnaire at http://apps.ecy.wa.gov/opas/.
- Governor's Office of Regulatory Assistance at (800) 917-0043 or help@ora.wa.gov.
- For a list of addresses to send your JARPA to, click on agency addresses for completed JARPA.

10a. Compliance with the State Environmental Policy Act (SEPA). (Check all that apply.) [help]

- For more information about SEPA, go to www.ecy.wa.gov/programs/sea/sepa/e-review.html.

☐ A copy of the SEPA determination or letter of exemption is included with this application.

☒ A SEPA determination is pending with _EFSEC_ (lead agency). The expected decision date is:

The applicant is requesting that EFSEC prepare an Environmental Impact Statement.

☐ I am applying for a Fish Habitat Enhancement Exemption. (Check the box below in 10b.) [help]

☐ This project is exempt (choose type of exemption below).

- ☐ Categorical Exemption. Under what section of the SEPA administrative code (WAC) is it exempt?
- ☐ Other: _____

☐ SEPA is pre-empted by federal law.

10b. Indicate the permits you are applying for. (Check all that apply.) [help]

LOCAL GOVERNMENT

Local Government Shoreline permits:

☒ Substantial Development ☐ Conditional Use ☐ Variance

☐ Shoreline Exemption Type (explain): _____

Other city/county permits:

☒ Floodplain Development Permit ☐ Critical Areas Ordinance

STATE GOVERNMENT

Washington Department of Fish and Wildlife:

☒ Hydraulic Project Approval (HPA) ☐ Fish Habitat Enhancement Exemption – Attach Exemption Form

Effective July 10, 2012, you must submit a check for $150 to Washington Department of Fish and Wildlife, unless your project qualifies for an exemption or alternative payment method below. **Do not send cash.**

Check the appropriate boxes:

☐ $150 check enclosed. (Check #_____)
Attach check made payable to Washington Department of Fish and Wildlife.

☐ Charge to billing account under agreement with WDFW. (Agreement #_____)

☐ My project is exempt from the application fee. (Check appropriate exemption)
- ☐ HPA processing is conducted by applicant-funded WDFW staff. (Agreement #_____)
- ☐ Mineral prospecting and mining.
- ☐ Project occurs on farm and agricultural land. (Attach a copy of current land use classification recorded with the county auditor, or other proof of current land use.)
- ☐ Project is a modification of an existing HPA originally applied for, prior to July 10, 2012. (HPA #_____)

Washington Department of Natural Resources:

☐ Aquatic Use Authorization

Complete JARPA Attachment E and submit a check for $25 payable to the Washington Department of Natural Resources. **Do not send cash.**

Washington Department of Ecology:

☐ Section 401 Water Quality Certification

FEDERAL GOVERNMENT

United States Department of the Army permits (U.S. Army Corps of Engineers):

☐ Section 404 (discharges into waters of the U.S.) ☒ Section 10 (work in navigable waters)

United States Coast Guard permits:

☐ Private Aids to Navigation (for non-bridge projects)

Part 11–Authorizing Signatures

Signatures are required before submitting the JARPA package. The JARPA package includes the JARPA form, project plans, photos, etc. [help]

11a. Applicant Signature (required) [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities, and I agree to start work only after I have received all necessary permits.

I hereby authorize the agent named in Part 3 of this application to act on my behalf in matters related to this application. _____ (initial)

By initialing here, I state that I have the authority to grant access to the property. I also give my consent to the permitting agencies entering the property where the project is located to inspect the project site or any work related to the project. _____ (initial)

Applicant Printed Name	Applicant Signature	Date

11b. Authorized Agent Signature [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities and I agree to start work only after all necessary permits have been issued.

Authorized Agent Printed Name	Authorized Agent Signature	Date

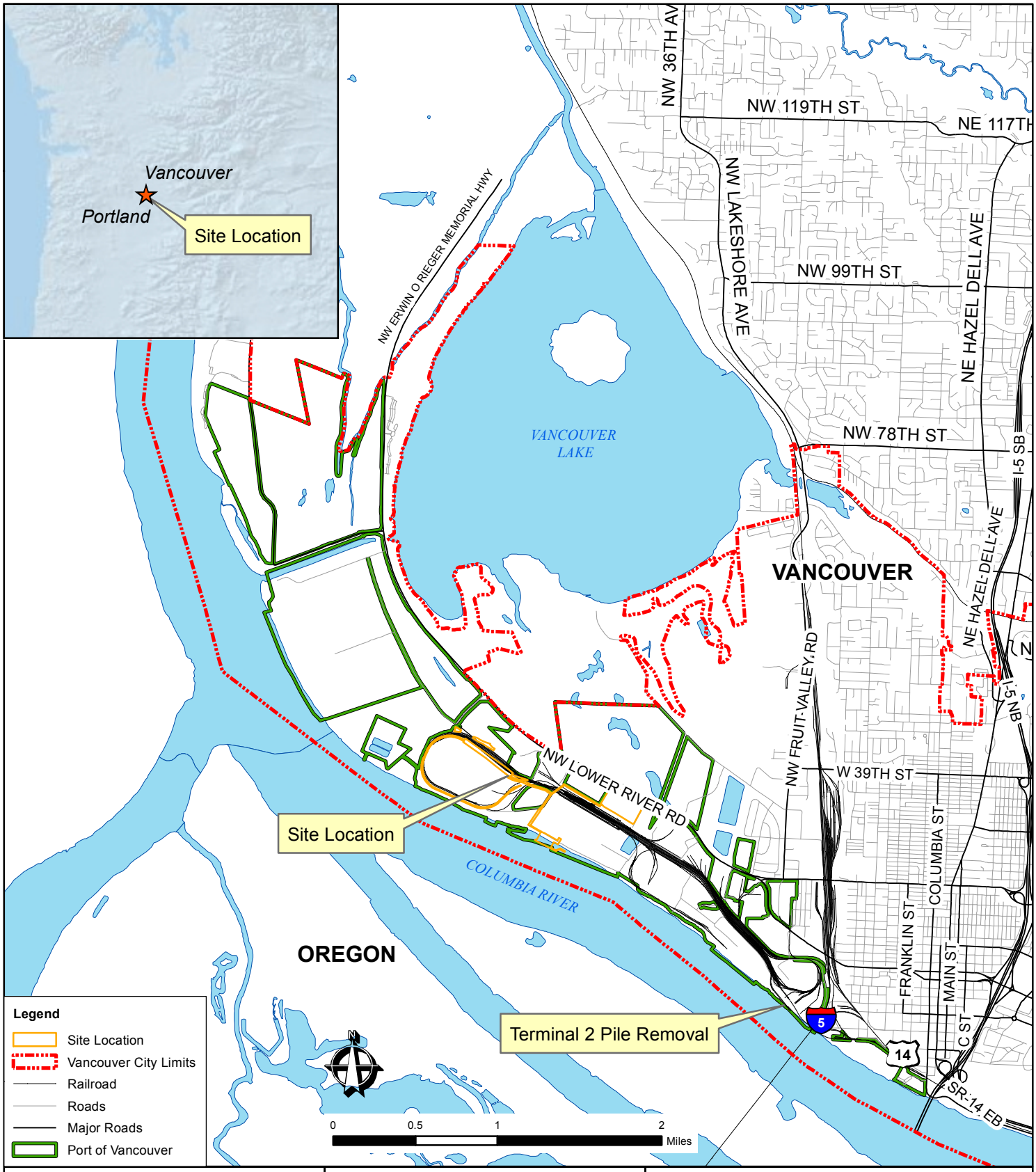
11c. Property Owner Signature (if not applicant). [help]
Not required if project is on existing rights-of-way or easements.

I consent to the permitting agencies entering the property where the project is located to inspect the project site or any work. These inspections shall occur at reasonable times and, if practical, with prior notice to the landowner.

Property Owner Printed Name	Property Owner Signature	Date

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years or both.

If you require this document in another format, contact the Governor's Office of Regulatory Assistance (ORA) at (800) 917-0043.
People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call (877) 833-6341.
ORA publication number: ENV-019-09 rev. 06-12



PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 1
VICINITY MAP

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

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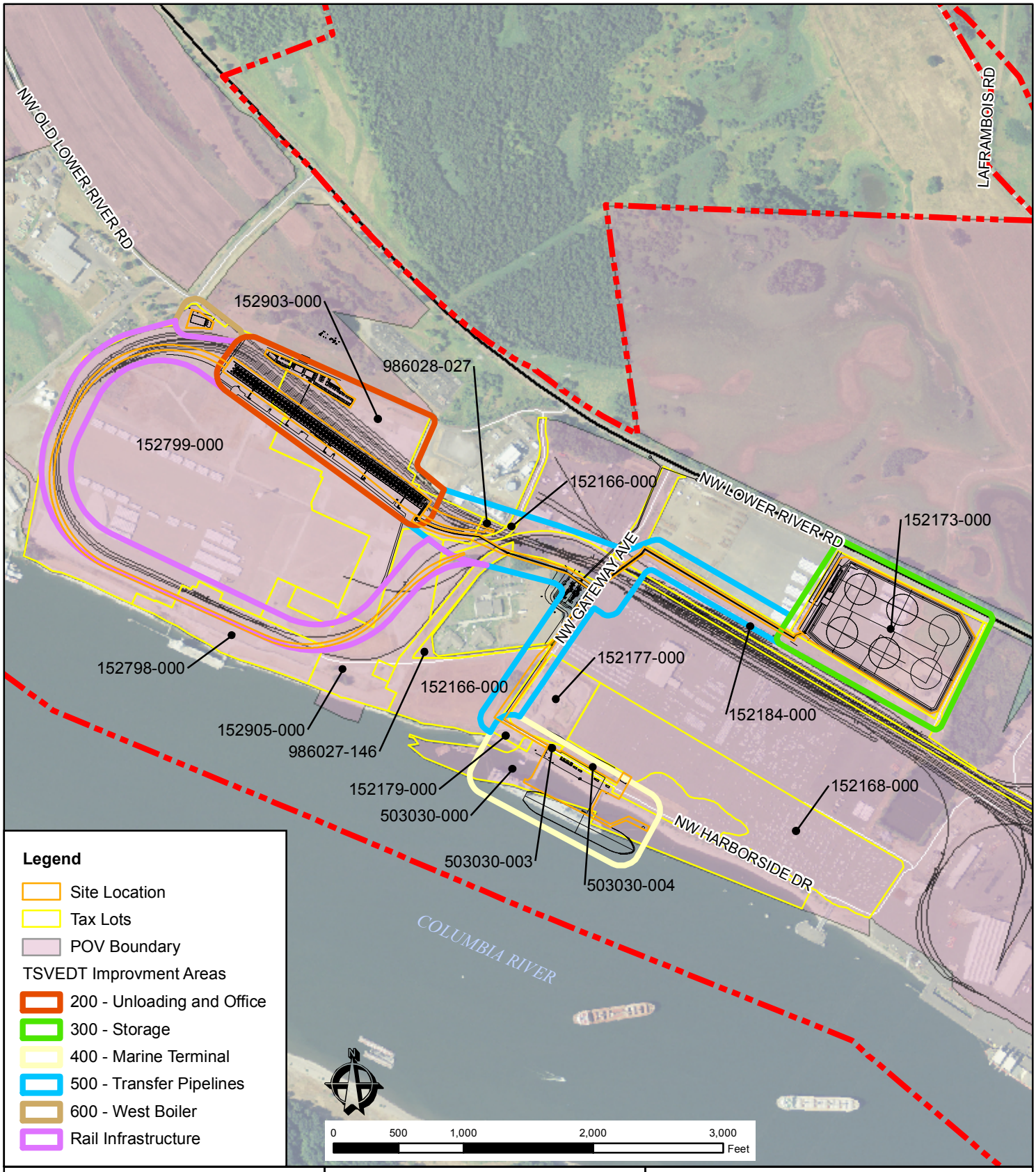

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 2
TAX LOTS

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

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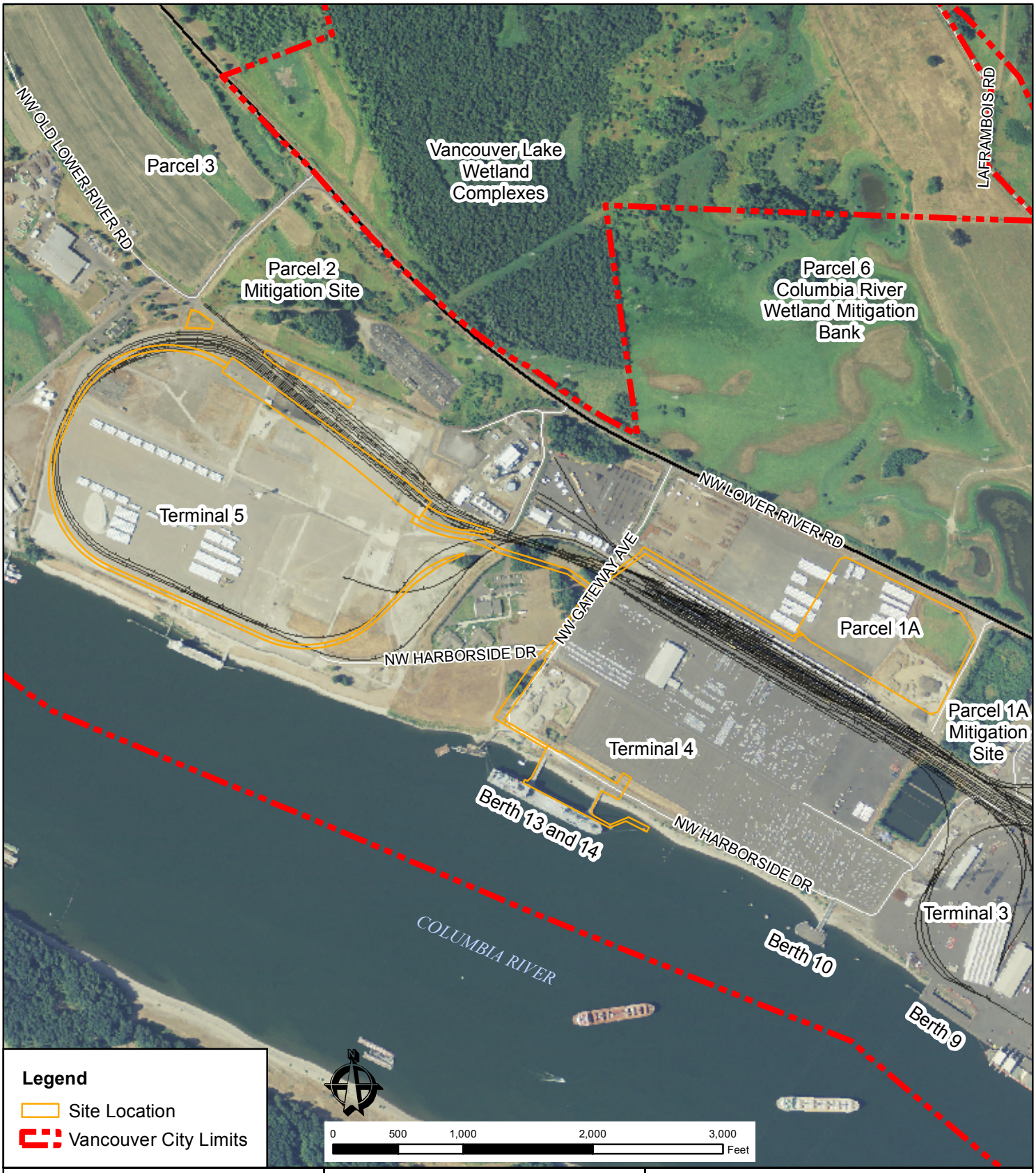

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 3
EXISTING CONDITIONS

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

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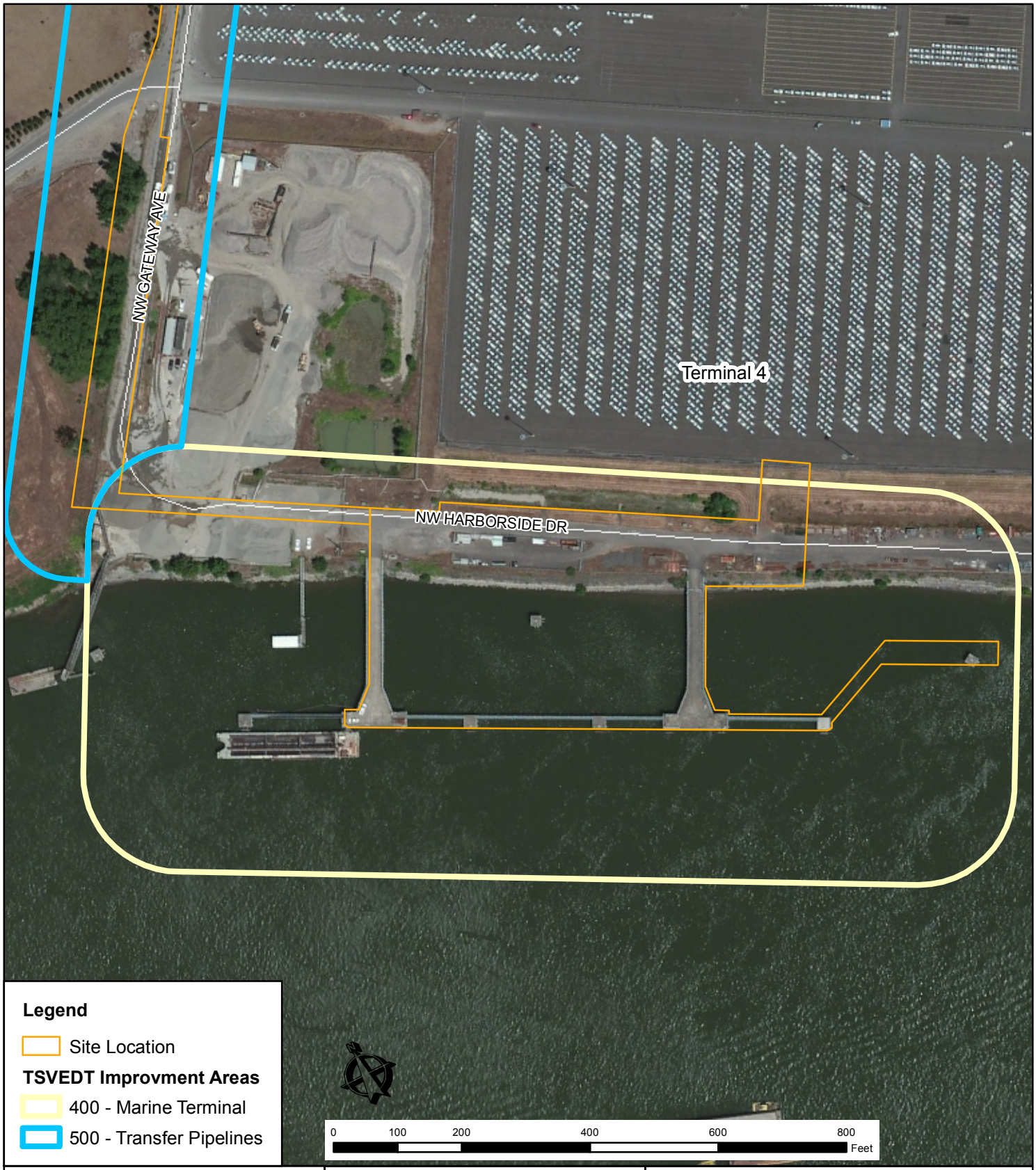

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 4
EXISTING CONDITIONS OF
AREA 400 MARINE TERMINAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

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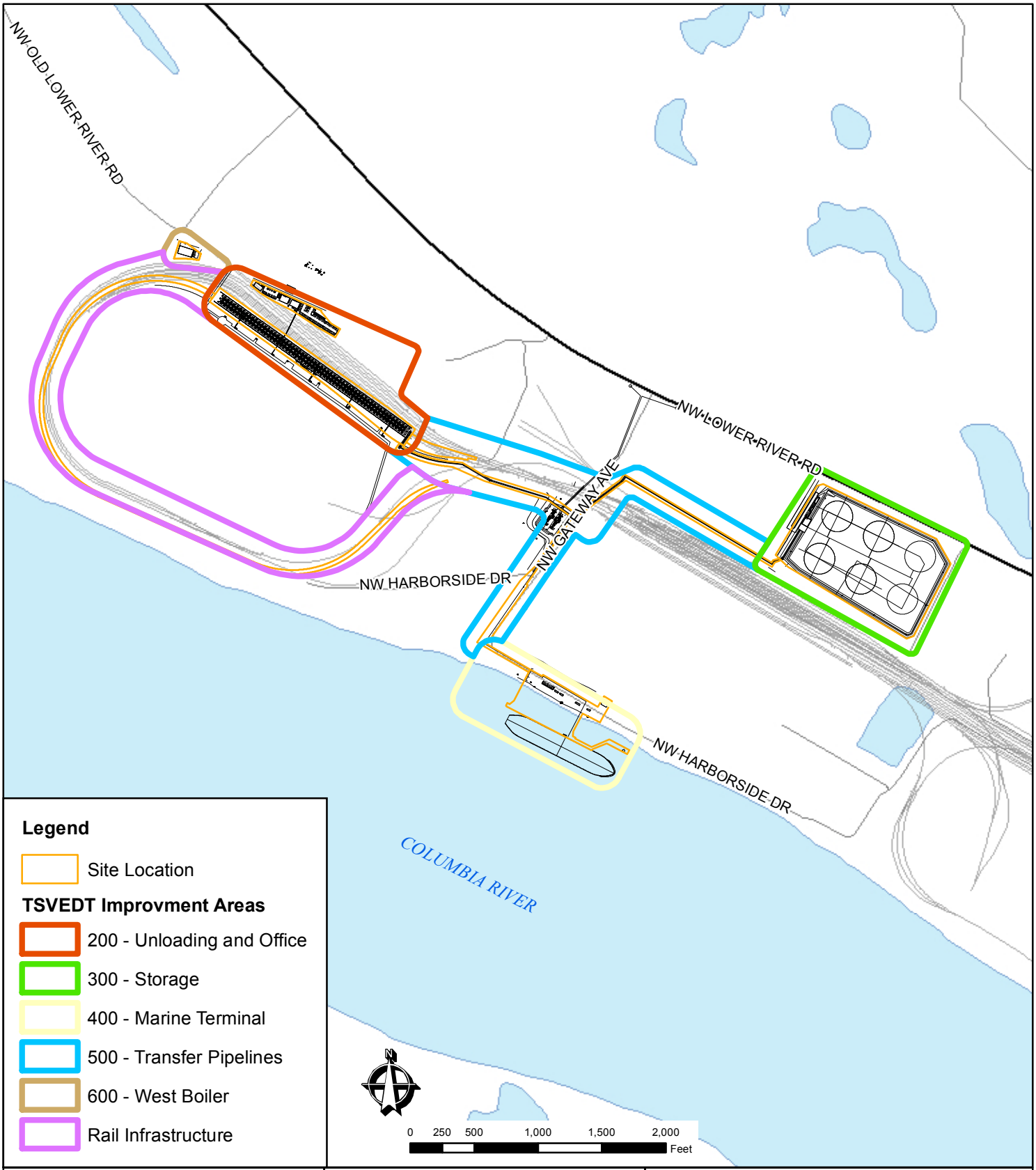

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 5
OVERALL SITE PLAN

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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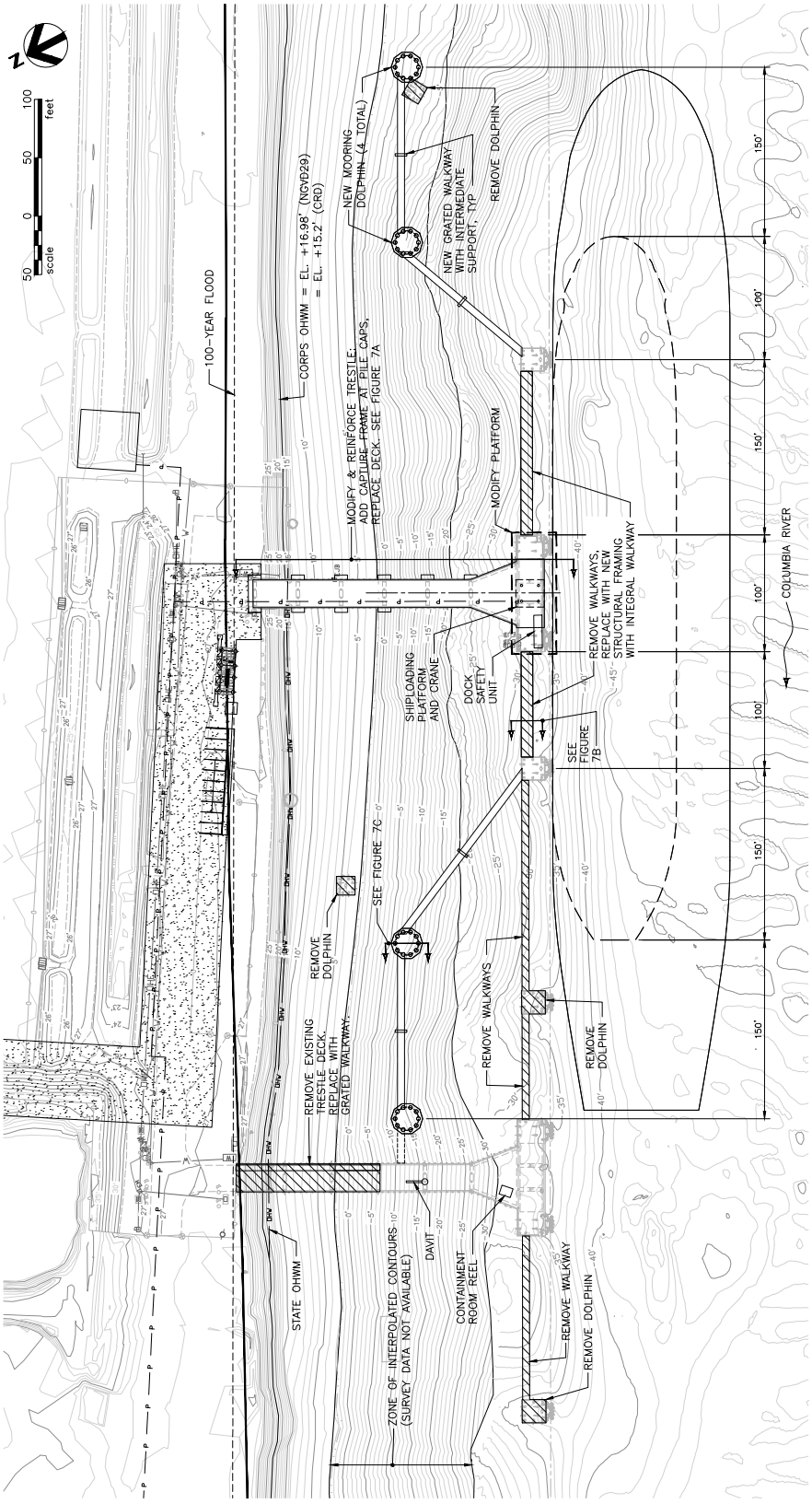

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 6
SITE PLAN AREA 400
MARINE TERMINAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

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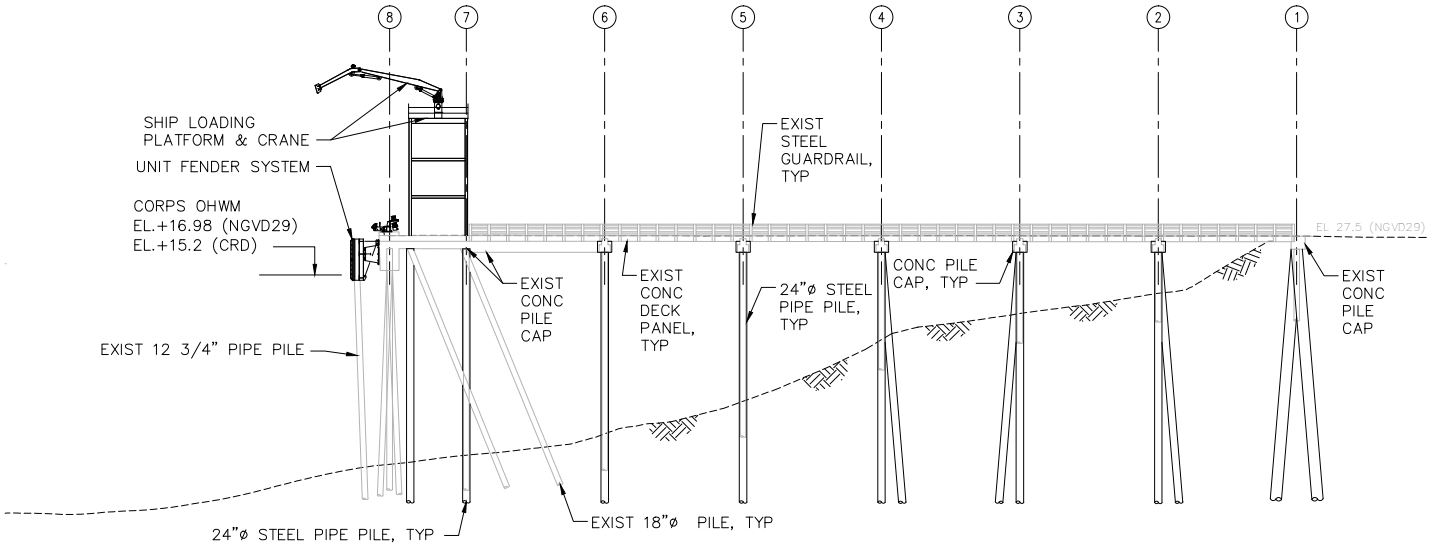
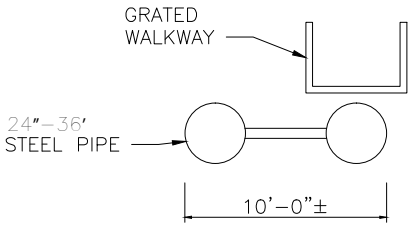
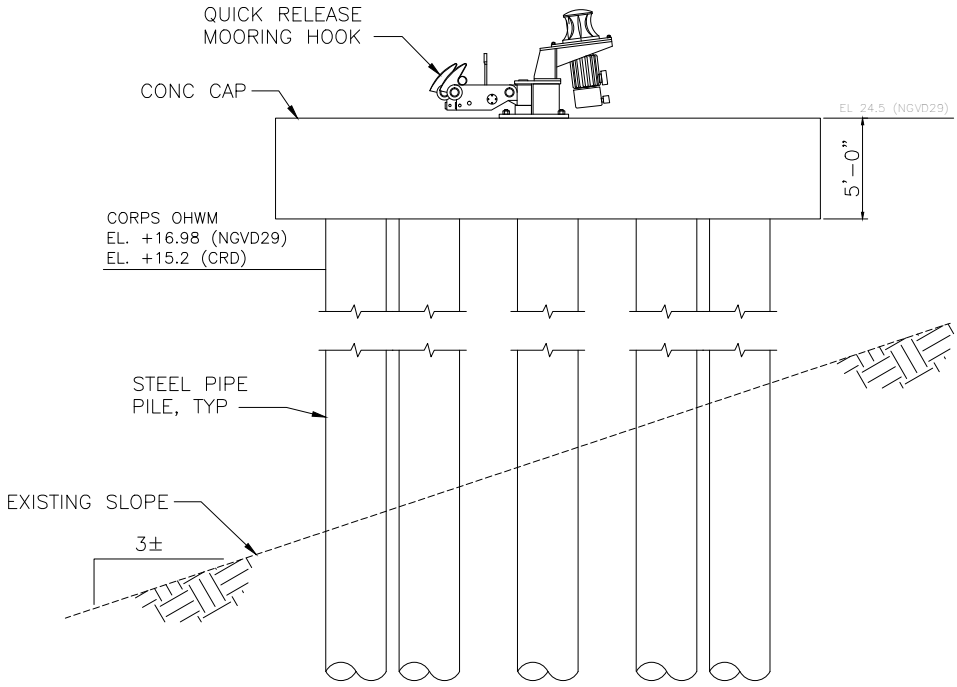


ELEVATION - LOOKING WEST A/7



SECTION - FRAMING B/7



ELEVATION- PLUMB PILE MOORING DOLPHIN C/7

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 7
CROSS SECTION AREA 400 MARINE TERMINAL

TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

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Berth 13/14 Piles and Overwater Coverage Table (for Figue 8 - Aquatic Impacts)

Shoreline Location Description	Area of Overwater Coverage - Solid ft^2	Area of Overwater Coverage - Grated ft^2	# Piles (24 to 36-inch diameter)	Area of Pile Footprint ft^2
Below Corps OHWM (20 ft or less) with Shallow Water				
Trestle Modifications	144	-	12	38
Walkway to Dolphin	-	340	1	3
Berth 14 Walkway	-	430	-	-
Dolphin	535	-	10	71
Subtotal	679	770	23	112
Deep Water (20 ft below Corps OHWM and deeper)				
Trestle/Platform Modifications	48	-	8	25
Framing/Struts	1,380	460	2	6
Dolphins	1,605	-	30	212
Walkways to Dolphins	-	2,540	3	9
Berth 14 Walkway	-	60	-	-
Contingency Piles	-	-	10	31
Subtotal	3,033	3,060	53	283
Total	3,712	3,830	76	395

PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 8
AQUATIC IMPACTS
AREA 400 MARINE TERMINAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

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PURPOSE:To establish facilities to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast of North America

APPLICANT: Tesoro-Savage

ADJACENT PROPERTY OWNERS (project site): Port of Vancouver, Washington Department of Natural Resources (WDNR), Clark County, Clark Public Utilities, Hickey Family Company and Farwest Steel Properties

FIGURE 9
TERMINAL 2
PILE REMOVAL

TESORO SAVAGE VANCOUVER
ENERGY DISTRIBUTION TERMINAL

LAT/LONG: N 45.648/ W 122.725
NEAR/AT: VANCOUVER
COUNTY OF: CLARK
STATE OF: WA
APPLICATION BY:
TESORO SAVAGE PETROLEUM TERMINAL LLC

August 2013

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Planning Application

PRE-APPLICATION, PRE-APP WAIVER, PRE-APP CRITICAL AREAS (PIR)

CITY OF VANCOUVER
Submit to: 415 W 6th ST ~ Vancouver, WA 98660
PO Box 1995 ~ Vancouver, WA 98668
Phone (360) 487-7800 Fax (360) 487-7808
www.cityofvancouver.us

OCCUPANCY TYPE		
☐ Single-Family	☐ Commercial	☐ Multi-Family
☒ Industrial	☐ Critical Area	

WORK TYPE	
☒ Pre-Application	☐ Pre-Application Waiver Request

ADDITIONAL INFORMATION					
Infill Project:	☐ Yes	■ No	**If yes, tier level:**	☐ Tier I	☐ Tier II
Lot Acreage/sf:	29 acres		**# of lots:** *(if applicable)*	N/A	
Comp Plan:	IND		**Zoning Designation:**	IH	

PROJECT SITE INFORMATION AND LOCATION

Project site address: 5501 NW Lower River Rd, Vancouver, WA 98660

Suite/bldg./apt #:

Project name: Tesoro Savage Petroleum Terminal LLC

Job #:

Tax Assessor Serial Number: see attached narrative

PROJECT DESCRIPTION

Briefly describe the proposed project including the general physical features of the site and current uses.
(Provide a more detailed description in the project narrative)

The proposed project is designed to receive crude oil by rail from various sources and transfer it to storage tanks where it will be held until it is loaded onto ships or barges for transport to end users. The project will include the construction of administrative and support buildings, rail unloading facility, piping, 6 tanks that can store up to 375,000 barrels each, marine loading facility that will include pipelines, cranes, observation/control platform, and lighting to be installed on the existing dock structure at the site. In addition, a boiler/steam plants will be built on the site and an additional two rail lines will be added to the rail infrastructure at the Terminal 5 loop.

■ APPLICANT	☐ CONTACT PERSON
Business name: Tesoro Savage Petroleum Terminal LLC	
Contact name: Kelly Flint	
Address: 6340 South 3000 East, Suite 600	
City/State/Zip: Salt Lake City, UT 84121	
Phone:	Fax:
E-mail (required):	

■ PROPERTY OWNER	☐ TENANT
Name: Port of Vancouver, USA	
Address: 3103 Lower River Road	
City/State/Zip: Vancouver, Washington 98660	
Phone: (360) 693-3611	Fax: (360) 735-1565

COMMERCIAL, INDUSTRIAL & MULTI-FAMILY *ONLY*

Do you anticipate managing/storing any chemicals, petroleum products or automotive fluids on the site? If yes, please describe:

Tesoro Savage Petroleum Terminal LLC (applicant) is proposing to construct a facility to receive crude oil by rail, store it on site, and ship it by the Columbia River to various consumers and end users primarily on the west coast.

Will this facility process wastewater to the sanitary sewer system? If yes, please describe:

Yes. Water demands are anticipated to be fairly minor. The largest process demand is the boiler/steam plant which at buildout may require approximately 30 gallons per minute of treated (on-site treatment) process water.

Which NAICS classification(s) in VMC 20.440.030 (Table 20.440-2) best describes your proposed use? *(Industrial only)*

The closest listing is Petroleum manufacturing (#3241)

PROJECT QUESTIONS

Please list specific questions and/or issues you wish to have answered at the Pre-Application conference:

1. See attached narrative for the list of questions.

2.

3.

4.

NOTICE

I/we understand that per VMC 20.210.090 (Review for Counter Complete Status), if it is determined that the application is not complete, the City shall immediately reject and return the application. I/we agree that City of Vancouver staff may enter upon the subject property at any reasonable time to consider the merits of the application, to take photographs and to post public notices.

REQUIRED SIGNATURES

Applicant Signature:	
Print Name:	Date:
Property Owner Signature:	
Print Name:	Date:

See following page for minimum submittal requirements

PRE-APPLICATION SUBMITTAL REQUIREMENTS

☐ **Required application fee per VMC 20.180**

Applicant must submit twelve (12) folded and collated copies of the following information

☐ **Completed and signed pre-application conference request form**

☐ **Plan of the proposed development** (drawn to scale), no larger than 24"x36" and clearly marked with the following:

- **(a)** Project name
- **(b)** Vicinity map
- **(c)** Scale
- **(d)** North arrow
- **(e)** Date
- **(f)** Applicant's name and contact information

☐ **Project Description:** Provide a narrative description of the following:

- **(a)** Uses proposed for the site
- **(b)** Hours of operation
- **(c)** Estimated vehicular traffic to and from the site

☐ **Preliminary Site Plan –** Existing and proposed on-site structures and improvements including the following:

- **(a)** Identify use(s) of all existing and proposed structures
- **(b)** Location and dimensions and height of all existing and proposed buildings and structures
- **(c)** Location and dimensions of existing and proposed recreation areas and open space
- **(d)** Location of existing and proposed driveways, off-street parking and loading areas.
- **(e)** Location, dimensions and screening of proposed solid waste and recyclables storage areas
- **(f)** Existing or conceptual plan showing lighting and landscaping. Landscape plan should include location of private driveway(s) and buffering for off-street parking and loading areas
- **(g)** Location and dimensions of existing and proposed streets, right-of-way and public/private access easements on and adjoining the site
- **(h)** Location and dimensions of all existing and proposed above ground and below ground utilities

☐ **Preliminary Engineering Information -** Provide a conceptual drawing or sketch showing the following:

- **(a)** Approximate location of existing fire hydrants within a 100' radius of site
- **(b)** Proposed method of providing storm-water drainage on site
- **(c)** Proposed erosion control measures
- **(d)** Proposed grading activity for the site, indicating areas of proposed cuts and fills

☐ **Preliminary Architectural Information –** Provide a brief narrative description of the following for <u>each</u> structure and outdoor activity <u>to be built</u> or <u>retained</u> on site: ***(Commercial, Multi-Family and Industrial applications only)***

- **(a)** Gross square footage
- **(b)** Proposed and potential uses and occupancy group
- **(c)** Number of floors, building height and construction type
- **(d)** Conceptual plans showing at least the gross square footage
- **(e)** Conceptual elevation drawing
- **(f)** Dimensions and area of the project site

☐ **Preliminary Plat Information –** Provide a conceptual drawing or sketch showing the following: ***(Short Subdivisions, Subdivisions & Planned Developments and Critical Area applications only)***

- **(a)** The approximate location and type of all existing vegetation including;
  a. Individual trees with a diameter of six (6) inches or more measured four (4) feet above grade regardless of whether the trees are proposed for retention or removal as it relates to the proposed development
  b. The tree plan may show clusters of such trees, rather than individual trees when individual trees are near one another
- **(b)** Provide proposed plan for compliance with tree conservation ordinance per VMC20.770

PRE-APPLICATION WAIVER REQUEST SUBMITTAL REQUIREMENTS

☐ **Completed and signed pre-application waiver request form**

☐ **Required application fee per VMC 20.180**

☐ **A written narrative justifying the request for pre-application waiver**

Pre-Application Conference Request

Tesoro Savage Petroleum Terminal LLC
Vancouver, Washington

Submitted to

City of Vancouver
Land Use Planning
415 West Sixth Street
Vancouver, Washington 98660

June 2013

Submitted by

BergerABAM
1111 Main Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.00

PRE-APPLICATION CONFERENCE REQUEST

Tesoro Savage Petroleum Terminal LLC
Vancouver, Washington

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

Tesoro Savage Petroleum Terminal LLC (the applicant) is proposing to construct a facility to receive crude oil by rail, store it on site, and ship it by the Columbia River to various consumers and end users primarily on the West Coast (the proposed project). This narrative describes the proposed project and the City of Vancouver (City) standards that are likely to apply to it.

1.1 Project Site

The proposed project is located within the Port of Vancouver (port) and involves three separate locations that will be linked by project elements: Terminal 5, Parcel 1A, and Berths 13 and 14 (Figures 1 and 2).

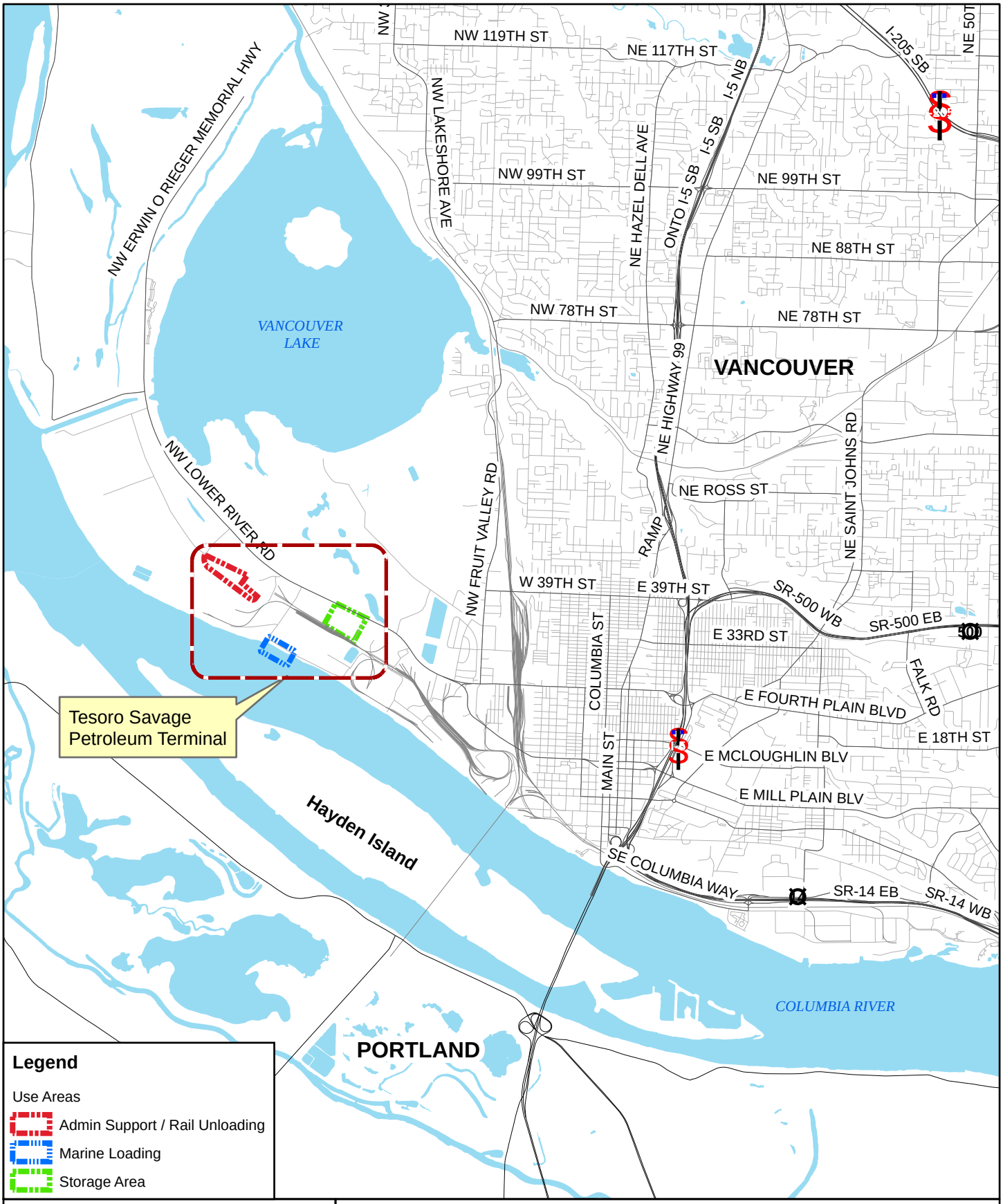
Administrative functions, support services, a boiler/steam plant, additional rail lines and rail unloading will be located at 5701 NW Lower River Road in Vancouver, Washington (see Drawing Sheet 0100-SP-001). This site is the former location of aluminum processing facilities owned and operated by Evergreen Aluminum LLC (Evergreen) and the Aluminum Company of America (Alcoa). This area of the port is generally defined as Terminal 5.

The site has been the location of intensive historic industrial use, dating back to 1940 when Alcoa first developed the site for aluminum smelting operations through the early 2000s when aluminum processing activities on the property ended. The port completed the purchase of the Evergreen and Alcoa properties in 2009 and, with the exception of the on-site water tower and the dock structure in the Columbia River, all structures of the defunct aluminum processing plants have been removed.

The Terminal 5 site is currently developed for the outdoor storage of wind turbine components and other cargoes and contains multiple rail lines for port operations. The rail on the site represents the westernmost segment of the West Vancouver Freight Access (WVFA) project, a rail improvement project that is under construction at the port and will expand and improve rail access.

As part of the proposed project, crude oil storage tanks will be located on the port's Parcel 1A on the south side of NW Lower River Road just east of Farwest Steel (3703 NW Gateway Avenue). This site was developed by the port for general cargo laydown and is currently partially occupied temporarily by a steel scrap storage yard.

Ship or barge loading will occur at existing Berths 13 and 14 on the Columbia River south of the current Subaru facility. These berths were developed by the port and have most recently been used as layberths.



BergerABAM

Figure 1: Vicinity Map
Tesoro Savage Petroleum Terminal
Vancouver, Washington

Location: Clark County, Washington
Source: Clark County GIS, 2012

0 0.25 0.5 1 Miles

3

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1.2 Operator and Employment

Tesoro Savage Petroleum Terminal LLC will own and operate the facility on the site which will be leased from the port.

It is anticipated that at full build-out, the proposed project will result in the full-time employment of approximately 110 operations and administrative personnel and will operate on a continuous basis. The proposed project also includes substantial capital improvements representing a significant investment at the port and in the Portland-Vancouver regional economy.

1.3 Request

The applicant is requesting a pre-application conference with the City to discuss the proposed crude oil terminal. The facility will be designed to receive bulk shipments of crude oil via freight rail, store it temporarily, and pipe it to marine vessels for shipment.

1.4 Permits

The proposed project is designed to receive approximately 360,000 barrels per day of crude oil by rail and ship it via marine waters. Pursuant to the Revised Code of Washington (RCW) 80.50, the proposed project is subject to the jurisdiction of the Washington State Energy Facility Site Evaluation Council (EFSEC) because it involves over 50,000 barrels per day shipped over marine waters. EFSEC is a state agency with jurisdiction over certain of the state's energy facilities and is responsible for considering project compliance with substantive state and local permitting requirements, including the federal regulatory programs that have been delegated to the state. The state and local laws that apply to a project are considered through EFSEC's site certification process. In addition, federal permits may be required for potential work on Berths 13 and 14.

The following permits or environmental reviews may apply to the proposed project and, with the exception of federal requirements, will be considered by EFSEC through its site certification process.

1.4.1 Federal[1]

- U.S. Army Corps of Engineers (USACE) Rivers and Harbor Act Section 10 permit
- Endangered Species Act (ESA) Section 7 consultation
- Section 106 of the National Historic Preservation Act (NHPA) consultation

1.4.2 State

- Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA)
- Conformance with the Model Toxics Control Act (MTCA) consent decree
- National Pollutant Discharge Elimination System (NPDES) storm water permitting and compliance

[1] The need for and scope of federal permits and associated environmental review (if any) will be determined based on the final project design.

1.4.3 City

- Critical areas permit (frequently flooded areas, fish and wildlife habitat conservation areas, and geologic hazard area)
- Tree conservation
- Site plan review (SPR)
- Shoreline substantial development permit (SSDP)
- Major grading permit
- Archaeological review
- Building, fire, plumbing, mechanical, and other construction permits
- Industrial wastewater discharge permit

1.4.4 Other Local Reviews

Additional local review will include an air discharge permit and participation in State Environmental Policy Act (SEPA) compliance, for which EFSEC will act as lead agency.

1.5 Previous Site Improvements and Approvals

The project site has been the subject of multiple recent development activities and these are listed below.

1.5.1 Wind Turbine Laydown Area Mass Grading

Grading permit approvals were received in 2009 for fill on the site for leveling and base rock compaction for the outdoor storage of wind turbine components at Terminal 5. Grading permits for this work were completed in both the City (PRJ2008-01911) and Clark County (County) (GRD2009-00002) because, at the time, portions of the Terminal 5 site remained in the County. They have since been annexed into the City and grading in conjunction with these approvals is now complete. In addition to these approvals, the City approved a grading permit (GRD2009-00030) for a temporary access drive to the wind turbine area.

1.5.2 WVFA Project

The port completed the installation of a loop track providing direct and expanded rail access to Terminal 5 and a route for rail traffic to circulate and return east to exit the port. All federal, state, and local permits were obtained for that separate rail improvement project. Local permit approvals for the WVFA project were obtained in April of 2008 (PRJ2007-0032) and modified through a post-decision review approval in 2009 (PRJ2007-00322/PST2009-00003). Modifications to the original approval have also been approved.

1.5.3 Terminal 4 Improvements

On October 1, 2009, the port received SPR, SSDP, and grading permit approvals (PRJ2009-01134/PSR2009-00050/SHL2009-0008/GRD2009-00064) for the expansion of its existing auto storage area at Terminal 4. While most of the newly proposed auto storage was within Terminal 4, proposed grading activities extended to the southeastern extreme of the site of this proposed project on Terminal 5 parcels 152798-000, 152166-000 and 152905-000.

1.5.4 Bulk Potash Handling Facility

On June 16, 2011, the port received SPR, SSDP, and other approvals (PRJ2010-01305/SHL2010-00001/ARC2011-00005/CAP2011-00008/ENG2011-00008/GRD2011-00010/PSR 2011-00004/TRE2011-000023) to construct a new marine terminal on the south half of Terminal 5.

1.5.5 Parcel 1A NE Laydown Area

On April 18, 2012 the port received approval to fill an isolated wetland on Parcel 1A (PRJ2011-01308/ARC2012-00004/CAP2012-0006/TRE2012-00043) for use as general cargo laydown. Wetland impacts were mitigated through the purchase of credits from the Columbia River Wetland Mitigation Bank.

1.6 Construction Schedule

Per its enabling statute (RCW 80.50.100 (1)(a)), the EFSEC is to make a recommendation to the Governor regarding approval of the proposed project within 12 months of receipt of an application. It is anticipated that construction will occur over 9 to 12 months beginning as soon as permits are issued.

2.0 PROJECT DESCRIPTION

The proposed project is designed to receive crude oil by rail from various sources in North America and pipe it to storage tanks where it will be held until it is loaded onto ships or barges for transport to end users, which are expected primarily to be West Coast refineries. It is anticipated that this crude oil will replace a portion of the crude oil shipped to the refineries from existing Alaskan and foreign sources by marine waters. The attached set of drawings identifies the location of the proposed project elements described below.

2.1 Administrative and Support Buildings

The proposed project will require an approximately 3,400-square-foot office building for administrative functions and two buildings to house lockers, restrooms, and other employee support facilities of approximately 3,400 square feet and 2,500 square feet. These elements will be located on the north side of the Terminal-5 Loop south of Old Lower River Road (see Drawing Sheet 0200-SP-0002). Parking and landscaping will be provided per City standards.

2.2 Rail Unloading Facility

The rail unloading facility will be located south of the administrative and support facilities and is designed to handle unit trains consisting of approximately 120 double-walled tank cars, each up to 62 feet in length and powered by three locomotives for a total length of approximately 7,661 feet (see Drawing Sheet 0200-SP-0200). At full build-out, approximately four unit trains, carrying up to a total of approximately 360,000 barrels of crude oil per day, will arrive via Class I railroad lines for staging on existing and planned tracks at the port. Trains will arrive at Terminal-5 and travel in a clockwise direction to the unloading building on the north side of the Terminal 5 rail loop. The design will accommodate complete unit trains, eliminating the need to break trains into smaller segments during the unloading process.

The rail cars will be unloaded in a building that will be approximately 1,850 feet by 91 feet in size, with a maximum height of approximately 50 feet. A typical cross section of the unloading building is shown in Drawing Sheet 0200-SP-001. The building is designed to accommodate three parallel tracks. Each track will include 30 unloading stations for a total of 90 stations. Each station will accommodate 1 tank car.

Each unloading station will include the following elements:

- Spill pans between rails that will lead to a common containment trench and holding tanks.
- Concrete containment trenches approximately 5-feet deep to accommodate the collection pipe and conduits for electrical and data lines.
- Walkway gratings for the work platform and mezzanine to access the top of the cars.

Unloading will be accomplished with a closed-loop system that includes dry fit connectors and automatic shut-offs. Hoses will be connected to the valves on the cars using dry fit connectors, and the crude oil will gravity-drain from the cars to the collection pipe and then to pump vaults in the building, from which the crude oil will be pumped to the storage tanks.

Thirty of the unloading stations will be equipped with steam fittings to heat heavier oils to facilitate oil transfer from the tank car. Pre-steaming stations may be included in advance of the unloading building to allow heating to occur prior to reaching the unloading stations. Steam will be provided from natural gas boilers housed in an associated approximately 3,000-square-foot building. Each of the pump vaults will house a series of pumps that will push the crude oil to the storage tanks on Parcel 1A.

Pedestrian bridges at each end of the building will allow workers to pass over the unit trains during operations. Additional pedestrian bridges will allow access to the administrative and support buildings over the existing Terminal 5 rail loops and to the interior of the rail loop.

2.3 Piping

A combination of above- and below-ground steel pipes will convey crude oil from the rail unloading facility to the tanks and from the tanks to Berths 13 and 14. At full build-out the system may include the following (Drawing Sheet 0100-SP-001):

- Up to three approximately 24–inch-diameter, 1,800-foot-long pipes will collect the crude oil unloaded at the rail unloading stations.

- Three approximately 24-inch-diameter, 5,500-foot-long pipes will connect the unloading facility to the storage tanks.

- Two approximately 24-30 inch-diameter, 5,300-foot-long pipe will connect the storage tanks with Berths 13 and 14.

- One approximately 6-inch-diameter, 5,300-foot-long pipe will return crude oil from Berths 13 and 14 to the storage tanks in the event of loading process shutdowns and to prevent over pressure and hammering in the pipe conveyance system.

- One approximately 16- to 22-inch-diameter, 600-foot-long pipe will deliver hydrocarbon vapor generated during loading of vessels to the vapor combustion/recovery unit (described in Section 2.5 Marine Loading, below)

Piping will be supported above ground except where necessary to cross roadways, access points, and similar surface features. Where road or rail crossings occur, the piping will be housed in underground steel casings or raised above ground for standard American Railway Engineering and Maintenance-of-Way Association (AREMA) clearances.

2.4 Storage Area

The crude oil will be stored in up to six double-bottom, above-ground steel tanks located on 22 acres on Parcel 1A, approximately 1,600 feet north of the Columbia River and approximately 5,200 feet southeast of Vancouver Lake (see Drawing Sheet 0300-SP-003). These tanks will be approximately 48 feet in height and 240 feet in diameter, with a shell capacity of 380,000 barrels each. Each tank will have a fixed roof to keep precipitation from reaching the inside of the tank and an internal floating roof to control tank vapor emissions to the atmosphere. The double-bottomed tanks will include a leak detection system between the tank floors. Two of the proposed tanks may include steam heating coils in their bases to maintain temperatures for heavier crude oil grades.

The tanks will be enclosed by a containment berm approximately 6 feet in height. The containment area will be designed with a capacity at least equal to 110 percent of the volume of the largest tank plus precipitation from a 24-hour, 25-year storm event. The entire tank containment area will be lined with an impervious membrane to prevent any spills from leaving the containment area via the ground. A sump will collect storm water from the containment area; the sump will be designed to prevent crude oil-contaminated water from being pumped to the storm water disposal system in the event of a spill.

To convey the stored crude oil to the dock for transfer to a ship or barge, a pump pit containing up to six pumps will be located on the west side of containment area. An approximately 3,000-square-foot building will house natural gas boilers that will provide heat for the two tanks equipped with heating coils. In addition, smaller buildings will be located in the same area for the control equipment, motor control centers, fire suppression equipment, and fire pumps.

Access to the storage area will be from an existing shared driveway from Lower River Road located at the northwest corner of the site. This driveway currently provides access to the site and Farwest Steel. The driveway will extend to the site and lead to a small parking area containing five spaces for maintenance vehicles.

2.5 Marine Loading

As described above, crude oil will be pumped into a 24-30 inch above- and below-ground pipe to existing port Berths 13 and 14 (Sheet 0100-SP-001). Piping, jib cranes, a moveable gangway, an observation and control platform, dock safety unit, pipe trays, and lighting will be installed on the existing dock that serves Berths 13 and 14. The dock will be able to accommodate vessels with a capacity of up to 600,000 barrels and loading rates of up to 40,000 barrels per hour. The loading system will incorporate automatic shutoff valves with a maximum 30-second shutoff time. As described above, a return line will allow oil to return to the storage tanks in case of a shutdown of the ship loading system.

The existing berth layout provides sufficient clearances from existing berth structures and the space that is required for vessel maneuvering during berthing and departure. Minor changes to the existing catwalks and mooring system may be required, but the need for new structural elements is not anticipated. A ramp and float or davit system will be added to accommodate mooring of a 24-foot-long skiff for booming and spill response.

The marine vessels will generally arrive at the berth empty. While they are being loaded, vapors from the vessel tanks will be collected and either recovered or combusted to control the emissions released to the air. Piping from the dock will convey the vapors to an enclosed vapor combustion or recovery unit just west of the CalPortland facility. Depending on the selected method, this unit will consist of a 50- by 50-foot concrete slab housing equipment and up to two 10- to 15-foot-diameter steel stacks approximately 45-50 feet in height.

During loading operations vessels will be partially encircled by booms to contain any accidental releases of crude oil and prevent it from migrating downstream. Temporary floating booms will be placed around the vessel by a small skiff before any loading begins. A fence-type floating boom may be placed between the berth and the shoreline in place of the floating boom. This would remain in place and would not require placement by the skiff during each vessel call.

2.6 Steam Plant(s)

Certain grades of crude oil must be heated to flow freely during the transfer and loading process. The proposed project includes natural gas boilers housed in buildings at the eastern entrance to Terminal 5 and at the storage area. It is anticipated that generating the necessary steam will require a boiler with a peak capacity of 300 Million British thermal units per hour (MMBtu/hr). Steam will be supplied to the rail unloading facility and storage tank area via insulated pipelines. Depending on market conditions, the Applicant may choose to construct the steam plant as a subsequent phase, or during the initial construction phase.

Natural gas will be supplied to the steam plants from the existing pipeline serving the area. There is an existing gas line in Old Lower River Road that will provide service to the site.

The steam plant will generate up to 30 gallons per minute of wastewater from condensate and blow down. This wastewater will be pretreated to meet City discharge limitations prior to discharge into the City sanitary system.

2.7 Rail

Up to two additional lines will be added to the Terminal 5 loop to accommodate the rail unloading facility. The additional lines will form two complete loops inside of the existing rail loops and will begin and end near the Gateway Avenue grade separation. The additional rail facilities may require modifications or relocations to existing surface and below ground features, such as utilities, within the rail alignment.

2.8 Fire Suppression

Several systems will be installed to provide fire suppression to the proposed project elements. The rail unloading area will be served by a closed foam and water system designed to activate as necessary in five segment areas. The storage tanks will also be covered by a fire foam system. Each storage tank will have permanent nozzles installed to allow injection of fire suppression foam inside the top of the tank. Automatic fire sprinklers will be provided for the steam plant buildings. A fire monitor will be installed at the marine loading dock, with a water cannon connected to a hydrant or other available water supply. Fire suppression systems will be designed to National Fire Protection Association and American Petroleum Institute requirements, as well as the more stringent Factory Mutual Global insurance requirements. All fire suppression systems will be designed to activate automatically, and will be equipped with manual trip stations.

2.9 Proposed Access

Primary vehicular access to the proposed project will be to the administration building on Old Lower River Road, a private road owned and maintained by the port. Old Lower River Road connects with Lower River Road approximately 1,000 feet west of the proposed office building. The storage tank area will be accessed from a shared drive with Farwest Steel from NW Lower River Road. The storage tank area is not anticipated to require full-time staffing and parking will be provided for routine maintenance needs. The marine loading area will be accessed by Gateway Avenue and port-maintained access roads. An existing asphalted area at the berths will be used by project personnel during ship loading operations. Although the boiler/steam plant at the rail unloading facility ordinarily will not be occupied full time, parking for maintenance vehicles will be provided.

The extended road network includes NW Lower River Road (State Route 501), which is a state highway and a major truck route with a 50-mile per hour (mph) speed limit. Approximately 1.5 miles east of the site, NW Lower River Road connects to the Mill

Plain Extension (a principal arterial with a 35-mph speed limit) and West Fourth Plain Boulevard (a primary arterial and state route with a 35-mph speed limit). West Mill Plain and West Fourth Plain boulevards connect to I-5, SR 14, and points beyond.

Traffic during operations will consist primarily of privately owned employee vehicles as well as limited deliveries by tractor trailers. Construction traffic will vary during the 9- to 12-month construction period, depending on the work element and number of construction employees on-site and deliveries.

Public transit does not serve the site. C-TRAN (the area's public transit provider) Route No. 25 is the transit route closest to the site. It travels on West Mill Plain and Fruit Valley Road, approximately 1.5 miles east of the site.

2.10 Building Occupancy Groups

It is anticipated that the structures proposed with the proposed project will meet the occupancy groups shown in Table 1.

Table 1 - Occupancy Groups

Building	Building Type	Size (approximate square feet)
Train Unloading Building	F-1	163,913
Train Unloading Boiler Building	F-1	6,600
Train Unloading Control/E House	F-1	483
Train Unloading Fire Pump and Foam Building	F-1	737
Office Building	B	3.360
Change Rooms	B	3,360 and 2,520
Tank Farm Boiler Building	F-1	3,000
Tank Farm Control E House	F-1	500
Tank Farm Fire Pump and Foam Building	F-1	737
Control/E Room by Piping Rack	F-1	500
Control/E Room by Piping Rack	F-1	500
Dock Side Control/E Room	F-1	500

3.0 EXISTING CONDITIONS

3.1 Project Location

The site of the proposed project encompasses approximately 6 acres at the port's Terminal 5 property, 22 acres at Parcel 1A, and approximately 1 acre at Berths 13 and 14. Final acreages may change based upon the lease agreement with the port. Table 2 identifies the tax parcels and facilities. A Parcel map is shown in Figure 2.

Table 2 – Proposed Project Parcels

Parcel Number	Proposed Project Facilities
152799-000, 152903-000 (Terminal 5)	Rail Unloading Facility and Administrative and Support Buildings
152173-000 (Parcel 1A)	Storage Area
152166-000, 503030-000, 503030-003	Marine Loading
152184-000, 152177-000, 152179-000, 986027-146, 986027-027, 50303-001, 152166-000,	Piping

The site address (Terminal 5) is 5501 NW Lower River Road, Vancouver, Washington 98660 and the site is found within the SE ¼ of Section 18, NW ¼ of Section 19, and the NW and NE ¼ of Section 20, Township 2 North, Range 1 East. Berths 13 and 14 are located at approximately Columbia River Mile (RM) 103.5.

3.2 Comprehensive Plan and Zoning

3.2.1 Project Site

The site is zoned Heavy Industrial (IH) with an Industrial (IND) comprehensive plan designation. The IH zoning allows a variety of industrial uses, including the proposed facility, which would meet the City's definition of "warehouse/freight movement" as defined in Section 20.160.020 of the VMC. Other project elements, such as the proposed rail spur and utility connections, are also permitted uses. The Vancouver Municipal Code also permits "railroad yards" within the IH zone. In addition "Petroleum and Coal Products Manufacturing" is listed as a permitted use under the NAICS code.

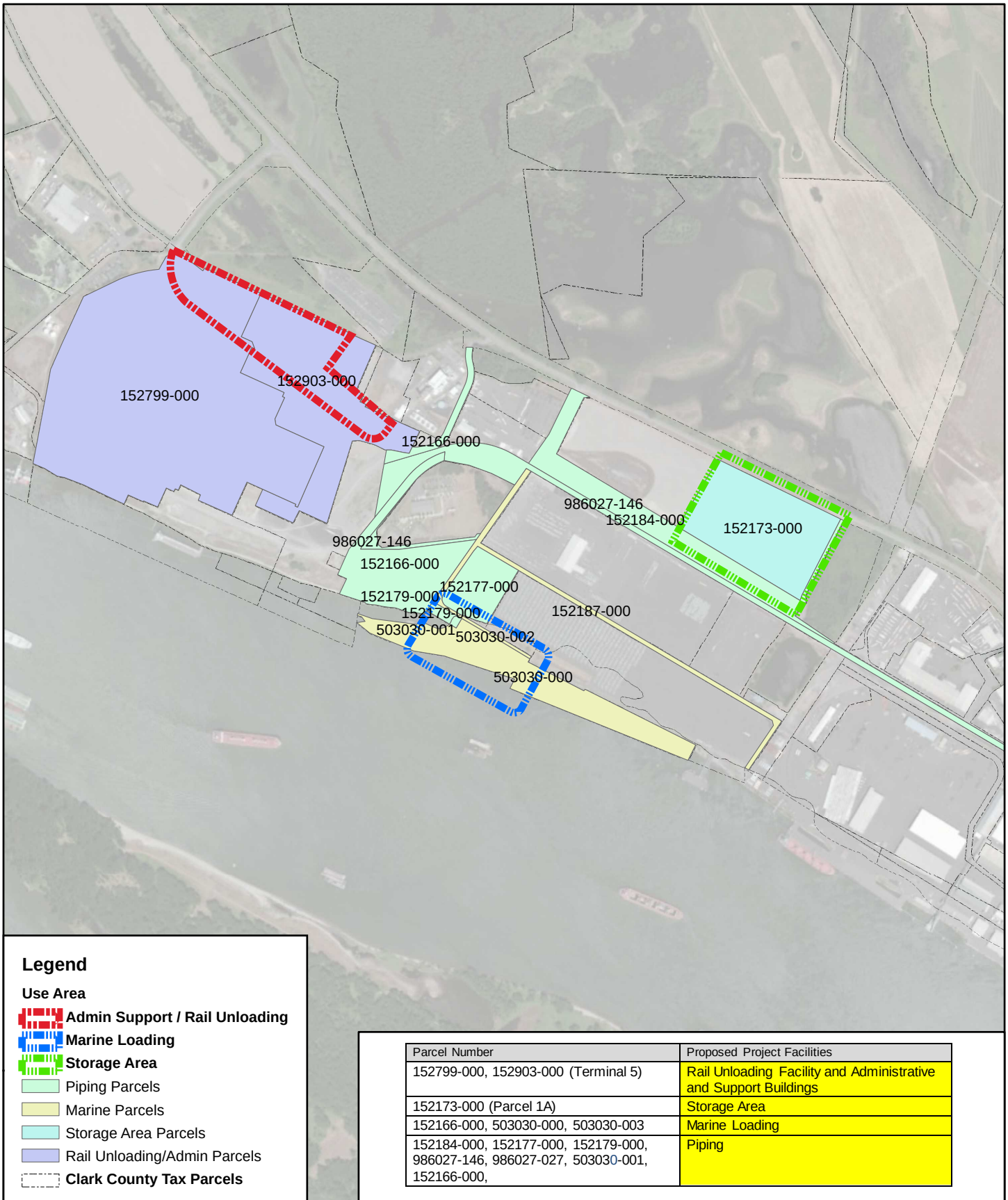
3.2.2 Surrounding Properties

As shown in Figure 3, zoning of adjacent parcels is IH, with the exception of parcels located on north of the storage area on Parcel 1A. Land north of Lower River Road near Parcel 1A is zoned Greenway (VMC 20.450).

3.3 Topography and Existing Structures

The site of the proposed project is primarily flat, and much of it is covered with impervious surfaces related to the historic development associated with the former aluminum smelting facilities, recent port paving improvements and other port development. The steepest grades are near the shoreline, where steep slopes are present from the top of the bank down to the riprapped shoreline.

The only structures on the site are a water tower owned by the port, located near the center of tax lot 152799-000, and the existing dock at Berths 13 and 14.



Legend

Use Area

- **Admin Support / Rail Unloading**
- **Marine Loading**
- **Storage Area**
- Piping Parcels
- Marine Parcels
- Storage Area Parcels
- Rail Unloading/Admin Parcels
- **Clark County Tax Parcels**

Parcel Number	Proposed Project Facilities
152799-000, 152903-000 (Terminal 5)	Rail Unloading Facility and Administrative and Support Buildings
152173-000 (Parcel 1A)	Storage Area
152166-000, 503030-000, 503030-003	Marine Loading
152184-000, 152177-000, 152179-000, 986027-146, 986027-027, 503030-001, 152166-000,	Piping

BergerABAM

Figure 2: Parcel Map
Tesoro Savage Petroleum Terminal
Vancouver, Washington

Location: Clark County, Washington
Source: Clark County GIS, 2012

0 500 1,000 2,000 Feet

3

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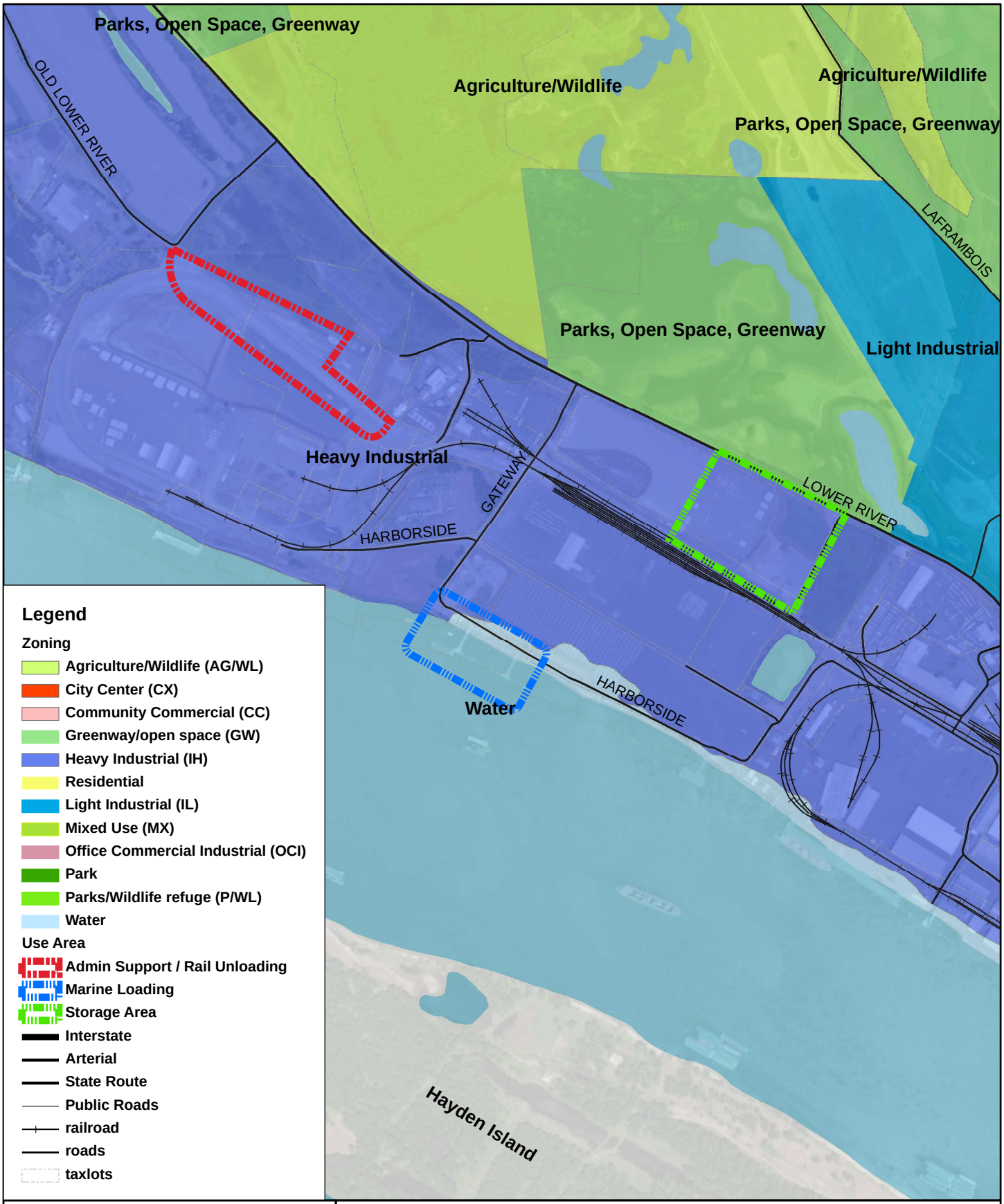

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Figure 3: Zoning Map
Tesoro Savage Petroleum Terminal
Vancouver, Washington

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0 500 1,000 2,000 Feet

Location: Clark County, Washington
Source: Clark County GIS, 2012

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3.4 Ecology Consent Decree and Restrictive Covenant

Within the boundary of the proposed project, there are four locations that are the subject of an existing Washington State Department of Ecology (Ecology) consent decree and the environmental restrictive covenants discussed below. In addition the entire former Alcoa/Evergreen site is subject to a restrictive covenant associated with the clean-up of the site. Portions of the project including the rail unloading building, additional rail lines and support elements for the ship loading may be located in these four areas..

3.4.1 Consent Decree No. 09-2-00247-2, for the Alcoa Inc. Site Located at 5701 NW Lower River Road, Vancouver Washington (January 30, 2009)

VANEXCO/Rod Mill Site – The 1995 consent decree (95-2-03268-4) for the Vanexco/Rod Mill building called for the building foundation (flood slabs) to serve as a cap to address PCB contamination beneath the building. Ecology approved an amendment in the 2009 Consent Decree to allow the removal of the building, providing that surface materials placed above the foundation are sloped to provide drainage away from the area. The Vanexco/Rod Mill Site is the location of the administrative and support buildings included in the proposed project.

East Landfill – The 2003 agreed order (DE03 TCPIS-5737) required Alcoa to conduct source control and bank stabilization at the East Landfill. The East Landfill is a well-defined area containing material that exceeds MTCA Method A industrial clean-up levels. Work under the agreed order was completed in 2004 and the East Landfill is capped with a RCRA double-lined cover. The East Landfill is the location of the marine vapor recovery/combustion unit included in the proposed project.

Spent Pot Liner (SPL) Storage Area—The 1992 consent decree (92-2-00783-9) for the SPL storage area called for cover with either a polyvinyl chloride (PVC) or high density polyethylene (HDPE) membrane or a 2-foot (61 cm) thick clay cover with a hydraulic conductivity of no more than $1x10^{-6}$ cm/sec. The 1992 consent decree further required that the SPL cap be maintained. The 1992 consent decree was dismissed on January 30, 2009 and no longer has effect; however, the operation and maintenance activities, including institutional controls and cover maintenance, originally contained in the 1992 consent decree are now contained in the 2009 consent decree and continue to be applicable to the site.

The 2009 consent decree (09-2-00247-2) also notes Ecology's certification that all the terms of the construction portion of the 1992 consent decree had been completed on May 3, 1992. Prior to 2009, the SPL area was covered with an HDPE liner to meet this consent decree requirement.

In April 2010, with Ecology approval, as part of its WVFA project, the port placed an asphalt cap over the HDPE liner previously covering the contaminated soil area. The cap consisted of a layer of asphalt overlain by an asphalt-impregnated geotextile (a combination of non-woven polypropylene fabric and asphalt cement tack coat) and geomembrane overlain by a second layer of asphalt. The fabric and tack coat

combination form an asphalt membrane interlayer within the pavement section. This cap remains in complete form today.

North/North 2 Cap – On March 26, 2009, former landowner Alcoa, Inc. entered into an environmental restrictive covenant in favour of Ecology pursuant to its consent decree with Ecology effective January 30, 2009 restricting activity in the North and North 2 (NN2) landfills. This restrictive covenant was necessary because of the residual concentration of contaminants on the properties that exceeded cleanup levels for soil and/or groundwater established in the MTCA under Washington Administrative Code (WAC) 173-340-720 and 740. These materials are presently covered by a 1-foot layer of clean sand. Per the restrictive covenant, these materials may be reused on site with Ecology's permission. This area is located in the rail loop that is proposed with this project.

3.4.2 Restrictive Environmental Covenant (December 31, 2008); Grantor: Evergreen Aluminum LLC & Grantor: State of Washington, Department of Ecology

Ingot Plant Cap – The previous site of ingot processing on the property has been the subject of remediation and containment and is governed by an existing Ecology restrictive covenant. This site is located immediately south of the southwest corner of Terminal 5 and additional rail construction could occur in this area. The contamination is covered with 12 inches of crushed concrete.

3.5 Surrounding Uses

Uses surrounding the proposed project are primarily industrial. Bordering uses of the rail unloading and administration buildings are as follows: the Clark County Jail Work Center is approximately 600 feet to the east, the CPU River Road Generating Plant is approximately 100 feet to the northeast, and the Tidewater Barge Company is approximately 100 feet to the west. The port's bulk potash handling facility is planned for the area immediately south. The area immediately to the north of the proposed project is used for propane storage and distribution and includes Old Lower River Road.

The storage area is bordered to the south by the port's rail system and the Subaru facility. The site is bordered to the east by the port's Parcel 1A wetland, to the west by Farwest Steel and by Lower River Road and open space to the north.

The marine loading area is surrounded by port facilities including Subaru and CalPortland.

The nearest residence is an isolated rural house owned by the port and located at 6818 NW Old Lower River Road approximately 3,100 feet (0.6 mile) northwest of the proposed location of the boiler/steam plant for the rail unloading facility. The nearest residential neighborhood is the Fruit Valley Neighborhood, approximately 3,200 feet (0.6 mile) east of the storage area. In addition, the Clark County Jail Work Center is located off Gateway Avenue between the elements of the proposed project. This facility includes 224 beds in a minimum security setting.

3.6 Natural Conditions

3.6.1 Geology

County Assessor's data identifies the following soil types on the site (as show in Figure 4).

- Water (WAT), for areas mapped below the ordinary high water mark (OHWM)
- Sauvie silty clay loam, 0 to 8 percent slopes (SpB)
- Newberg silt loam, 0 to 3 percent (NbA)
- Fill land (Fn)
- Sauvie silt loam, 0 to 3 percent slopes (SmA)
- Pilchuck fine sand, 0 to 8 percent slopes (PhB)

As noted below, the site has been mapped by the City as being susceptible to soils liquefaction, a geologic hazard area per Section 20.740.130 of the critical areas protection provisions of the VMC (see Figure 4, Soils Map).

3.6.2 Vegetation

Previous development and remediation activities filled, paved, and/or capped the entire site of the proposed project. As a result, vegetation on the site is primarily limited to grasses, non-native weedy herbaceous vegetation, and shrubs located between the top of the bank of the Columbia River and the riprap at the water's edge. Additionally, a number of trees are located along the shoreline at Berths 13 and 14.

3.6.3 100-Year Floodplain

The 100-year floodplain and floodway of the Columbia River are located at 30 feet NAVD 88 and extends generally to the top of the bank along Berths 13 and 14 (FEMA Map #53011C0363D). In addition, there is an isolated floodplain located on Parcel 1A as shown on FEMA Map Number 53011C0364D. The port filled this area as authorized by GRD2012-00025. Figure 5 indicates the mapped floodplain.

3.6.4 Wetlands

There are no mapped wetlands on the site of the proposed project. Parcel 1A previously contained an isolated wetland that was filled (see section 1.5.5).

There are wetland mitigation sites located east of the access road on the east side of the Parcel 1A site and north of Old Lower River Road in the vicinity of the proposed administration building. In addition, the Columbia River Wetland Bank is located north of NW Lower River Road north of the Parcel 1A site.

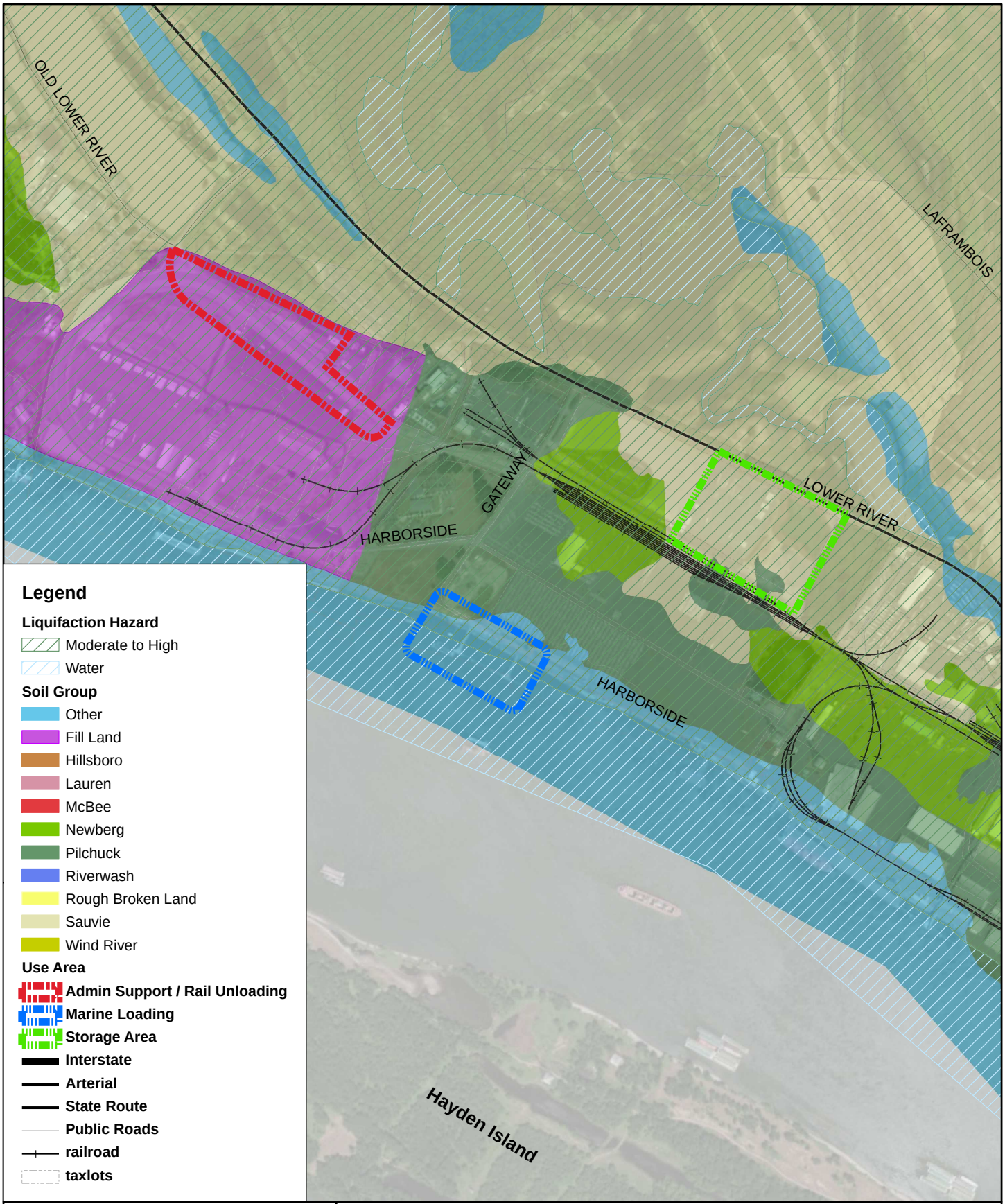

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Figure 4: Soils Map
Tesoro Savage Petroleum Terminal
Vancouver, Washington

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0 500 1,000 2,000 Feet

Location: Clark County, Washington
Source: Clark County GIS, 2012

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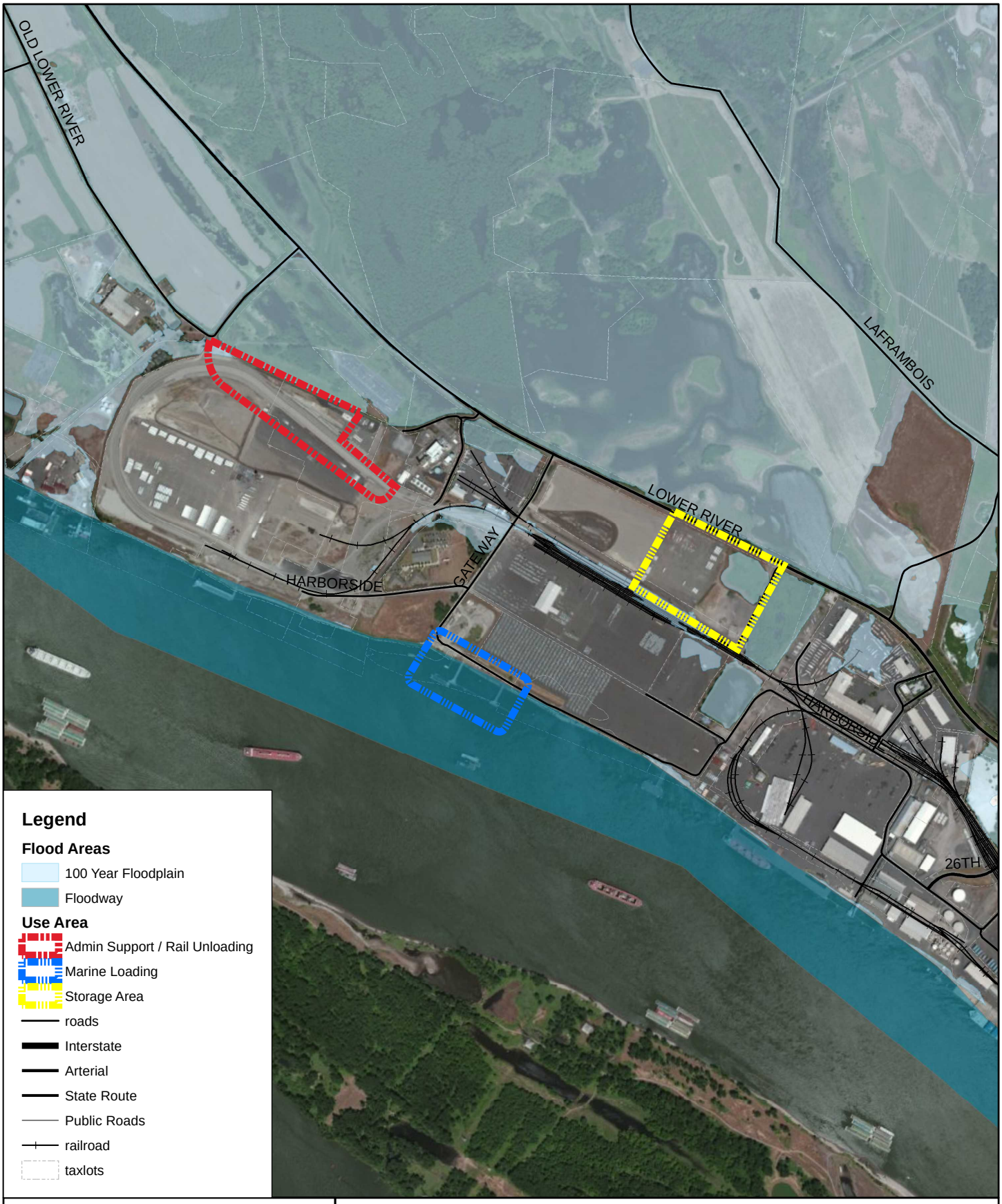

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Figure 5: Floodplains
Tesoro Savage Petroleum Terminal
Vancouver, Washington

Location: Clark County, Washington
Source: Clark County GIS, 2012

0 500 1,000
Feet

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3.6.5 Archaeology

According to the Clark County Archaeological Predictive Model, the site is within Level A and/or high (80-100%) areas. There are no mapping indicators of archaeological site buffers. Most of the area of the proposed project was surveyed previously for various development projects, including the port's WVFA project. An archaeological study was performed by Archaeological Investigations Northwest, Inc. (AINW) in February 2009 for a project area that included portions of the site.[2] Additionally, a cultural resources survey was performed by Jones & Stokes (now IFC International) in December 2007 for a project area that included portions of the site. Neither study found evidence of intact prehistoric or historic-era archaeological sites on the project site or of structures eligible for listing in the National Register of Historic Places (NRHP).

3.7 Storm Water/Erosion Control

The rail unloading facility and administration building are located within the boundaries of the Terminal 5 expansion project, and the storm water contributions were factored into the design and sizing of the existing conveyance system.

The storage area (Parcel 1A) is located within the planning boundaries of the completed Terminal 4 pond improvements.

3.8 Utilities

The port is currently served with City water and sanitary sewer facilities. The port additionally operates a private water system and maintains storm water facilities on site. Potable water and existing fire hydrants are currently available on or adjacent to all of the locations involved in the proposed project. Sanitary sewer service is available along the south side of the storage area, and the nearest connection point westward for the rail unloading facility, offices, boiler/steam plant, and berth is a manhole located just south of the Clark Public Utilities Generating Plant.

Electrical service to the proposed project site is available from the existing Clark County Public Utilities distribution system.

4.0 REGULATORY COMPLIANCE

4.1 Trip Generation (VMC 11.95)

It is estimated that, at full project build-out, the project as proposed will result in approximately 410 average daily trips (ADT), with approximately 60 trips occurring in the AM peak hour and 57 trips occurring in the PM peak hour. Traffic generation is based on the anticipation that approximately 110 full-time staff will be employed by the facility at full build-out. The trip estimates are based on trip rates from *Trip Generation, 9th Edition* published by the Institute of Transportation Engineers using data for General

[2] The Port of Vancouver's Proposed Alcoa/Evergreen Development Project, Clark County, Washington, Archaeological Study, Archaeological Investigations Northwest, Inc., Report No. 2257, February 19, 2009.

Light Industrial (land use code 110). The facility will operate 24 hours a day, 7 days a week with personnel on weekends and staggered shifts.

The trip estimates identified above are preliminary estimates for pre-application purposes only and additional trip data based on the nature of the use may be included in the traffic impact study that will be prepared for the project.

4.2 State Environmental Policy Act

Pursuant to WAC 463-47, EFSEC will act as lead agency for SEPA compliance. RCW 80.50.180 provides that all actions undertaken by the City are exempt from compliance with SEPA, RCW 43.21C.030.

4.3 Critical Areas Ordinance (VMC 20.740)

The critical areas found on the site include frequently flooded areas, geologic hazard areas (seismic hazard), and fish and wildlife habitat conservation areas. Development is proposed, to some extent, in each of these areas and therefore it is anticipated that a critical areas report will be submitted to address project compliance with the applicable provisions of VMC Chapter 20.740, Critical Areas Protection.

4.3.1 Fish and Wildlife Habitat Conservation Areas (VMC.20.740.110)

Project activities at Berths 13 and 14 are located within the riparian management area (RMA) and riparian buffer (RB) area of the Columbia River. The riparian boundaries are measured landward from the biological OHWM and are limited by existing impervious surfaces. The existing riparian habitat is of lower value due to historical industrial land uses which have functionally isolated the riparian area from the Columbia River. The riparian area within the proposed project site is mostly devoid of vegetation with the exception of scattered trees and vegetation below the top of the bank. Impervious surfaces include existing roadways, material laydown areas, compacted soil, access trestles, and storm water facilities. A critical areas report addressing the issue will be provided during preliminary review to satisfy the requirements of VMC.20.740.110.

4.3.2 Frequently Flooded Areas (VMC 20.740.120)

Current plans include utilization of the existing dock. Therefore, it is anticipated that the critical areas report will include a review under the frequently flooded area provisions of Section 20.740.120 of the VMC. It is not anticipated that any fill will be placed in the flood fringe or floodway. Further, to ensure any in-water structures included in the proposed project will withstand elevated river levels in flood events, the structures will be approved by a structural engineer licensed in Washington.

A portion of the tank area on Parcel 1A is identified as an isolated floodplain (see section 3.6.3) previously approved for fill.

4.3.3 Geologic & Seismic Hazards (VMC 20.740.130)

County GIS data indicate moderate-to-high potential for liquefaction or dynamic settlement within the site area of the proposed project. A geotechnical report will be provided to address the liquefaction potential on the site and recommending

construction techniques to address any identified potential soils instability and seismic issues.

4.3.4 Wetlands (VMC 20.740.140

As indicated in section 3.6.4, portions of the proposed project site were designated as wetlands but were filled and land to the east is a forested wetland. No activity or impacts are proposed within the Parcel 1A wetland area. According to VMC Table 20.740.140-5, the wetland buffer for a Category 3 wetland with a low habitat function is between 40 and 80 feet based on the land use intensity. However, according to VMC 20.740. (C)(1)(b)(1)(e), areas within buffers that are completely functionally separated from a wetland and do not protect the wetland from adverse impacts may be excluded from the buffer. Because the site of the proposed project is completely developed and an existing access road separates it from the Parcel 1A wetland, the buffer will not affect the project site.

4.4 Shoreline Management Master Program (VMC 20.760)

Ship loading elements are the only anticipated project elements that will require construction within the jurisdiction of the City's Shoreline Management Master Program (SMMP) (within 200 feet of the OHWM). The SMMP designates the shoreline environment of the upland areas on the site as High Intensity and the areas of the site below the OHWM of the river as Aquatic.

Within the High Intensity and Aquatic designations, water-dependent industrial uses are permitted activities. The SMMP defines a water-dependent use as follows: "a use or a portion of a use which requires direct contact with the water and cannot exist at a non-water location due to the intrinsic nature of its operations." The purpose of the proposed project is to transfer crude oil from railcars to ships. Consequently, the proposed facility activities clearly meet the definition of a water-dependent use. Further, per Policy 4.3.5.1, the purpose of the High Intensity designation is "to provide for high-intensity water-oriented commercial, transportation, and industrial uses…." Table 6-1 lists *Water-dependent* industrial uses as permitted in the High Intensity and Aquatic shoreline designations with no setback or height limits.

It is anticipated that the proposed project would be subject to the SMMP policies and regulations shown in Table 2.

Table 2 - SMMP Policies and Regulations

Section	Associated Regulation(s)
5.1	1-2, 4-6, 9, 11, 15
5.2	All
5.3	All
5.4	2
5.6.1	All
5.6.2	1-5
5.6.3	All
5.7	All
5.8.1	All
5.9	1-7
5A	All
Table 6-1	All
6.3.3.5	1, 4-5
6.3.6	1, 5-6

4.5 Land Use (VMC 20.440.030)

The proposed project is permitted in the IH zone. The proposed project is consistent with the City's definition in VMC 20.160.020 of a warehouse/freight movement use, a permitted use. This definition is as follows:

> *Uses involved in the storage and movement of large quantities of materials or products indoors and/or outdoors; associated with significant truck and/or rail traffic. Examples include free-standing warehouses associated with retail furniture or appliance outlets; household moving and general freight storage; cold storage plants/frozen food lockers; weapon and ammunition storage; major wholesale distribution centers; truck, marine and air freight terminals and dispatch centers; bus barns; grain terminals; and stockpiling of sand, gravel, bark dust or other aggregate and landscaping materials.*

Table 3 below shows how the proposal is consistent with the City's development standards for the IH zone.

Table 3 - Development Standards (VMC Table 20.440.040-1)

Development Criteria	IH Zone	Proposed
Minimum Lot Size	None	N/A
Maximum Lot Coverage	100%	N/A
Minimum Lot Width	None	N/A
Minimum Lot Depth	None	N/A
Minimum Setbacks	See VMC 20.925	See Section 4.8
Maximum Height	None	Approx. 50 feet (rail unloading)
Minimum Landscaping Requirement (% of total net area)	0%	≤5%

4.6 Tree Ordinance (VMC 20.770)

Impervious surfaces from historic development and recent grading dominate the site. Because the City interprets the provisions of VMC Chapter 20.770 to apply only to the area of existing pervious surfaces, the tree density requirements would not apply to the majority of the site area. If existing pervious surfaces will modified with the proposed project appropriate tree mitigation plantings will be completed.

4.7 Landscaping (VMC 20.925)

The City's policy is that the buffering and screening provisions of VMC 20.925.070 do not apply to industrial sites with adjacent port ownership. All areas of the proposed project are surrounded by existing port industrial sites with the exception of Parcel 1A which is adjacent to the Farwest Steel development to the west and the port-owned open space/wetland bank to the north. According to Table 20.925.030-1, development within the IH zone requires an L1, 0- to 5-foot buffer when adjacent to land zoned IH and an L2, 10-foot buffer when separated from the resource zone by a street. These buffers are applicable to the west and north sides of the storage area. In addition, a minimum of 10 percent landscaping and required perimeter screening will be provided in the parking lot of the administration building as required by VMC 20.945.040.

4.8 Parking and Loading (VMC 20.945)

Per Section 20.945.070 of the Vancouver Municipal Code (VMC), industrial services buildings require one parking space per 600 square feet of building area. Parking will be provided at the administrative buildings located on Old Lower River Road. The storage tank area will not be continuously occupied and only parking for maintenance vehicles will be provided. Parking for operation of the ship loading will be located on existing surfaces in the vicinity of the dock.

4.9 Archeological Resources

The applicant anticipates conducting a new archaeological survey for areas not previously studied. While findings from previous studies indicate a low likelihood of encountering cultural artifacts during construction, the applicant will develop and implement an Inadvertent Discovery Plan during construction.

4.10 Storm Water/Erosion Control

Storm water improvements will be analyzed and designed in accordance with City development standards and Ecology's *Stormwater Management Manual for Western Washington*. Storm water from the site will be discharged through manmade conveyances to the Columbia River; therefore, the proposed project is exempt from the flow control minimum requirement. Storm water treatment technologies will be implemented to treat and monitor storm water quality in accordance with the required Industrial NPDES General Storm water Permit.

Storm water from the boiler/steam plant and the area of the administration building north of the existing rail loop will be treated on site in accordance with current regulations and discharged through existing casings underneath the railroad tracks. Flow contributions from the rail unloading facility will be treated through oil/water separators prior to discharge into the existing port storm water system.

Storm water for the storage area (Parcel 1A) will be treated on site using oil/water separators prior to its discharge to the existing storm water system. No pollution generating surfaces will be constructed with the storage area. Accesses in/out of the area are for periodic sampling and maintenance.

There are no modifications to the impervious surfaces at the existing shipping berths and therefore no storm water improvements are proposed at this time.

4.11 Utilities

Electrical service will be obtained by interconnection to the local distribution system. Potable water demands are anticipated to be fairly minor. The largest process demand is the boiler/steam plant which at build-out may require approximately 30 gallons per minute of process water. Fire flow is the largest water demand and design criteria for the water system. The project team is currently conducting hydrant flow tests to determine system adequacy at the storage area, rail unloading facility, boiler/steam plant, and ship loading berth. Fire protection systems including additional hydrants and chemical suppression systems are proposed at the storage tank area and rail unloading facility.

Based on the present level of design, it is anticipated that water supply for fire suppression at the storage tank area can be obtained either from the port or from the City of Vancouver. All other water needs at the proposed project would be supplied by the City of Vancouver.

The anticipated sanitary sewer discharges include domestic sewerage from the administration and support buildings, and treated boiler blow-down water (wastewater generated from solids left behind during the steam generation process), and interior drains from the rail unloading facility, including rail car drip pans. A water treatment facility is planned in the building housing the steam plant to provide pre-treatment for the boiler blow-down water before discharge to the City sanitary sewer system.

Oil/water separators will be used in all other areas of the site where hydrocarbons could enter into the sanitary sewer drains.

5.0 QUESTIONS/ITEMS FOR PRE-APPLICATION DISCUSSION

a. VMC 14.010.050, Prohibited Discharge Standards, states that petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin, in amounts that will cause Pass Through or Interference are prohibited from sanitary sewer discharges. Section 14.010.080, Local Limits, states a threshold of 50 mg/L. Please confirm the performance criteria for crude oil in wastewater.

b. VMC 14.010.050 Prohibited Discharge Standards requires that discharges shall not cause the temperature at the treatment plant to exceed 104-degrees. For this proposed site, what is an acceptable maximum discharge temperature at the proposed discharge location? Where is this located?

c. The previous staff report for PRJ2010-01305 indicates that the downstream sanitary sewer pump station #4516, XB732 may not have sufficient capacity for additional wastewater discharges. Please confirm the existing pump station capacity, requirements for connection, and limits of necessary improvements if any?

d. Farwest Steel was required to construct frontage improvements with their recent development. Please provide detailed requirements for frontage improvements at the Tank Farm site on NW Lower River Road, SR-501.

e. The current development plan for the Tank Farm includes sharing the existing access road east of Farwest Steel. This will be for occasional maintenance only. Are there any intersection or access improvements required?

f. It is our understanding from discussions with City staff the determinations of required fire flow and locations for fire protection equipment will be determined by a 3rd party consultant who specializes in fire protection for flammable/combustible liquid tank farms. Can the City provide an estimate of required fire flows at this time? Please additionally provide a description of how the 3rd party review may impact review schedules and coordination.

g. Please confirm that frontage improvements along NW Old Lower River Road will not be required in the vicinity of the proposed office building. Other recent development in this area has been exempted from frontage improvements.

h. To the extent possible, please provide all as-built reference drawings for public utilities located on or adjacent to the project locations.

i. We understand that the 2012 codes (IFC, IBC, IECC, etc.) will become effective in July and will apply to this project.

j. What is the required building separation where no barrier is provided for fire protection?

k. Would the City identify the study intersections required in the traffic study?

l. Would the City identify any planned transportation improvements affecting the study intersections?

m. We request that the City help identify all in-process developments in the study area that need to be accounted for at the study intersections.

n. The general site lighting design for each area will consist of several 480V, 400 watt, LED type fixtures. The fixture quantities and heights will be designed to provide an average of 3-5 foot-candles near grade or working area. Will this comply with the city's current lighting standards and light pollution criteria? If not, please provide the acceptable site lighting criteria and/or standards.

Last Saved by: Tony.pritchett on: Jun 5, 2013 11:38 AM File: Q:\Vancouver\2013\A13.0267\CADD\Dwgs\PRE-APP\COVER.dwg

Port of Vancouver USA

Tesoro Savage Terminal LLC

SHEET OVERVIEW

(SEE GD-002 FOR SHEET INDEX)

AD = ARCHITECTURAL DRAWINGS
CD = CIVIL DRAWINGS
DD = DEMOLITION DRAWINGS
EC = EROSION CONTROL DRAWINGS
ED = ELECTRICAL DRAWINGS
FA = FIRE ALARM DRAWINGS
FP = FIRE PROTECTION DRAWINGS
FD = FOUNDATION DRAWINGS
GA = GENERAL ARRANGEMENT DRAWINGS
GD = GENERAL DRAWINGS
ID = INSTRUMENTATION DRAWINGS
LA = LANDSCAPE DRAWINGS
LD = LOOP DIAGRAMS
LS = LIFE SAFETY/CODE PLAN
MD = MECHANICAL DRAWINGS
PD = PIPING DRAWINGS
PF = PROCESS FLOW DIAGRAMS
PI = P&ID
SD = STRUCTURAL STEEL DRAWINGS
SP = SITE PLANS
VD = VENDOR DRAWINGS

OWNER INFORMATION

PORT OF VANCOUVER
3103 NW LOWER RIVER ROAD
VANCOUVER, WA 98660

TELEPHONE: 360-693-3611
CONTACT: MONTY EDBERG
CONTACT: GREG WESTRAND

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NORTHWEST UTILITY NOTIFICATION CENTER

COMMISSIONERS

NANCY BAKER
JERRY OLIVER
BRIAN WOLFE

EXECUTIVE DIRECTOR

TODD K. COLEMAN

PROJECT DESCRIPTION

XXX

FA #: XXXXXXX
POV PROJECT NUMBER: XXXXXX

DESIGN TEAM

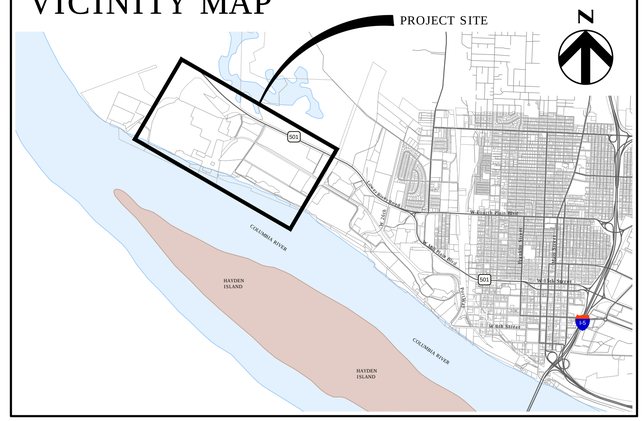
BergerABAM
700 NE MULTNOMAH ST.
PORTLAND, OR 97232
SUITE #900

TELEPHONE: 503-872-4100
FAX: 503-872-4101
WEBSITE: WWW.ABAM.COM
CONTACT: SAM ADAMS

R&M ENGINEERING CONSULTANTS
5280 S COMMERCE DR.
MURRAY, UT 84107
SUITE #E-130

TELEPHONE: 801-263-3419
FAX: 801-263-0128
WEBSITE: RMSTRUCTURAL.COM
CONTACT: XXX

VICINITY MAP



PRE-APP
NOT FOR CONSTRUCTION

ENGINEERING MANAGER DATE
PORT OF VANCOUVER, USA

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, OR 97232
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

THIS DRAWING CONTAINS PROPRIETARY AND PRIVILEGED INFORMATION OF TESORO SAVAGE PETROLEUM LLC AND SHALL NOT BE DISCLOSED OR USED FOR THE BENEFIT OF OTHERS WITHOUT PRIOR WRITTEN PERMISSION OF THE DRAWING OWNER.

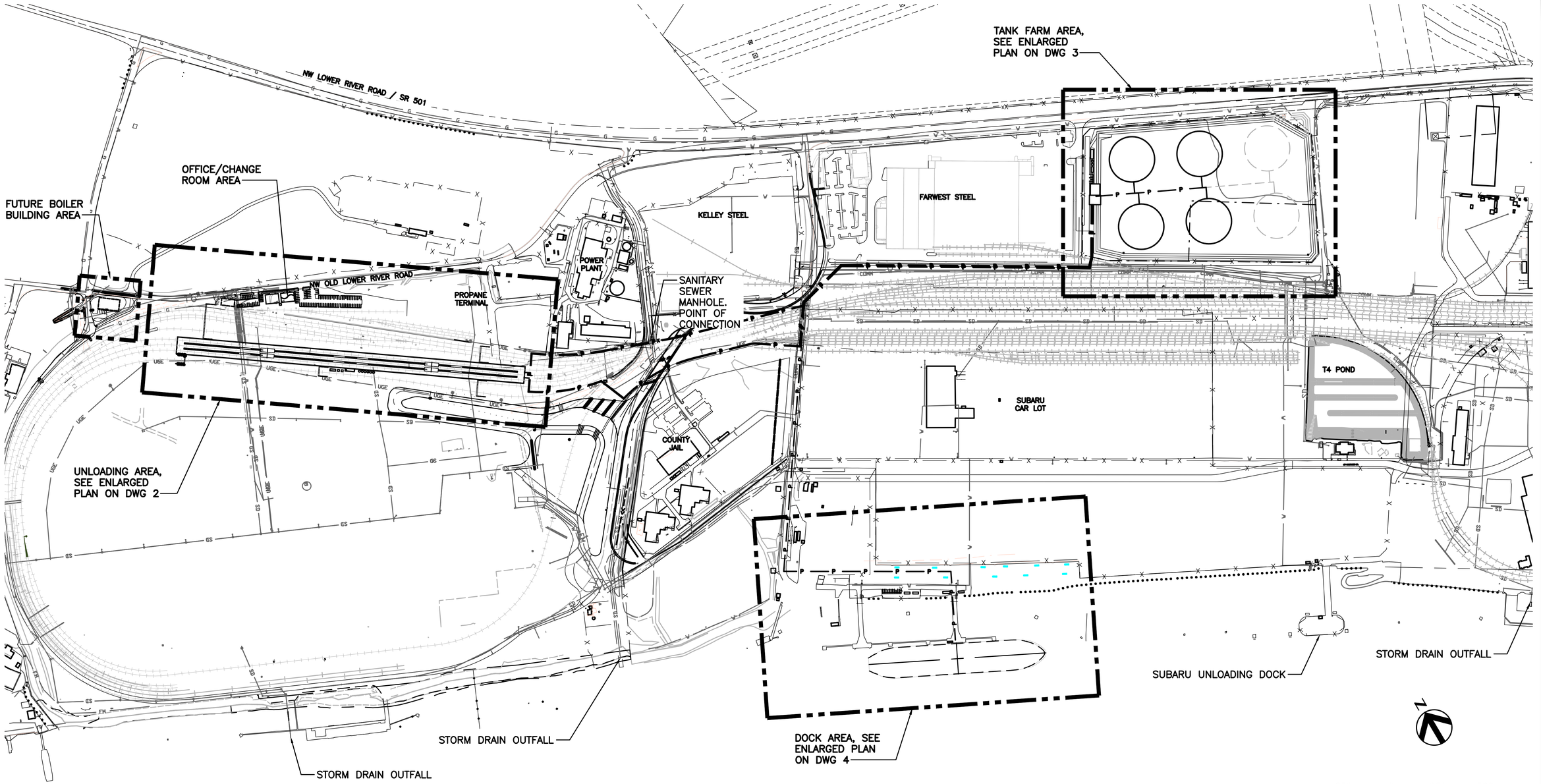
CUSTOMER: TESORO SAVAGE PETROLEUM LLC

PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: COVER SHEET AND LOCATION MAP

DESIGN:	DES	START DATE:	6/5/2013	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	6/5/2013	PROJECT MANAGER:	XX
CHECKED:	MCH	APPROVED:	XXX	SIZE:	24X36

DRAWING NUMBER Jun 05, 2013 – 11:41am
COVER
SHEET X/XX
REV. 0



NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, OR 97232
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM LLC

PROJECT: TESORO SAVAGE TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: KEY PLAN

DESIGN:	DS	START DATE:	5/21/2013	SCALE:	1"=250'
DRAWN:	TNP	PRINT DATE:	6/4/2013	PROJECT MANAGER:	XXXX
CHECKED:	SA	APPROVED:	XXX	SIZE:	24x36
DRAWING NUMBER				SHEET	REV.
				1/X	X

NW OLD LOWER RIVER ROAD / SR 501

EXIST HYDRANT

CONNECT TO EXIST WATER

CONNECT TO EXIST SEWER

CHANGE ROOM

PROPOSED PARKING AREA

PROPOSED PARKING AREA

EXIST HYDRANT

EXIST HYDRANT

PROPANE TERMINAL

24" STM-SP

24" STM-SP

FUTURE OFFICE BUILDING

OFFICE BUILDINGS

EXIST RAIL UTILITY CASINGS

RAIL UNLOADING COVERED STRUCTURE

EXIST HYDRANT

PROPOSED HYDRANTS W/ 300' SPACING, TYP

FUTURE ROADWAY IMPROVEMENTS

EXIST STORM DRAIN, SEE KEY PLAN FOR CONTINUATION AND OUTFALL LOCATIONS

1" = 60' scale 60 0 60 120 feet

N

STORMWATER NOTES:

1. ROOF DRAINS FROM UNLOADING STRUCTURE TO BE DISCHARGED DIRECTLY TO ON-SITE STORM DRAIN.
2. RAIL CAR DRIP PANS WITHIN FACILITY TO BE TREATED WITH OIL/WATER SEPARATOR AND TREATED EFFLUENT TO BE DISCHARGED TO ON-SITE STORM DRAIN.

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, OR 97232
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM LLC

PROJECT: TESORO SAVAGE TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: UNLOADING AND OFFICE AREA ENLARGEMENT

DESIGN:	DS	START DATE:	5/22/2013	SCALE:	1"=60'
DRAWN:	TNP	PRINT DATE:	6/4/2013	PROJECT MANAGER:	XXXX
CHECKED:	SA	APPROVED:	XXX	SIZE:	24x36
DRAWING NUMBER				SHEET	REV.
				2/X	X

NW LOWER RIVER ROAD / SR 501

CONNECT TO EXIST CITY WATER

PROPOSED HYDRANT, TYP

CONTAINMENT BERM

PROPOSED ELECTRICAL/MECHANICAL EQUIPMENT LOCATIONS

PROPOSED PARKING AREA

PROPOSED TANK FARM AREA

T.F. BOILER

PUMP PIT

FARWEST STEEL

PROPOSED PIPELINE ROUTES

CONTAINMENT AREA STORM SUMP

EXIST STORM DRAIN LINES TO POND, SEE KEY PLAN FOR CONTINUATION AND OUTFALL LOCATIONS

CONTAINMENT AREA STORM SUMP

OIL/WATER SEPARATOR

CONNECT TO EXIST SANITARY SEWER

HAZARDOUS AREAS, TYP

EXIST HYDRANTS

HAZARDOUS AREA

1" = 60'

60 0 60 120

scale feet

STORMWATER NOTES:

1. ROOF DRAINS FROM STORAGE TANKS TO BE DISCHARGED DIRECTLY TO ON-SITE STORM DRAIN.
2. TANK FARM CONTAINMENT AREA TO BE SLOPED TO DRAIN TO STORM DRAIN SUMPS. WATER WILL BE TREATED THROUGH OIL/WATER SEPARATORS AND TREATED EFFLUENT WILL BE DISCHARGED TO ON-SITE STORM DRAIN.

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, OR 97232
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM LLC

PROJECT: TESORO SAVAGE TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

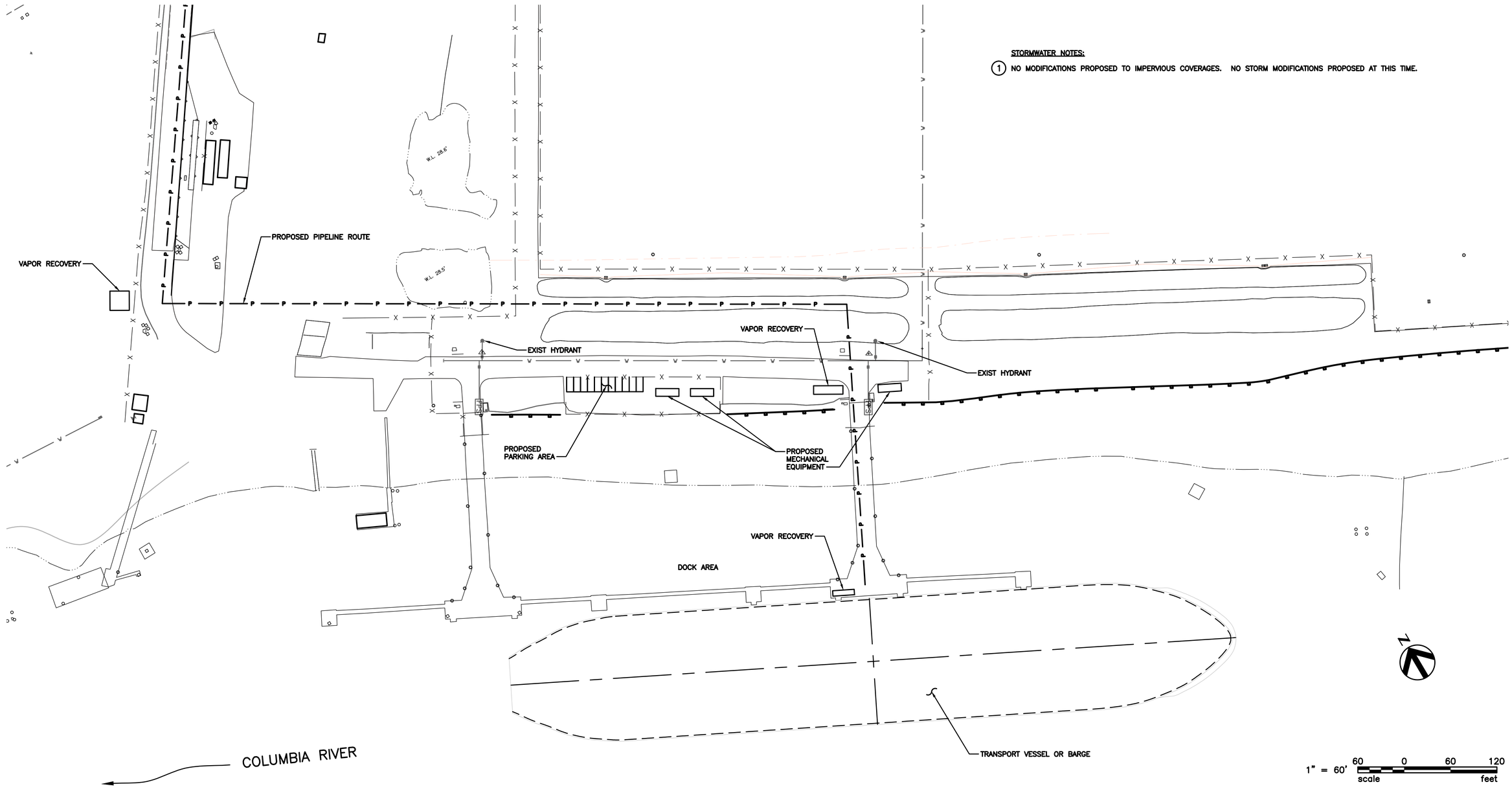
DESCRIPTION: TANK FARM AREA ENLARGEMENT

DESIGN:	DS	START DATE:	5/22/2013	SCALE:	1"=60'
DRAWN:	TNP	PRINT DATE:	6/4/2013	PROJECT MANAGER:	XXXX
CHECKED:	SA	APPROVED:	XXX	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
	3/X	X

STORMWATER NOTES:

(1) NO MODIFICATIONS PROPOSED TO IMPERVIOUS COVERAGES. NO STORM MODIFICATIONS PROPOSED AT THIS TIME.



NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
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Portland, OR 97232
(503) 872-4100 FAX: (503) 872-4101

TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM LLC

PROJECT: TESORO SAVAGE TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: DOCK AREA ENLARGEMENT

DESIGN:	DS	START DATE:	5/22/2013	SCALE:	1"=60'
DRAWN:	TNP	PRINT DATE:	6/4/2013	PROJECT MANAGER:	XXXX
CHECKED:	SA	APPROVED:	XXX	SIZE:	24x36
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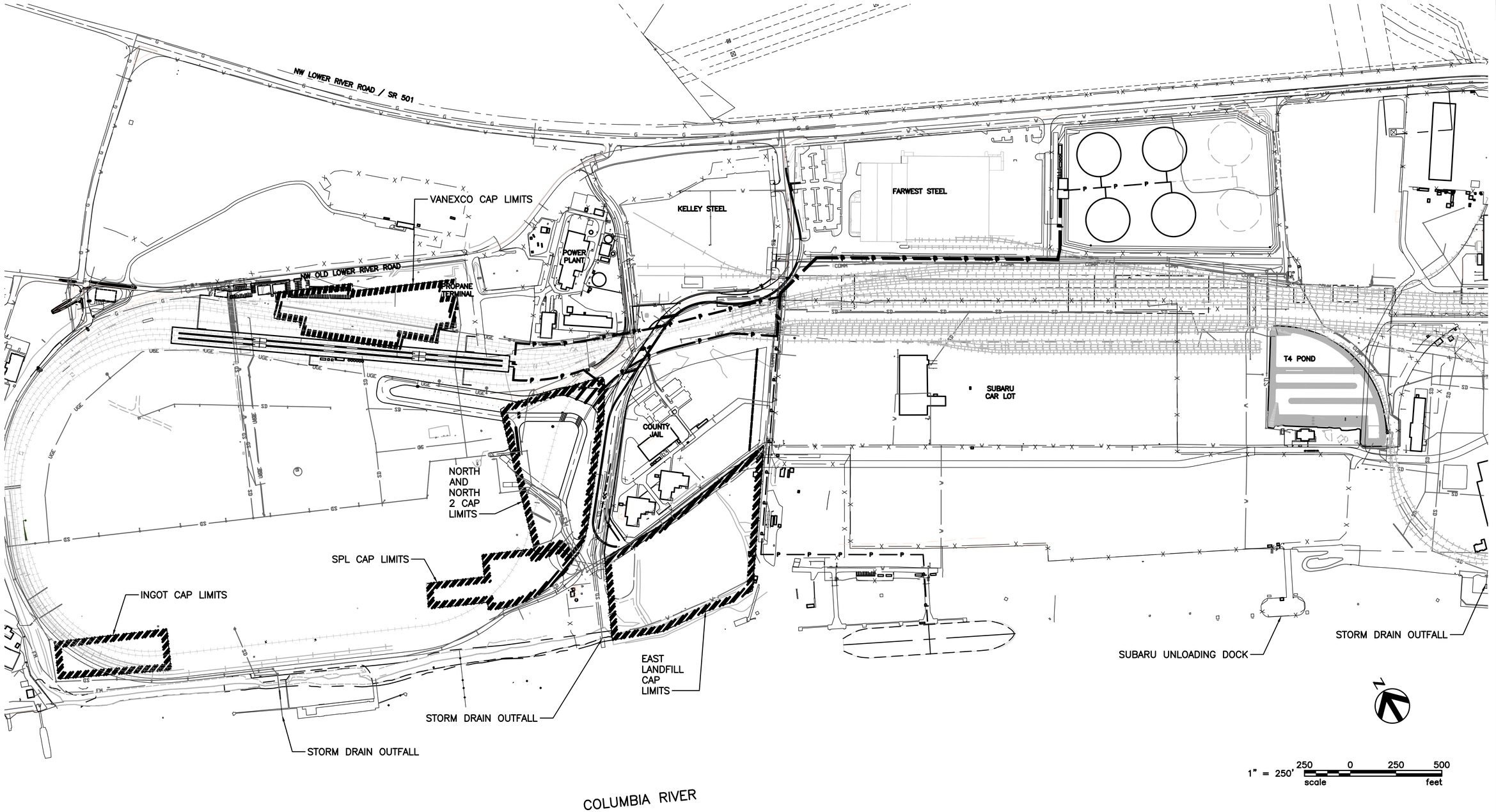
				4/X	X



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700 NE Multnomah Street, Suite 900
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TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM LLC

PROJECT: TESORO SAVAGE TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: SITE PLAN – CONTAMINATED AREA CAPS

DESIGN:	DS	START DATE:	6/4/2013	SCALE:	1"=250'
DRAWN:	TNP	PRINT DATE:	6/4/2013	PROJECT MANAGER:	XXXX
CHECKED:	SA	APPROVED:	XXX	SIZE:	24x36
DRAWING NUMBER				SHEET	REV.
				5/X	X

SUPPLEMENTAL PRE-APPLICATION CONFERENCE NOTES
TESORO SAVAGE PETROLEUM
6/27/13

NOTE TO APPLICANTS: The comments recorded below are supplemental to the written comments given to applicants at the meeting, and therefore do not represent a complete record of requirements or issues discussed at the pre-app. A copy of these notes shall be given to the applicant at the end of the pre-app, and a copy shall be kept in the pre-app file.

YOU MUST SUBMIT AN ENTIRE SET OF PRE-APP COMMENTS, INCLUDING THESE PAGES, WHEN YOU SUBMIT FOR SITE PLAN REVIEW.

ADDITIONAL STAFF COMMENTS

ZONING
Staff: Jon Wagner
Change to written comments: yes ☐ no ☒

Comments: Additional info on lighting

BUILDING
Staff: Chris Drone

Change to written comments: yes ☐ no ☒

Comments:

FIRE
Staff: Chad Lawry
Change to written comments: yes ☒ no ☐

Comments: will provide additional information on requirements

ENGINEERING
Staff:

Change to written comments: yes ☐ no ☐

Comments:

add 1620

Additional info on projects that are in-process re: traffic

PARKS
Staff: ~~Jean Akers~~
Change to written comments: yes ☐ no ☒
Comments:

C-TRAN
Staff: Heather Cowley
Change to written comments: yes ☐ no ☒

Comments:

Staff Taking Notes: Lou Wagner

Copy Received By: Ted Deery
(Applicant or Representative)

Pre-application Sign-in Sheet
PRJ-143550/PIR-34550
JUNE 27, 2013 AT 2:30 PM

For Public Record

Listing your information on this sign-in sheet is voluntary. This sign-in sheet may be subject to public disclosure under state law, subject to provisions in the Public Disclosure Act per Chapter RCW 42.56.

Name (Please Print)	Address	Phone #	E-mail Address
Mike Swanson	COV - mp Engineering	487-7182	mike.swanson@cityofvancouver.us
Richard Hoiland	COV - Water Protection	487-7199	richard.hoiland@ "
JOHN GENTRY	VANCOUVER FIRE DEPT	487-7845	john.gentry@cityofvancouver.us
AARON A. ODEGARD	COV SANSWR	4877153	LMIE # 1342
BRIAN CARRICO	1111 MAIN STREET, Suite 300	823.6122	brian.carrico@abam.com
HELEN DEVERY	1111 MAIN ST, SUITE 300	826-6114	helen.devery@abam.com
Kelly J. Flint	6340 So. 3000 East, Suite 600 SLC UT	801-944-6600	kellyflint@Savagecompanies.com
David Corpron	6340 So. 3000 E #660 SLC UT 84121	801-944-6600	davidcorpron@savage
Lauren Goldberg	111 Third St. Hood River, OR 97031	5419050985	lauren@columbiariverkeeper.org
Candice McLaughlin	"	"	candice@columbiariverkeeper.org
Stephen Posner	2242 Evergreen Pk Blvd, Oly 98504	360-664-1903	sposner@utc.wa.gov
Greg Turner	COV - Planning	360-487-7883	greg.turner@cityofvancouver.us
Ryan Lapossa	COV - Transportation	360-487-7706	ryan.lapossa@cityofvancouver.us
Ryan Bennett	19910 W. 161st St., Olathe, KS 66062	913-747-2082	rbennett@poolefire.com
NIC NASH	ICPE	801-255-1111	nic.nash@icpeinc.com

Mike Marchant — Savage Co.: 6340 So 3000 E Suite 600, SLC, UT 84121 — 801-944-6600 — Mike Marchant@SavageServices.com

Pre-application Sign-in Sheet
PRJ-143550/PIR-34550
JUNE 27, 2013 AT 2:30 PM

For Public Record

Listing your information on this sign-in sheet is voluntary. This sign-in sheet may be subject to public disclosure under state law, subject to provisions in the Public Disclosure Act per Chapter RCW 42.56.

Name (Please Print)	Address	Phone #	E-mail Address
Chris Drone	City of Vancouver	360-487-7842	chris.drone@cityofvancouver.us
Anne Friesz	WDFW	360-906-6764	anne.friesz@dfw.wa.gov
Patty Boyden	Port Vancouver	360-992-1103	pboyden@portvanusa.com
Lisa Willis	" "	360-992-1138	lwillis@portvanusa.com
MaryMattox	1111 //	360-992-1125	mrmattix@portvanusa.com
Irina Makarow	Berger Abam	360-850-9052	irina.makarow@abam.com
Tim McMahan	Stoel Rives LLP	503-294-9517	TLMCMAHAN@STOEL.COM
BRIAN DUNN	KITTELSON & ASSOC.	503-228-5230	bdunn@kittelson.com
Anais MAINGE	Kittelson & Associates	503-535-7483	amainge@kittelson.com
DAN SHAFAR	Berger ABAM	503-872-4084	dan.shafar@abam.com
Sam Adams	"	360-823-6126	SAM.ADAMS@ABAM.COM
Jeff Hale	R&M Engineering	(801)-263-3419	jeffh@rmstructural.com
Matt Gill	Tesoro	907 261 7221	matthew.p.gill@tsocorp.com
Doug Price	Tesoro	210-626-6287	DOUGLAS.B.PRICE@TSOCORP.COM
Eric LaBrant	Fruit Valley Neighborhood	503-875-1312	LABRANT@GMAIL.COM

Pre-application Sign-in Sheet
PRJ-143550/PIR-34550
JUNE 27, 2013 AT 2:30 PM

For Public Record

Listing your information on this sign-in sheet is voluntary. This sign-in sheet may be subject to public disclosure under state law, subject to provisions in the Public Disclosure Act per Chapter RCW 42.56.

Name (Please Print)	Address	Phone #	E-mail Address
TRACY TUNTLAND	COV - MP. ENGINEERING	487-7168	TRACY.TUNTLAND@CITYOFVANC.US
Jon Wagner	COV CEDD	487-7885	Jon.wagner@cityofvancouver.us

NAME	ADDRESS	PHONE	EMAIL
GREG WESTRAND	PORT OF VANCOUVER	(360) 213-1248	gwestvaud@portvanusa.com
Rebecca Gulao	Stoel Rives LLP	(503) 2949149	rcgulao@stoel.com
Chad Lawry	V.F.D.	360-487-7237	chad.lawry@cityofVancouver.us

P.O. Box 1995 • Vancouver, WA 98668-1995
www.cityofvancouver.us

Pre-Application Conference

Community & Economic Development Department

Conference Date: 6/27/13 at 2:30 pm

Case File: Tesoro Savage Petroleum PRJ-143550/PIR-34550

Description: The project is designed to receive crude oil by rail, transfer it to storage tanks then load the oil onto ships or barges for transport to end users. The proposal includes constructing administrative and support buildings, rail unloading facility, piping, 6 tanks that can store up to 380,000 barrels each, marine loading facility that will include pipelines, cranes, observation/control platform and lighting for the existing dock structure. A boiler/steam plant will be built on the site and an additional two rail lines will be added to the rail infrastructure at the Terminal 5 loop.

Site Location: 5501 NW Lower River Rd

Legal Description: Tax Lots 152903000, located in the NE Quarter of Section 19, Township 2N, Range 1E of the Willamette Meridian

Contact
Helen Devery
Berger/ABAM
1111 Main St. Ste 300
Vancouver, WA 98660
360-823-6100

Applicant:
Tesoro Savage Petroleum Terminal LLC
Kelly Flint
6340 South 3000 East
Suite 600
Salt Lake City, UT 84121

Property Owner:	Port of Vancouver, USA 3103 NW Lower River Rd. Vancouver, WA 98660 360-693-3611
Comprehensive Plan:	Industrial
Zoning Designation:	IH (Heavy Industrial)
Case Manager:	Jon Wagner, Senior Planner
Neighborhood Assoc(s):	Fruit Valley, Chair: Eric LaBrant

PROCEDURAL NOTE

RCW 80.50 establishes the Energy Facility Site Evaluation Council. RCW 80.50.040 'enumerates the powers of the council, including review of energy plants.

RCW 80.50.020 (12) (d) defines energy plant as including the following;

> Facilities which will have the capacity to receive more than an average of fifty thousand barrels per day of crude or refined petroleum or liquefied petroleum gas which has been or will be transported over marine waters, except that the provisions of this chapter shall not apply to storage facilities unless occasioned by such new facility construction.

As this proposal meets the definition of energy plant, it will be reviewed by the Washington State Energy Facility Site Evaluation Council.

RCW 80.50.120 addresses the effect of certification as follows:

(1) Subject to the conditions set forth therein any certification shall bind the state and each of its departments, agencies, divisions, bureaus, commissions, boards, and political subdivisions, whether a member of the council or not, as to the approval of the site and the construction and operation of the proposed energy facility.

(2) The certification shall authorize the person named therein to construct and operate the proposed energy facility subject only to the conditions set forth in such certification.

(3) **The issuance of a certification shall be in lieu of any permit, certificate or similar document required by any department, agency, division, bureau, commission, board, or political subdivision of this state, whether a member of the council or not. [Emphasis added]**

Although the state will have the overall review authority for the proposal, the following preapplication conference report indicates the regulations and standards that would be applicable if the city were charged with the review authority .

APPLICABLE STANDARDS

The application shall include a **comprehensive** narrative addressing how the development complies with the standards outlined below, including a description of the uses proposed for the site, and a construction schedule.

VMC Title 11: Streets and Sidewalks
VMC Title 11.95: Concurrency
VMC Title 12: Trees and Vegetation
VMC Title 14.04, 14.10, and 14.16: Water and Sewers
VMC Title 14.24: Erosion Control
VMC Title 14.25: Stormwater
VMC Title 14.26: Water Resource Protection
VMC Title 16: Fire Code
VMC Title 17: Building and Construction

VMC Title 20: Zoning/Land Division/SEPA
Revised Code of Washington (RCW)

GENERAL SITE INFORMATION:

Zoning District	IH (Heavy Industrial)
Adjacent Zoning Designation	IH (Heavy Industrial) and GW (Greenway)Vancouver Lake
Comprehensive Plan Designation	Industrial
Parcel Size	Total of three parcels – 29 acres
Adjacent Land Uses	Heavy Industrial
Access Roads	Lower River Road and Gateway Avenue
Existing Vegetation	
Existing Structures	Area is mostly paved with few buildings
Topography	Generally flat upland, sloping to the Columbia River
Habitats of Local Importance	No mapping indicators
Fish and Wildlife Habitat Conservation Areas	Riparian Management Area and Riparian Buffer
Frequently Flooded Areas	Portions of the site are in the floodplain and floodway
Geological Hazard Areas	Mapping indicators
Wetlands	Mapping indicators, however, these have been filled and mitigated
Shoreline Management Areas	The portion of the project at Berths 13 and 14 are within Shoreline jurisdiction
Archaeology	The area is indicated as a Level A; high probability for encountering artifacts
Drainage Basin	Vancouver Lake/Lake River
Wellhead Protection	No mapping indicators
Soils	PhB Pilchuck fine sand, 0 to 8% slopes
Park Impact Fee District	#1
School Impact Fee District	Vancouver
Impacted Schools	Not applicable
Traffic Impact Fee District	Vancouver
Transportation Analysis Zones	38
Sewer District	Vancouver
Water District	Vancouver
Fire Service	Vancouver
Neighborhood Association	Fruit Valley

KEY ISSUES

The key issues relate to the use proposed and compliance with applicable state and local regulations as reviewed by the Washington State Energy Facilities Site Evaluation Council.

ZONING COMMENTS — Jon Wagner (360) 487-7885

REQUIRED PROCESSES:

Under the provisions of RCW 80.50, this request will be reviewed and a certification will be reviewed by the Washington State Energy Facility Site Evaluation Council.

If this were a city-reviewed project it would be subject to a Type II review as it would involve site plan review and a Shoreline Substantial Development Permit.

Per VMC 20.210.020.D, when more than one application is submitted for a given development and those applications are subject to different types of procedure, then all of the applications are subject to the highest type of procedure that applies to any of the applications.

IH (HEAVY INDUSTRIAL) ZONING DISTRICT (VMC 20.440):

The site is zoned IH, The proposal is for a petroleum terminal. The use will involve administrative support buildings, rail unloading facilities, marine loading facilities and petroleum storage.

The IH zone is described at VMC 20.440.020(C) as follows:

> The IH zoning district provides appropriate locations for intensive industrial uses including industrial service, manufacturing and production, research and development, warehousing and freight movement, railroad yards, waste-related and wholesale sales activities. Activities in the IH zone include those that involve the use of raw materials, require significant outdoor storage and generate heavy truck and/or rail traffic.

Under the description of use classifications in VMC 20.160.020, at subsection (D)(5) - Warehouse/Freight Movement is defined as follows:

> Uses involved in the storage and movement of large quantities of materials or products indoors and/or outdoors; associated with significant truck and/or rail traffic. Examples include free-standing warehouses associated with retail furniture or appliance outlets; household moving and general freight storage; cold storage plants/frozen food lockers; weapon and ammunition storage; major wholesale distribution centers; truck, marine and air freight terminals and dispatch centers; bus barns; grain terminals; and stockpiling of sand, gravel, bark dust or other aggregate and landscaping materials.

The proposal is fits within this use classification.

Per Table 20.440.030–1, Warehouse/Freight Movement is allowed outright in the IH zone.

DEVELOPMENT STANDARDS (VMC 20.440)

Table 20.440.040-1 sets out the development standards in the IH zone as follows:

Standard	Required	Existing/Proposed
Minimum lot size	none	Not applicable
Maximum lot coverage	100%	Not applicable
Minimum lot width	None	Not applicable
Minimum lot depth	None	Not applicable
Minimum setbacks*		
Separated from site by a street	Pursuant to buffering and screening standards contained in VMC Tables 20.925.030-1 and 20.925.030-2.	Not indicated, see provisions relating to landscaping below
Not separated from site by a street feet		Not indicated, see provisions relating to landscaping below
Maximum height	None	Not applicable
Minimum landscaping requirement (percentage of total net area)	0	Pursuant to buffering and screening standards contained in VMC Tables 20.925.030-1 and 20.925.030-2.

***** Staff has reviewed these standards and has determined they are not appropriate to development within the Port of Vancouver. Staff has previously issued a determination that no setbacks are required adjoining Harborside Drive (see Minor Adjustment for Port of Vancouver Terminal 4 Setback, PRJ2009-01134/MZR2009-00378 dated Dec.22, 2009). However, those portions of the proposal that border on property not owned by the Port of Vancouver, or have frontage on a public street will be required to meet the landscaping/setback requirements. The landscaping standards will apply to the proposed development on Parcel 1A for the boundary along Lower River Road and the boundary between Parcel 1A and the Farwest Steel facility to the west.

ARCHAEOLOGICAL RESOURCE PROTECTION (VMC 20.710):

The purpose of this ordinance is to encourage the identification and preservation of cultural, archaeological, and historic resources consistent with the Growth Management Act of 1990 as well as the Vancouver Comprehensive Plan. This project is located within an area of high probability for discovery of archaeological resources; therefore, a predetermination would be required. The archaeological predetermination shall be prepared by a profession archaeologist as defined by the state of Washington in RCW 27.53.030(8). However, if any cultural or historical resources are discovered during construction activity, construction shall cease until a qualified archaeologist assesses the find. This application will contact all applicable authorities.

CRITICAL AREAS PROTECTION (VMC 20.740):

Projects requiring Critical Area Permits are required to submit the critical area boundary locations in digital format. The digital submittal can be in a CAD file or a GIS shapefile. The digital data must be on the same coordinate system as the Clark County GIS database: State plane coordinates using NAD 1983 datum and the Washington State zone (also referred to as the FIPS zone 4602).

Refer to the City of Vancouver website at http://www.cityofvancouver.us/buildpermits.asp under critical area permits for links and downloads of submittal specifications, domains, critical layer templates for CAD files and shapefiles.

The digital submittals are not required until the final phase of the project however you are strongly encouraged to contact the City GIS Coordinator during the preliminary stages if you should have any questions about submittal requirements.

The applicant has correctly identified the following Critical Areas apply to this proposal:

- Fish and Wildlife Habitat Conservation Areas
- Frequently Flooded Areas
- Geologic and Seismic Hazards
- Wetlands

A Critical Areas Report addressing each of this would be required if the application were reviewed by the city.

SHORELINE MANAGEMENT (VMC 20.760):

The applicant has provided a listing of the applicable provisions of the Vancouver Shoreline Master Program

These are as follows:

Section	Associated Regulation(s)
5.1	1-2, 4-6, 11, 15
5.2	All
5.3	All
5.4	2
5.6.1	All
5.6.2	1-5
5.6.3	All
5.7	All
5.8.1	All
5.9	1-7
5A	All
Table 6-1	All
6.3.3.5	1, 4-5
6.3.6	1, 5-6

Staff concurs with the applicant's listing of applicable regulations. However, the provisions relating to Shorelines of Statewide Significance are not included in the regulations; they are contained in Chapter 3 of the Shoreline Master Program, and are as follows:

3.2 Shorelines of Statewide Significance

Within the City of Vancouver, the Columbia River and Vancouver Lake are designated shorelines of statewide significance (SSWS). Shorelines of statewide significance are of value to the entire state. In accordance with RCW 90.58.020, SSWS will be managed as follows:

1. Preference shall be given to the uses that are consistent with the statewide interest in such shorelines. These are uses that:

a. Recognize and protect the statewide interest over local interest;
b. Preserve the natural character of the shoreline;
c. Result in long term over short term benefit;
d. Protect the resources and ecological function of the shoreline;
e. Increase public access to publicly-owned areas of the shorelines;
f. Increase recreational opportunities for the public in the shoreline; and
g. Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary.

2. Uses that are not consistent with these policies should not be permitted on SSWS.
3. Those limited shorelines containing unique, scarce and/or sensitive resources should be protected.
4. Implementation of restoration projects on shorelines of statewide significance should take precedence over implementation of restoration projects on other shorelines of the state.
5. Development should be focused in already developed shoreline areas to reduce adverse environmental impacts and to preserve undeveloped shoreline areas. In general, SSWS should be preserved for future generations by 1) restricting or prohibiting development that would irretrievably damage shoreline resources, and 2) evaluating the short-term economic gain or convenience of developments relative to the long-term and potentially costly impairments to the natural shoreline.

Staff customarily requires the applicant to address these provisions.

TREE CONSERVATION (VMC 20.770):

The purpose of this ordinance is to establish a process and standards to provide for the protection, preservation, replacement, proper maintenance and use of trees, associated vegetation and woodlands located within the City of Vancouver.

Unless otherwise exempted in Section 20.770.030, any site subject to a development, as defined in Section 20.150, within the City of Vancouver, shall be required to develop a Tree Plan and shall be required to meet the minimum tree density. (VMC 20.770.080).

Departmental policy is that if the area of a proposed building or other construction is in an area that is currently covered by impervious surfaces, the provisions of VMC 20.770 do not apply. To meet this standard the applicant must demonstrate the existing site is covered by impervious surfaces. For the pervious areas, the applicant is required to show compliance with the 30 tree units per acre requirement.

Per VMC 20.770.100.C, the tree maintenance requirements shall apply in perpetuity to developments that are multi-family residential developments in excess of four units, commercial and industrial. The applicant shall execute a covenant in a form agreeable to the City which shall require that the applicant and his successors comply with the maintenance requirement imposed by this section. The covenant shall be binding on successor property owners and owners' associations. The covenant shall be recorded by the county auditor.

SEPA REGULATIONS (VMC 20.790):

The State Environmental Policy Act, Chapter 43.21C RCW, is intended to ensure that environmental values are considered by state and local government officials when making decisions. The primary purpose of SEPA is to evaluate the environmental impacts of a proposed project and identify methods to reduce the impacts. A SEPA review of this proposal will be required as the proposal exceeds several of the categorical exemption thresholds.

GATED ACCESS STANDARDS (VMC 20.914):

If the proposed development includes provisions for gated access, this section contains regulations and other design standards for approval. Describe how the issues are satisfied in the project narrative.

Stacking area. Each access point shall show an area of sufficient length and width to safely stack traffic coming onto the property from the adjacent roadway. **Transportation Services shall determine the length of the stacking area based on the adjacent roadway type and design configuration. A parking area shall be provided to the right of the entry lane to accommodate visitors not able to open the gate.**

Entrance/Exit Design. Adequate vision clearance shall be provided so that motorists leaving a gated community have a clear view of the sidewalk on either side of the exit, and so that approaching pedestrians have a clear view of any approaching vehicle. Gated community entrances and exits shall be designed to achieve travel speeds not to exceed 5 miles per hour, and shall require a vehicle stop directly prior to crossing the street sidewalk. Entrance and exit areas shall be designed so that vehicles approaching or leaving the gated community can queue to enter/exit the traffic stream without blocking the sidewalk.

Turnaround feature. Each gate access point shall have an area that allows traffic to safely maneuver a turnaround when the gate is in closed position.

Lane width inside the gate. Fire and emergency access vehicles require passing room within the development. Twenty feet of unobstructed driving surface is required on the interior side of the access point and gate.

Emergency vehicle access required. Each project will require the applicant to produce a confirmation of approval from the Fire Marshal that indicates that the design of the gate(s) meets the Fire Marshal's requirements for emergency entry. The Fire Marshal's written approval shall be submitted with this application.

No encroachment into publicly owned right-of-way. The gates, operating equipment and fencing shall be located wholly within the private portion of the property. The property line shall be clearly indicated on the site plan. Swing gates are not allowed to encroach into the public right-of-way. The drives, streets and lanes inside a gated community are to remain private.

Pedestrian Access. Separate pedestrian access from driving lanes. Each access point shall have a pedestrian access and walkway that is separate from the driving lanes and links directly to the public sidewalk. Pedestrian walkways shall meet all standards for accessibility required by the Americans with Disability Act.

Lighting. Lighting fixtures shall be established and maintained at the access points to provide vehicle and pedestrian safety. The required lighting shall be automatically controlled to turn on during the hours of darkness.

Vision Clearance. Each access point shall demonstrate vision clearance as per 20.985 VMC.

Gate Material. The moving portion of the gate shall be constructed of material that is at least 80 percent open. Typically, wrought iron or other decorative material is used.

Gate opening width. Each gate must open to a minimum width of 15 feet or as required by the Fire Marshal.

IMPACT FEES (VMC 20.915):

Impact fees are calculated at the time of project approval **not pre-application.** Currently impact fees are calculated as follows:

Transportation impact fees will be required prior to issuance of building permits. The project is located within the Vancouver Subarea which requires $139 per trip. Transportation impact fees will be determined based on the trip generation report submitted with the application. The following is the formula for calculating the transportation impact fee:

TIF = Average Daily Trips x $139 x .85

School Impact Fees and **Park Impact Fees** are not required as no residential uses are being proposed.

LANDSCAPING (VMC 20.925):

VMC Table 20.925.030-1 indicates the required landscaping and setback between various uses. The chart is based on the zoning of the subject property, the zoning of the adjacent properties and whether there is an intervening street.

As the city has agreed that landscaping between interior lots within the port is not required, the following setbacks and landscaping apply only to the development of Parcel 1A:

For the north boundary; along NW Lower River Road, the adjacent property, to the north of NW Lower River Road is zoned GW (Greenway, Vancouver Lake). As the subject property is separated from the GW zone by a street, the L2 standard with a 10 foot setback is required.

For the west boundary, abutting the Farwest Steel site, an IH zoned parcel, the required minimum setback is either 5 feet or 0 feet (If building is to be built on the property line there is no required buffer for that portion of the site). The building constructed must meet all standards for zero lot line development. The level of landscaping, if required, is L1.

The specific landscaping standards relating to the L1, and L2 standards are indicated below:

VMC Table 20.925.030-2 Landscaping and Screening Design Standards[1]

Type	Name	Description	Minimum Shrubs Based on Buffer Depth	Minimum Trees	Wall or Berm or Fence Required - Standards

L1	General (for open areas)	Used where distance is primary means of separating uses or development, and landscaping enhances area between them	a. 10 ft or less = None b. Over 10 ft = 2 high or 3 low shrubs per 400 sq. ft. landscaped area	a. One tree per 30 lineal ft b. One tree per 800 sq. ft.	None
L2	Low Screen	Distance and low-level screening intended to separate uses or development. Applied where low level screening sufficiently reduces the impact of a use or development, or where visibility between areas is more important than a greater visual screen.	Continuous screen 3 ft high, 95% opaque year-round. 3+ gallon containers or equivalent with spread 18+ inches.	One tree per 30 lineal ft of landscaped area or as needed to provide a tree canopy over the landscaped area	3 ft high masonry wall or F2 fence or a berm may substitute for shrubs

[1] Additional Requirements:

L1, L2, L3, L4, L5 - Groundcover plants, grass lawn or approved flowers must fully cover the landscaped area not in shrubs or trees.

L2, L3 - When applied along street lot lines, the screen or wall is to be placed along the interior side of the landscaped area.

L4 - When abutting another property, the wall shall abut the property line. When abutting a street or road right-of-way, the wall shall be on the interior side of the landscaped area.

L1 - Within the commercial districts where a building is to be placed at the buffer line for a front setback, concrete or brick pavers may be used in place of the required groundcover for the length of the building for the front setback only; provided, the required trees are still supplied, the paved area is connected to the public sidewalk, and pedestrian amenities are provided such as benches or pedestrian plazas. Building need not be placed at the required buffer line to utilize this section if the area between the buffer line and the building is devoted entirely to pedestrian only areas.

L1, L2, L3, L4, L5 – Groundcover plants to be placed not more than thirty (30) inches on center and thirty (30) inches between rows. Rows of plants shall be staggered for a more effective covering. Groundcover shall be supplied in a minimum four (4) inch size container or a two and one-quarter (2 1/4) inch container or equivalent if planted eighteen (18) inches on center.

PARKING and LOADING (VMC 20.945):

Per Table 20.945.070-2, the Warehouse/Freight Movement use must provide one parking space per each 2,000 square feet of floor area.

The parking lot development standards are contained in VMC 20.945.040 as follows:

A. Review Authority. Parking lot design and drainage shall be subject to review and approval of the City Transportation Manager.

B. Maintenance of parking areas. All parking lots shall be kept clean and in good repair at all times. Breaks in paved surfaces shall be repaired promptly. Broken or splintered wheel stops shall be replaced so that their function will not be impaired.

C. All signing and striping, including that for private parking lots, shall conform to the Manual of Uniform Traffic Control Devices (MUTCD). Individual spaces shall be marked with painted stripes.

D. Location. Parking spaces shall not be permitted in any setback except as otherwise specified in this title. For single-family and duplex dwellings, passenger vehicle parking in excess of required parking is permitted in the front yard setback provided it is: located on a legally established driveway; located out of sight triangles as per 20.895 VMC; and does not extend into City right-of-way. Parking in the front yard setback otherwise allowed by this Chapter shall not include the storage of motor homes, trailers or recreational vehicles, including boats. Parking of motor homes, trailers recreational vehicles and boats is allowed in one side or rear setback on an impervious surface and served by a paved driveway. Such parking must be screened from the street and adjoining properties by a 6' sight obscuring fence or hedge.

E. No parking space shall be located where backing maneuvers from such a space would interfere with traffic flow to/from a public street to the parking area, generally within 20' of a circulation aisle-way near a public street access point.

F. Driveways. Driveways which provide access to off-street parking or loading from public streets shall comply with the following:

1. Driveways from the street to off-street parking or loading areas shall be designed and constructed to facilitate the flow of traffic and provide maximum safety for pedestrians. At a minimum all driveways shall meet arterial access spacing standards; on arterial roadways shared driveways and cross-access easements may be required to improve arterial efficiency and safety consistent with access management practices detailed in NCHRP Report 420.

2. Where driveways are gated, even temporarily, the driveway approach shall be designed such that vehicles approaching or leaving the gated drive can queue to enter/exit the traffic stream without blocking the sidewalk or the street traffic, and shall not impede internal site circulation. Design of gated driveways shall be subject to review and approval by the City Transportation Manager.

3. Driveways shall be improved with a permanent surface including but not limited to asphalt, concrete, brick or masonry or other material approved by the Planning Official. Applicants are encouraged to use City and Department of Ecology alternative paving Best Management Practices to enhance on-site water quality where appropriate based on anticipated use.

4. Except for single-family and duplex residences, groups of more than two parking spaces shall be served by a driveway so that no backing movements or other maneuvering within a street or other public right-of-way is necessary.

5. Loading/unloading driveways. If an on-site drop-off is provided, the driveway shall be designed for continuous forward flow of passenger vehicles.

G. On-site vehicle stacking for drive-through use

No drive through lanes are proposed.

H. Pedestrian access, circulation and connections. The following standards apply to multi-family, commercial, industrial and institutional uses in all zones:

1. The applicant shall extend pedestrian circulation routes to sidewalks and transit stops along streets abutting the site, to pedestrian facilities that extend to the edge of the site from off-site, and to the edge of the site in the direction of existing, approved or proposed off-site pedestrian and transit facilities.

2. Pedestrian circulation routes shall also connect structures and uses on the site, such as buildings, vehicle and bicycle parking areas, children's play areas, required outdoor areas, open spaces, plazas, resting areas and viewpoints.

3. To the extent practicable, the pedestrian circulation system shall be designed to minimize the distance a pedestrian needs to walk between typical origins and destinations of and off the site, including transit stops, public sidewalks and building entrances. Circuitous routes generally should be avoided except for an appropriate purpose given the use or setting.

4. Where pedestrian or bicycle routes cross access, maneuvering, parking or loading areas, the crossing must be clearly identified by using elevation changes, speed bumps, a different paving material, and other method that effectively alerts drivers, pedestrians and cyclists of the location and nature of the crossing. Striping is strongly discouraged as the only method of identification of pedestrian crossings. When striping is used, it must be continuously maintained in perpetuity in an effective manner by the property owner.

5. Where a pedestrian or bicycle route is parallel and adjacent to an auto travel lane or parking area, the pedestrian or bicycle route must be safely separated from the auto travel lane by using a raised path, a raised curb, bollards, landscaping or other physical barrier.

6. Lighting. The on-site pedestrian circulation system must be lighted to a level of 0.5 foot candle, except for handicapped accessible areas which must be lighted to 1.0 foot candle. Such lighting shall be directed in a manner to prevent glare on nearby residential areas.

7. Pedestrian route dimensions. In all commercial zones, the primary pedestrian connection between the main entrance and the fronting arterial shall be a minimum of 8' unobstructed width. All other pedestrian connections shall be a minimum of 6' unobstructed width. The Planning Official may modify these standards for minor expansions of existing uses that face site-specific challenges.

8. Required pedestrian circulation routes shall be improved with an asphalt, concrete or other approved all-weather surface; provided, pedestrian circulation routes through recreational or open space areas may be improved with a material consistent with their purpose and the characteristics of their location.

9. Connections. The pedestrian system must be connected to site and adjacent streets and nearby transit stops. The pedestrian system must also connect public open space or parks, commercial, office and institutional developments when existing development does not preclude such connection. Development patterns must not preclude eventual site-to-site connections, even if an adjacent site is not planned for development at the time of the applicant's development. Connections between buildings and the street shall be no greater than 200' apart.

I. Parking lot landscaping.

1. Purpose: The following landscaping standards are intended to improve and soften the appearance of parking areas; reduce the visual impact of parking areas from sidewalks, streets, and especially from adjacent residential zones; shade and cool parking areas; reduce the amount and rate of stormwater runoff from vehicle areas; and improve air quality.

2. Perimeter Landscaping: Any off-street parking area, other than for a single-family or duplex dwelling, shall be effectively screened by a sight-obscuring fence, wall or evergreen planting on each side which adjoins property situated in a residential zone, the premises of any school or like institution, or a public or private street. Screening along a common property line shall be 6' high. Landscape screening shall be capable of attaining a height of 6' within 2 years of planting. Screening along all public or private streets shall be a minimum of 3' high.

3. Interior Landscaping: Interior landscaping must be provided for sites containing more than 20 parking spaces. At least 10% of the parking and maneuvering areas, not including driveway areas, must be landscaped.

a. Standards: The landscape materials must meet the general standards below:

1. The landscaping must be dispersed throughout the parking area. All of the required landscape area may be in the parking area, or some may be in the loading areas.

2. Perimeter landscaping may not substitute for interior landscaping. However, interior landscaping may join perimeter landscaping as long as it extends at least four' into the parking areas from the perimeter landscape line.

b. Individual tree-planting spaces. Where an individual tree is planted in a space surrounded by pavement, the planting area must have a minimum dimension of six' with each tree placed in the middle.

c. Required landscape materials for parking lot landscaping. Landscape materials for parking lot interior and perimeter landscaping must be provided as follows:

1. Tree required. At least one tree must be provided for every 10 parking stalls. Existing trees may be used to meet this standard. At lease one tree shall be planted in each landscape island. Broadleaf trees must be at least 2 caliper inches at the time of planting and conifer trees must be at least 5' tall at the time of planting. Trees must be dispersed throughout the parking area to provide shade for the parking area. Some trees may be grouped, but the groups must be dispersed.

2. Shrubs required. At least one shrub must be provided for every 30 sq. ft. of required landscaped area. Shrubs must be at least the one-gallon container size.

3. Ground cover required. All of the landscaped areas that is not planted with trees and shrubs must be planted in ground cover plants, which may include grasses. Paths made of paving stones, flagstones, bricks, pavement, or similar materials may provide access across landscaped areas, but the surface area of impermeable materials does not count toward the required landscaped area.

4. Native Species. Planting of native species is encouraged.

J. Parking lot surfacing

1. All areas used for the parking or storage or maneuvering of any vehicle shall be improved with asphalt, concrete or other permanent surface approved by the Planning Official; The Planning Official may approve the use of City and Department of Ecology alternative paving Best Management Practices to enhance on-site water quality where determined to be appropriate based on type and frequency of anticipated use.

2. Parking areas to be used primarily for temporary staging of construction equipment and temporary parking for the facility during construction may be surfaced in gravel when authorized by the approval authority at the time the site development approval is given. The Planning Official may require the property owner to remove the gravel immediately following construction or enter into an agreement to pave the parking area: (1) within a specified period of time after its establishment; or (2) if there is a change in the types or weights of vehicles utilizing the parking area; or (3) if there is evidence of adverse effects upon adjacent roadways, water courses or properties. Such an agreement shall be executed as a condition of approval of the plan to establish the gravel parking area

K. Parking lot and access striping.

1. Except for single-family and duplex residences, any area intended to be used to meet the off-street vehicle parking requirements as contained in this chapter shall have all parking spaces clearly marked; and

2. All interior drives and access aisles shall be clearly marked and signed to show direction of flow and maintain vehicular and pedestrian safety.

L. Wheel stops. Parking spaces along the boundaries of a parking lot or adjacent to interior landscaped areas or sidewalks shall be provided with a wheel stop or bumper rail at least 6" high located 2' back from the front of the parking stall. The front 2' of the parking stall may be concrete, asphalt or low- lying landscape material that does not exceed the height of the wheel stop, provided sidewalks or other pedestrian paths are not obstructed.

M. Drainage. Off-street parking and loading areas shall be sloped to drain in accordance with specifications approved by the Director of Public Works. These areas shall be drained to prevent the flow of water onto the right-of-way, across pedestrian facilities, or onto adjacent properties unless specifically authorized by the Director of Public Works.

N. Lighting. All off-street parking areas larger than 5,550 sq. ft. shall be illuminated. Public parks that close at dusk are exempted from this provision. All lighting shall be directed away from any adjacent residential zone.

O. Space and aisle dimensions. Table 20.945.040–2

Table 20.945.040–2
Space and Aisle Dimensions

	Standard Stall Dimension		**Compact Stall Dimension**		**Aisle Width Dimension**	
Angle (degrees)	Stall Width (feet)	Stall Depth (feet)	Stall Width (feet)	Stall Depth (feet)	1-Way Aisle Width	2-Way Aisle Width
0	20	8	8	18	12	20
45	9	17	8	15	14	20
60	9	17	8	15	16	22
90	9	17	8	15	22	22

1. Designated disabled parking stalls which meet minimum dimensional requirements shall be counted as standard size parking stalls and shall be provided as required by applicable State of Washington and the City Adopted Building Code, as amended for disabled person parking spaces.

2. The width of each parking space includes a stripe that separates each space.

3. Up to 50% of all required on-site vehicular parking spaces may be compact spaces. Such spaces shall be marked as "compact" or "C".

4. Clustering: No more than an average of 10 parking spaces shall be placed side by side without an intervening break provided by a circulation aisleway, pedestrian walkway, or landscaping. If an average of no more than 10 side-by-side stalls is maintained overall, up to 15 stalls may be located side-by-side. Where landscaping provides a break in the group of spaces, the landscape island shall extend at least 1' into the circulation aisleway to provide a visual narrowing of the circulation aisleway.

5. A portion of a parking space may be landscaped instead of paved as follows:

a. The landscaped area may be up to 2’ of the front of the space as measured from a line parallel to the direction of the bumper of a vehicle using the space.

b. Landscaping must be ground cover plants; and

c. The landscaped area counts towards parking lot interior landscaping requirements, but not perimeter landscaping requirements, and shall not obstruct the minimum width requirements for pedestrian circulation.

6. Other parking angles, such as but not limited to 30 degrees or 75 degrees may be approved by the Planning Official, with dimensional requirements consistent with those illustrated in Table 20.945.040–2.

7. Minimum standards for a standard pa

Per VMC 20.945.040, the minimum parking space dimensions are as follows:

1. Standard Size: Width = 9 feet, Depth = 17 feet
2. Compact Size: Width = 8 feet, Depth = 15 feet.
   (Up to one half of required spaces may be compact sizes with the exception of temporary lots, in which case there is no limit as to the proportion of compact size spaces.)

No parking shall be allowed within setbacks or required yards unless otherwise specified in the Zoning Code.

The required number of accessible and van accessible parking spaces shall comply with IBC Section 1106 and WAC 51-50-1106.

Per VMC 20.945.080, off-street loading is required. The following table indicates the minimum required loading areas:

Table 20.945.080–1
Minimum Loading Berths

Number of Berths	Gross Floor Area
1	5,000 sq. ft. up to 25,000 sq. ft.
2	25,000 sq. ft. up to 50,000 sq. ft.
3	50,000 sq. ft. up to 100,000 sq. ft.
1 additional for each	50,000 sq. ft. in excess of 100,000 sq. ft.

Berths shall be a minimum of 10’ wide, 45’ long and 14’ high.

SIGNS (VMC 20.960):

No signs are proposed at this time. Future proposals must adhere to the standards found at VMC 20.960.

SOLID WASTE DISPOSAL AND RECYCING (VMC. 20.970)

The following comments were received from Elsie Deatherage, of the city’s Solid Waste Services [(360) 619-4122]

The proposed plans appear to show a garbage and recycling enclosure in the parking lot next to the office building. This would offer good truck access and be conveniently located for the office and change room.

GENERAL ENGINEERING

Public improvements are typically required for a new development. One or more engineering disciplines usually require Civil Plans. *Preliminary* and *Full Civil Plans* are to be 22 inches x 34 inches (ANSI D) or 24 inches x 36 inches (ARCH D), and stamped by a Washington State licensed civil engineer.

In the standard permit review process, the land use approval usually precedes the civil plan review process. **Streamlined projects in the alternative 90-day review process require *Full Civil Plans* with the initial land use application to start the civil plan review process.** For land use approval only, *Preliminary Civil Plans* are sufficient to show whether it is feasible for a project to meet engineering requirements. *Preliminary Civil Plans* to be submitted to the City include conceptual drawings and preliminary engineering reports. Depending on the project, *Preliminary Civil Plans* may or may not need all the items listed below for Civil Plans. The purpose of *Preliminary Civil Plans* is to provide City engineers enough information to make a fully complete determination, meaning the application contains sufficient information to make a land use decision of approval, approved with conditions or denial. It does not mean that the application meets applicable standards. Refer to each engineering discipline's section within this document and, if needed, contact the engineer assigned to determine *Preliminary Civil Plan* requirements for a fully complete application. The engineer assigned for each discipline is listed at the top of each section.

Comment [meh1]: Modify this section for handout with Type I application. 'Contact who (case manager, engineering counter?) to determine engineering requirements for the proposed project?

After the fully complete review process, City staff documents findings and requirements for the proposed project within a staff report. The applicant's next step is to follow the staff report requirements and if required start the civil plan review process by submitting *Full Civil Plans* with engineering reports. *Full Civil Plans* shall provide an engineering design which is 90% complete with all necessary plans, profiles, cut sections, details and reports.

The civil plan review process is a comprehensive engineering review process in which *Full Civil Plans* are submitted to the City, redlined by City staff and returned to the applicant for revision. Civil Plans for a typical development include the following:

- Cover Sheet
- Existing Conditions Plan
- Site Plan and/or Plat Plan
- Grading and Erosion Control Plan
- Stormwater Plan
- Street Plan (per Transportation's Standard Drafting Requirements)
- Utility Plan
- Signing and Striping Plan
- Lighting Plan
- Landscape/Planting Plan
- Stormwater Report
- Traffic Study
- Request for Certificate of Concurrency

The civil plan review process is repeated until the Civil Plans meet all applicable standards upon which *Final Civil Plans* are requested. *Final Civil Plans* receive conditional approval for construction. Conditions of approval for the proposed project will be determined by City staff and thoroughly outlined in a 'Plan Approval Letter (PAL)' addressed to the applicant. After *Final Civil Plan* approval occurs, the conditions outlined in the 'PAL' must be met by the applicant in order to obtain final acceptance, occupancy and/or final plat approval. Conditions for a typical development are listed below:

- ✓ Obtain all construction permits such as a grading permit, right of way permit, and an approved traffic control plan prior to the start of construction.
- ✓ Schedule and attend a preconstruction meeting with Construction Services.
- ✓ Construct the civil improvements and obtain a written 'Completion of Construction' from City inspection.
- ✓ Ensure erosion control measures are in place and functioning properly.
- ✓ Submit engineering stamped as-built drawings and CAD file of utilities and transportation improvements for review and approval.
- ✓ Submit a utility costs and quantities breakdown.
- ✓ Execute and submit all necessary documents for recording such as; public utility easements, utility covenants, deeds of dedication, and bills of sale.
- ✓ Obtain and submit street and stormwater maintenance bonds.
- ✓ Pay all applicable sewer and/or water main fees.
- ✓ Other conditions will apply depending on the project.

Written 'Final Acceptance' of the constructed public improvements will be granted only after all conditions listed in the 'Plan Approval Letter' are met.

Sanitary sewer and water System Development Charges (SDC) are collected prior to issuing a water meter and building occupancy. Sewer and water connection fee estimates are provided by the engineering counter upon request, (360) 487-7804.

References:

The design and construction of water, sewer, erosion control and stormwater systems shall be in accordance with the current *City's General Requirements and Details for the Design and Construction of Water, Sanitary Sewer, and Surface Water Systems;* available online at *www.cityofvancouver.us* on the Building, Planning & Environment tab under Engineering Review.

Transportation development information and details are available online at *www.cityofvancouver.us* on the Building, Planning, & Environment tab under Transportation Development Review.

The standard detail sheets may be omitted from the design plans by referencing the General Requirements on the civil plan cover sheet, using the 'Standard Detail Waiver Note' found on the City website under the same headings as the General Requirements listed above.

The Vancouver Municipal Code is available online at *www.cityofvancouver.us* on the City Government tab under Municipal Code.

TRANSPORTATION ENGINEERING COMMENTS **Ryan Lopossa 487-7706**

The City of Vancouver recently completed an update to the Vancouver Municipal Code, Title 11, Streets and Sidewalks. These changes took effect as of November 15, 2012 and will be applied to all new applications submitted thereafter.

The revised Title 11 sections can be found at the following link:
http://www.cityofvancouver.us/vmc?tid=325

NW Old Lower River Road (SR-501)

- NW Old Lower River Road is designated as a State Highway Route (SR-501) and City of Vancouver Principal Arterial. Any frontage improvement requirements for Lower River Road will be subject to comments from the Washington State Department of Transportation. The applicant is required to submit a copy of the civil plans to WSDOT for review and approval. For WSDOT requirements contact Jeff Barsness at (360) 905-2059 or barsnej@wsdot.wa.gov. The applicant shall ensure that the right-of-way is sufficient to encompass all required improvements. If the existing right-of-way is substandard, right-of-way dedication will be required. **Showing the right-of-way dimension on the preliminary and civil plans is a Fully Complete item.**

- The existing road along the property frontage of Lower River Road includes asphalt roadway, curb around the radius at Gateway Avenue and storm drainage. The roadway configuration is one travel lane in each direction, a center turn lane and bike lanes.

- The City of Vancouver Parks Department's Master Paths and Trails Plan includes a segment along the proposed property development, ie. **Segment 4A: Lower River Road.** This segment runs from Fourth Plain Boulevard to the Flushing channel along Lower River Road. Per the Master Plan, typical treatment would be a new shared-use path and bike lanes Roadside Trail as on Mill Plain Boulevard. The best trail option would be a trail separated from traffic along the road within a 15 feet easement with a 12' wide path, in addition to paved shoulders. The applicant should work with the City's Parks Department for any right-of-way or trail easement requirements that may change the location or configuration of stormwater treatment facilities along the property frontage.

- The applicant shall install City of Vancouver standard frontage improvements along Lower River Road including the trail, enhanced crosswalks at all street crossings, truncated domes at the termination points of the trail, traffic control devices as warranted and storm drainage (as required by the City Stormwater Ordinance).

- **Full-width and half-width street sections are required with all civil plan submittals**. The sections shall reference the standard plan number and include site specific soil types. The sections shall indicate full-width right-of-way and pavement dimensions in addition to the proposed improvements.

- Control Density Fill (CDF) is required for street cuts along Lower River Road, a Principal Arterial per VMC 11.80.040(E) and City Standard Plan T05-04, T05-06A, T05-06B, T05-07 and T05-01B for trench restoration. **Main trench restoration shall match the full depth of**

the asphalt. T05-01B requires pavement restoration to extend through to the next travel lane, at a minimum. Trenches shall be grouped together when possible.

- Street Cut Permits shall be required anytime street cut work is performed in the right-of-way. Street Cut Permits shall be obtained from Engineering Services at Development Review at 487-7804.

- Street lighting is required public streets per VMC 11.80.090. Some infill developments may be granted relief from this requirement per VMC 11.80.060. The applicant will need to ensure that the street lighting for the site meets the requirements of city standard plan T21-01A & B. Any substandard street lighting shall be required to be upgraded to current city standards as part of this project.

  Showing existing and proposed street lighting on the preliminary and/or civil plans is a Fully Complete item for project submittal. Submittals shall include a lighting analysis with AGI software, light type, size, height, wattage and station and offsets (for both existing and proposed street lighting).

  Per City of Vancouver Street Lighting Policy; where existing street lights are mounted on Clark Public Utilities wood poles, the street lights shall be changed to current standards. However, when no roadway or sidewalk improvements are being installed within an existing neighborhood, the use of an aerial design with a **Type W** standard (wood pole mounting) may be approved by the City's Transportation Services Manager.

- Access from Lower River Road shall be utilized via the existing access point on the west end of the proposed tank farm site. No other direct access to Lower Road shall be allowed pursuant to VMC 11.80.110(A)

- Minimum driveway spacing from the property line is 20 feet on a Principal Arterial street per VMC 11.80.110(A).

- Minimum driveway spacing from the back-of-curb-return is 115 feet on a Principal Arterial street per VMC 11.80.110(A).

- Commercial driveway width off a an arterial is 25 feet to 40 feet at the bottom of the ramp per VMC 11.80.110(A)(3).

- The applicant shall be required to remove all existing driveways not utilized as access to the proposed development. Driveway removals shall be replaced with, but not limited to, pavement restoration, curb & gutter, sidewalk, planter strip and any necessary street improvements germane to the site street frontage classification and applicable Standard Details.

- The applicant shall provide a shared access and maintenance agreement to cover the cost of maintaining and operating street surface, signs and markings, street lights, and drainage system, as it applies to private streets and shared driveways. Any shared accesses shall be called out on the plat. **The agreement shall be recorded on all parcels that are party to**

the private roadway. Shared access and maintenance agreements shall be provided prior to civil plan approval.

NW Old Lower River Road

- The portion of Ne Old Lower River Road fronting the subject proposal is designated a Private Street. **Showing the right-of-way dimension on the preliminary and civil plans is a Fully Complete item.**

- The existing road along the property frontage of NW Old Lower River Road includes asphalt roadway only.

- The applicant shall install City of Vancouver standard frontage improvements along NW Old Lower River Road including driveway approaches, traffic control devices as warranted, and storm drainage (as required by the City Stormwater Ordinance).

Access

- Commercial driveway width off a non-arterial street is 20 feet to 40 feet at the bottom of the ramp per VMC 11.80.110.B.

- The applicant shall be required to remove all existing driveways not utilized as access to the proposed development. Driveway removals shall be replaced with, but not limited to, pavement restoration, curb & gutter, sidewalk, planter strip and any necessary street improvements germane to the site street frontage classification and applicable Standard Details.

- The City of Vancouver may revise, limit or prohibit street or driveway access movements where such movements may create dangerous or hazardous conditions. Such restrictions may include, but are not limited to driveway removal or relocation, installation of medians or curbing, and access restricting driveway design.

- Per VMC 11.80.050 (J), the city will not maintain streets, signs, street lights, or drainage improvements associated with a private street. Prior to final inspection and approval of a private street, a maintenance agreement must be recorded with the Clark County Auditor as a covenant running with the land for any and all parcels served, or potentially served. The agreement must set forth the terms and conditions of responsibility for liability, maintenance, maintenance methods, standards, distribution of expenses, remedies for noncompliance with the terms of the agreement, right of use easements, and other considerations. The agreement also must include the creation of a private street maintenance fund and the annual assessment.

- The curb radii at all other intersections in the development must be a minimum of 20 feet. Right-of-way dedication may be required.

- Termination points of sidewalks shall have a temporary asphalt pedestrian ramp per City Standard Plan T02-10, for transition to the street pavement.

Modifications from this Standard

- Road Modifications shall meet the requirements of VMC 11.80.160 and be submitted with the governing application. **Road Modification submittal is a Fully Complete item.**

General Transportation Comments

- **Full-width and half-width street sections are required with all civil plan submittals**. The sections shall reference the standard plan number and include site specific soil types. The sections shall indicate full-width right-of-way and pavement dimensions in addition to the proposed improvements.

- Street Cut Permits shall be required anytime street cut work is performed in the right-of-way. Street Cut Permits shall be obtained from Engineering Services at Development Review at 487-7804.

- Street signing and striping shall be installed by the Developer. All street signs and striping shall be installed per the MUTCD.

- Street curvature shall be designed to accommodate Fire Department vehicles (single unit vehicles, per the AASHTO design manual).

- The City of Vancouver may revise, limit or prohibit street or driveway access movements where such movements may create dangerous or hazardous conditions. Such restrictions may include, but are not limited to driveway removal or relocation, installation of medians or curbing, and access restricting driveway design. (11.80.080, 11.80.110)

- ADA compliant pedestrian ramps per VMC 11.80.070 shall be placed at all intersections and where pedestrian crossing will occur. New ADA regulations require the use of truncated domes for all ramps as follows:

LOCATIONS	***COLORS***
All Brick Ramps	**White**
Streets with a majority of residential frontage and infill developments	**Brick Red**
Non-residential arterial streets and new residential development	**Safety Yellow**

- In general, full access intersections, signalized and non-signalized, on arterials will be permitted only at existing intersections with other county, state and city arterial and residential streets (VMC 11.80.110 (C)(1)).

- Per the International Fire Code, Section 503, a minimum 20 feet of unobstructed width is required for Fire Department apparatus access on all streets more than 150 feet in length. For all streets between 36 feet and 28 feet curb-to-curb paved width, "No Parking" signs shall be posted on one side, per City Standards, at the Developer's expense. For all streets less than 28 feet curb-to-curb paved width, "No Parking" signs shall be posted on both sides, per City Standards, at the Developer's expense.

- To prevent any conflict with existing underground utilities, overhead utilities and their pole or related structure locations, a survey and base map shall be prepared and included with the civil plans for any traffic related project (e.g. signals, striping, etc.) to show all utility and underground features.

- Mailbox location placement shall meet current ADA requirements and City Standard T07-01, and be shown on the civil plans.

- Transportation review and inspection fees will be collected prior to civil engineering plan approval.

Sight Distance and Vision Clearance Triangles

- Public and private streets, public alleyways, controlled and uncontrolled intersections and driveways shall comply with the sight distance requirements of VMC 11.80.140 and the current version of *A Policy on Geometric Design of Highways and Streets (AASHTO)*. A sight distance analysis shall be provided in the applicant's traffic study or in a document for projects that do not require a traffic study.

- Vision clearance requirements shall be met per VMC 20.985 and City Standard Plan T04-04.

- *Vision clearance shall also be demonstrated on the site plan, plat, landscape plans and civil plans.*

Street Lighting

- Street lighting plans shall be coordinated with Clark Public Utilities (CPU). New contactor cabinets and service may be required. For additional information, contact CPU directly at 360-992-3000.

Design Considerations and Opportunities

- The City of Vancouver views bicycle use as a viable mode of transportation. The city requests the incorporation of bicycle parking into site design. Bicycle parking design standards are outlined in VMC 20.945.050. All bicycle parking shall meet the requirements found on the city's website.
  http://www.cityofvancouver.us/ced/page/bicycle-parking-program-0

City staff welcomes the opportunity to work with the applicant to provide bicycle parking with this project. A bicycle parking design guidelines booklet which illustrates the standards is available free of charge. For more information on bicycle facilities, please contact Long Range Planning at 487-7728.

- It is recommended that the applicant provide surface treatment across the access from NW Lower River Road to clearly call attention to the pedestrian trail crossing. The applicant's design considerations will need to include high visibility, texture and structural integrity.

Neighborhood Traffic Management Devices and Streetscape Treatments

- All existing and proposed traffic management devices and streetscape treatments shall be indicated on the site, plat and civil plans. These may include but are not limited to traffic circles, speed humps and cushions, curb extensions, medians and raised crosswalks. Preliminary and final plans shall include full dimensioning, details or detail callouts and associated pavement markings and signing. Existing offsite devices and treatments shall be indicated if located within 50 feet of the project limits, or within offsite utility extension areas.

Traffic Signal and Interconnect Design

- Traffic signal and interconnect design plans shall utilize current City of Vancouver traffic signal and interconnect design specifications and drafting standards. The applicant shall contact shall Chris Christofferson, Senior Traffic Engineer, at 360-487-7716, for the current submittal and review requirements.

- The developer shall consider measures that provide un-interrupted and full operation of the traffic signal(s) located the intersection of ???? and ???? at all times during the construction of the project. These measures shall include vehicle detections and pedestrian movements on all approaches in a way that normal operation continues; for instance installation of video detection before loop detections are severed. The developer shall coordinate with City of Vancouver's inspectors for traffic signal modifications and/or any other activity that would impact the normal operation of the City's traffic system as part of the temporary traffic control. **All damaged loop detections shall be replaced within 48 hours unless otherwise approved by the City of Vancouver's inspector or traffic engineer.**

Parking and Circulation

- Per VMC 20.945.40(A). Review Authority. Parking lot design and drainage shall be subject to review and approval of the City Transportation Manager.

- At the time of application, the applicant shall submit turning movement diagrams to and through all access points, drive aisles and turnarounds utilizing the largest vehicle template anticipated.

- Pedestrian access to the fronting arterial roadway shall meet the requirements of VMC 20.945.040 (H) and VMC 20.914.020 (7).

Gated Access

- All subsequent submittals shall dimension existing and proposed gates and indicate gate swing.

- The gate entrance design shall provide for a queuing area to accommodate the largest anticipated vehicle to queue out of the right-of-way. **A queuing analysis to determine the maximum back of queue may be required**. A turnaround shall be provided to allow the largest anticipated vehicle to maneuver a turnaround outside the gate. No backing movements within the right-of-way will be permitted per VMC 20.945.040.

Contact

- For additional information or questions, please contact Ryan Lopossa at (360) 487-7706 or via email at Ryan.Lopossa@cityofvancouver.us.

Standard Details and Procedural information

- **Effective June 1, 2008 Transportation Services has implemented Transportation Development Review Services (TDRS) Drafting Standards for transportation improvement civil plan submittals. By setting expectations on submittal requirements the Drafting Standards will provide mutual benefits to the City and to the development in reducing review times and the number of reviews.**

  Local civil engineering firms have been notified of the implementation and have been provided with a copy of the standards. The standards are also available on the web at: http://www.cityofvancouver.us/transreview.asp?menuid=10463&submenuID=17481&itemID=19572.

  Per the Transportation Services Development Review Drafting Standards dated June 2007, page 4, the applicant is required to submit a base map for the proposed project at as-built stage to be designed on the City of Vancouver coordinate system. **In order to ensure the accuracy of the proposed design at an earlier stage in the review process, the applicant shall submit a preliminary layout in .dwg format at FC submittal or at the pre-submittal meeting for Streamlined projects. If the applicant elects to submit the layout via e-mail, please send to Roger Waters, roger.waters@ci.vancouver.wa.us. For questions, please call Roger Waters at (360) 487-7712.**

- The City of Vancouver has revised standard details effective August 15, 2008. New details are available at Transportation Development Review. The electronic files are available from Transportation Services in AutoCAD release 2000 and Adobe Acrobat PDF file formats. **The latest standard details may be referenced as part of the Transportation General Notes; with the exception of street standard plan cross-sections. Standard plan cross-sections must appear on the civil plans.** The files are also available on the City of Vancouver web site: **http://www.cityofvancouver.us/publicworks/page/transportation-development-review-and-capital-standard-plans-details.**

Estimated Transportation Review Fees (Site Plan)

Plan Review Fee (includes preliminary and final)

- General Case $3,084.99

CONCURRENCY ENGINEERING COMMENTS **Ryan Lopossa 487-7706**

(VMC 11.70)

- The proposed development is within the following Transportation Management Zone (TMZ) and Transportation Analysis Zone (TAZ):

TAZ # 26

Corridor/TMZ	**Limits of Corridor**
Fourth Plain Blvd	Port of Vancouver to I-5

- Using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, the following example is an estimation of trips that would be generated by the proposal, provided by the City as a courtesy to the applicant. Final trip generation figures will be based on the applicant's trip generation report, as scoped later in this report.

Land Use	ITE Code	Trip Rate	Units	ADT	AM PK	PM Pk
Proposed						
General Light Industrial	110	6.97/1000 sf –ADT 0.92/1000 sf – AM Pk 0.97/1000 sf – PM Pk	186,710 sf	1,301	171	181
Total				1,301	171	181

- **The City of Vancouver has adopted the 9th Edition of the ITE Manual. The applicant should utilize the 9th Edition for the trip generation in the Trip Generation and Distribution Report and/or Traffic Study.**

- **The City of Vancouver has approved a new Concurrency Ordinance that was adopted on January 5th, 2012. Consequently, the new concurrency requirements are currently in effect.**

- Based on the initial information, the proposed project would need to meet the Traffic Study requirements of VMC 11.70 and 11.80.130. **A Traffic Study is a Fully Complete item for project submittal.**

- **A traffic impact analysis (TIA) is required pursuant to VMC 11.70, 11.80.130 and 11.80.080. A copy of the City of Vancouver Traffic Study methodology/checklist can be found on the City of Vancouver website at** http://www.cityofvancouver.us/publicworks/page/concurrency

- **General TIA Requirements:**

  - For developments generating 5 or more net new PM peak hour trips, the applicant is required to submit trip generation and distribution for the proposed development and to list the number of PM peak trips entering each of the concurrency corridors in table format. See Table 1 below for the list of corridors.

  - Additionally, for developments generating 20 or more PM peak hour trips, the analysis shall encompass all intersections specified by the traffic engineer for LOS analysis that fall within the limits identified in 11.80.130. The analysis may also include intersections beyond the thresholds listed in 11.80.130 where significant traffic hazards would be caused or materially aggravated by the proposed development.

  - Trip distribution shall use the Regional Transportation Council select link assignment for the project TAZ.

  - Transportation Concurrency is evaluated according to the Corridor Classification. The Director may require additional information or modeling if an impacted corridor is operating close to the adopted level of service. Generally, where a proposed development sends trips to a Category 1 or Category 2 corridor, the Director shall track those trips and presume concurrency between LOS measurements pursuant to VMC 11.70.100.

Table 1: Concurrency Corridors and Current Classifications

Arterial Concurrency Corridor	Extent	LOS Standard Avg. PM Peak Speed (MPH)	2012 Corridor Classification
Mill Plain Blvd.	Fourth Plain to I-5	10	Category 1
	I-5 to Andresen	12	Category 1
	Andresen to I-205	12	Category 1
	I-205 to 136th Ave.	10	Category 1
	136th Ave. to 164th Ave.	10	Category 1
	164th Ave. to 192nd Ave.	10	Category 1
St. Johns / Ft. Van Way	Mill Plain to 63rd St.	12	Category 1
Fourth Plain Blvd.	Mill Plain to I-5	12	Category 1
	I-5 to Andresen	10	Category 1
	Andresen to I-205	10	Category 1
	I-205 to 162nd Ave.	10	Category 1
Andresen Road	Mill Plain to SR500	11	Category 1
	SR500 to 78th St.	15	Category 1
112th Avenue	Mill Plain to 28th St.	11	Category 1
	28th St. to 51st St.	15	Category 1
164th/162nd Avenue	SR14 to SE 1st St.	10	Category 1
	SE 1st St. to Fourth Plain	10	Category 1
Burton Road / 28th Street	18th St. to 112th Ave.	12	Category 1
	112th Ave. to 138th Ave.	10	Category 1
	138th Ave. to 162nd Ave.	12	Category 1
18th Street	112th Ave. to 138th Ave.	12	Category 1
	138th Ave. to 164th Ave.	12	Category 1
136th/137th Avenue	Mill Plain to 28th St.	12	Category 1

	28th St. to Fourth Plain	12	Category 1
192nd Avenue	SR14 to NE 18th St.	10	Category 1

Per-trip monitoring fees shall be charged for trips sent to every corridor, up to a maximum monitoring fee of $1500 for any single development (VMC 20.180.070).

- **Below are a few items that shall be included in the traffic impact analysis. All other requirements can be found on the City of Vancouver website at** http://www.cityofvancouver.us/publicworks/page/concurrency

  - Safety – Crash history and mitigations - Provide a five year crash history, crash rate per mev, and proposed mitigations for intersections with crash rate exceeding 1.0 per mev. Copies of the crash reports shall be included in the TIA. (VMC 11.80.130 and 11.70)
    Please contact Bill Gilchrist, city Traffic Engineer, at (360) 487-7717 or William.Gilchrist@cityofvancouver.us for a list of intersections to study.

  - Safety and operations – Queue analysis - Provide peak hour queue analysis. (VMC 11.80.130, 11.80.080, 11.70)
    Please contact Bill Gilchrist, city Traffic Engineer, at (360) 487-7717 or William.Gilchrist@cityofvancouver.us for a list of intersections to study.

  - Warrant analysis – Signals and Turn lanes - Provide traffic signal / turn lane warrants as defined by the Manual on Uniform Traffic Control Devices. (VMC 11.80.080)
    Please contact Bill Gilchrist, city Traffic Engineer, at (360) 487-7717 or William.Gilchrist@cityofvancouver.us for a list of intersections to study.

Contact

- For additional information or questions, please contact Ryan Lopossa at (360) 487-7706 or via email at Ryan.Lopossa@cityofvancouver.us.

Estimated Concurrency Fees due at time of application

Concurrency Evaluation (always charge) $151.27

Traffic Study Review (20+ PM peak trips only) $301.45

FIRE COMMENTS	**Chad Lawry 487-7237**

VMC 16.04.010 FIRE CODE:
As required by RCW Chapter 19.27, the city of Vancouver hereby adopts by reference the 2012 edition of the International Fire Code (IFC), including appendices B and E, as amended by RCW Chapter 19.27, WAC Chapter 51-54 and the provisions of this chapter. The approval of plans and specifications does not permit the violation of any section of the IFC or any federal, state, or local regulations.

Prior to making any decisions regarding its approval, the Vancouver Fire Department (VFD) must consider the impact the proposed facility may have on public safety, including the VFD's ability to provide sufficient fire protection services.
The VFD will conduct a detailed impact assessment to determine if any hazards or risks associated with the proposed facility and its operation will result in an increased need for fire protection services and what measures will be required to mitigate the impact.
The VFD will coordinate closely with the applicant's representatives, project contractors, the Vancouver Fire Marshal's Offices, and other key stakeholders to complete the impact assessment within 45 days from the date final plans for the project have been received by the VFD.

Fire Protection Services Impact Assessment - Scope of Work:
a) Assess fire and hazardous materials related risks associated with the proposed facility and its operation.

b) Assess risks associated with the proposed system(s) for transportation of any hazardous materials. Assessment to include:

- Truck transportation over local roadways and loading operations
- Rail transportation over local railways and loading operations
- Marine transportation over local waterways and loading operations
- Pipeline transportation

c) Evaluate VFD's capability to provide fire protection services to the proposed facility and related transportation systems. The evaluation shall identify any anticipated deficiencies in service capability. Evaluation to include:

1. Emergency response plans
2. Firefighting capability
3. Rescue capability, including confined space rescue
4. Hazardous material response capability
5. Potential off site consequences of a hazardous material release
6. Training
7. Equipment
8. Other resources

d) Evaluate proposed fire and spill protection systems for the facility.

e) Evaluate proposed physical security systems for the facility.

f) Recommend measures and estimated costs to mitigate any impact the proposed facility or related transportation systems may have on VFD's ability to provide sufficient fire protection services. Recommendations to include:

1. Emergency response plans
2. Firefighting capability
3. Rescue capability, including confined space rescue
4. Hazardous material response capability
5. Potential off site consequences of a hazardous material release
6. Training
7. Equipment
8. Other resources

For additional information contact:
Steve Eldred
Division Chief
Vancouver Fire Department
7110 NE 63rd Street
Vancouver, WA 98661
(360) 487-7304
steve.eldred@cityofvancouver.us

IFC 104.7.2 TECHNICAL ASSISTANCE
The fire code official is authorized to require the owner or agent to provide, without charge to the jurisdiction, a technical opinion and report from a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the fire code official and to require the stamp of a registered design professional.

IFC 105.6 FIRE CODE OPERATIONAL PERMITS
Applicable fire code operational permits required by this section and related to the project at the time of construction permit application are issued at no additional charge during the construction permit review and approval. These permits remain valid until the next Fire Marshal's Office inspection which is a generally more than a year after the issuance of the certificate of occupancy.

IFC CHAPTER 50 HAZARDOUS MATERIALS
The storage, dispensing, handling and use of hazardous materials shall comply with the requirements of Chapter 50 of the International Fire Code.

5001.5.1 The permit applicant shall submit a Hazardous Materials Management Plan (HMMP). The HMMP shall identify the following:
1. Storage and use areas.
2. Maximum amount of each material stored or used in each area.
3. Range of container sizes.
4. Locations of emergency isolation and mitigation valves and devices.
5. Product conveying piping containing liquids or gases, other than utility-owned fuel gas lines and low-pressure fuel gas lines.
6. On and off positions of valves for valves that are of the self-indicating type.
7. Storage plan showing the intended storage arrangement, including the location and dimensions of aisles.
8. The location and type of emergency equipment. The plans shall be legible and drawn approximately to scale. Separate distribution systems are allowed to be shown on separate pages.

5001.5.2 The permit applicant shall submit a Hazardous Materials Inventory Statement (HMIS). The HMIS shall include the following:
1. Manufacturer's name.
2. Chemical name, trade names, hazardous ingredients.
3. Hazard classification.
4. MSDS or equivalent.

5. United Nations (UN), North America (NA) or the Chemical Abstract Service (CAS) identification number.
6. Maximum quantity stored or used on-site at one time.
7. Storage conditions related to the storage type, temperature and pressure.

Building and Fire code requirements will be reviewed at the time of the construction permit submittal and will include documentation that the equipment, machinery, and alarms associated with the use, dispensing, storage and handling of hazardous materials is listed or its use. 5003.2.3

IFC CHAPTER 57 FLAMMABLE & COMBUSTIBLE LIQUIDS
The storage, dispensing, handling and flammable and combustible liquids shall comply with the requirements of Chapter 57 of the International Fire Code.

VMC 16.04.040 HAZMAT REGULATORY FEE:
This ordinance affects certain existing and proposed occupancies that store and/or handle hazardous materials. Your proposed facility may have to comply with this ordinance. Hazardous materials regulatory fees are determined by a fee schedule. The ordinance and fee schedule can be found in the Vancouver Municipal Code, Title 16, Chapter 16:40. You can find a copy of the ordinance on the City's website www.cityofvancouver.us.

Fire Plan Reviewer: Chad Lawry, Deputy Fire Marshal
Chad.lawry@cityofvancouver.us, Office: (360) 487-7237

IFC 503 FIRE APPARATUS ACCESS (VMC 16.04.150):
Standard Text: Fire apparatus access shall be provided, by an approved route, to within 150' of any point of the facility and any point on the exterior wall of the first story of the building as measured by an approved route around the exterior of the building. Fire apparatus roads shall have a minimum clear width of 20' and clear height of 13'6". The required width of a fire apparatus access road shall not be obstructed in any manner, including parking of vehicles, signage and mailboxes. Minimum required widths and clearance dimensions shall be maintained at all times. Fire department required access lanes exceeding 200' in length shall be provided with an approved fire apparatus turn-around or with drive through provisions. Temporary or permanent fire apparatus emergency access lanes shall be established and maintained clear to within 150 feet of any portion of a structure on the project site.
Buildings four or more stories in height shall be provided with approved aerial fire apparatus access roads. Aerial fire apparatus access roads shall be provided within 25 feet of the building, but not less than 15 feet from the building, along the length of one side of the building.

Where electronically supervised fire protection systems are installed, a Knox box shall be installed at the structure and shall contain keys/codes for night time emergency fire access (Potential exception: 24 hour/365 day on site staff).

"NO PARKING FIRE LANE" signage with directional arrows or red curb paint with white stenciled lettering (4" high block lettering/ ½" stroke) shall be posted wherever parking could obstruct the required 20' fire apparatus access lane.
Fire lane marking standards:
No on-street parking is allowed on access routes less than 28 feet wide.
Parking is allowed on one side only for access routes 28 feet to 36 feet wide.

Parking is allowed on both sides for access routes 36 feet wide and greater.
No on-street parking is allowed on cul-de-sacs that are specifically required by the fire department for apparatus turn-around with a radius of less than 43'. Where rolled curb/thickened sidewalks are approved as part of the apparatus turning radius signage shall be installed behind the sidewalks so that the radius remains unobstructed.
No parking in other types of required fire apparatus turn-around provisions.

SIGNAGE ON PLANS: Graphic example of an acceptable fire lane indication on plans and a detail sheet on fire lane markings are available for download via the internet. Clearly indicate sign locations and details on the final site plan. Where street improvements are involved, fire lane details and locations shall additionally be shown on the engineering plans.
Specific to this project:
The Fire Department requests a plan specifically showing fire apparatus access lanes throughout the facility. It is unclear if the open spaces between tracks, buildings and facilities are driving surfaces or not.
Fire lane signage is required and the locations can be identified during the civil engineering review.
0 Submittal is fully complete (FC) for Fire if checked
1 Required for FC:
Please provide a vehicle access plan featuring roadways and drivable surfaces for emergency vehicle access.

IFC 505 PREMISE IDENTIFICATION:
Standard text: Premise address/identification shall be visible and legible from the fire lane approach.
Specific to this project:
During construction a temporary or permanent address signs and street identification signs shall be erected so that they are visible and legible from the road fronting the property for emergency response.
Prior to occupancy the addresses shall be visible and legible from the street fronting the property. Street signs shall be installed and approved.
1 Submittal is fully complete (FC) for Fire if checked
0 Required for FC:
Nothing

IFC 508 WATER SUPPLY & FIRE HYDRANTS (VMC 16.04.160):
Standard text: FIRE HYDRANTS: The maximum hydrant spacing in commercial and multi-family residential developments shall be 400 feet between hydrants measured along a fire apparatus access lane. The distance from the most remote first floor exterior wall of structures shall not be more than 350 feet from a fire hydrant and not more than 150 feet from a fire lane. Where the buildings are protected by an approved fire sprinkler system, the maximum spacing between fire hydrants shall be 600 feet and the most remote first floor exterior wall of structures shall not be more than 450 feet from a fire hydrant and not more than 150 feet from a fire lane. Where structure placement is not yet proposed, measurement shall be taken from the most remote location on the lots.
The maximum hydrant spacing in one and two family residential developments shall be 600 feet between hydrants measured along a fire apparatus access lane. The distance from the most

remote exterior first floor wall of any structure shall not be more than 450 feet from a fire hydrant. Where structure placement is not yet proposed, measurement shall be taken from the most remote location on the lots.
Fire hydrants on the opposite side of principal arterial or larger streets shall not be considered for new projects. The first 1,500 gallons per minute of required fire flow may be taken from one fire hydrant. An additional fire hydrant shall be required for each additional 1,000 gallons per minute or fraction thereof.
Specific to this project:
Existing fire hydrants are shown and proposed new fire hydrant locations are shown.
For this project the Fire Department will rely on a 3rd party to consult with VFD based on VFD capabilities and tactics to approve fire hydrant locations and water supply provisions.
Final approval of fire hydrants and water supply can take place during civil plan review.
1 Submittal is fully complete (FC) for Fire if checked
0 Required for FC:
Nothing

IFC CHAPTER 9 FIRE PROTECTION SYSTEMS (VMC 16.04. 170 – 16.04.210):
Standard text: An approved fire sprinkler extinguishing system shall be installed and maintained in operable condition in buildings:
containing a floor area of over 12,000 square feet or 36’ in height. Each portion of a building separated from other portions by one or more four-hour rated fire barrier assembly(ies) may be considered a separate building if such four-hour rated fire barrier walls meet the requirements of International Building Code Section 706.
where access is restricted or unreliable.
where minimum fire flow can only be achieved with credit for a fire sprinkler system
where occupancy type/use based requirements apply.
Monitoring. Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to an approved supervising station or, when approved by the fire code official, shall sound an audible signal at a constantly attended location. IFC 904.3.5
Separate permit required for required or voluntary fire protection systems. Submit plans and specifications for review and approval prior to installation. Separate permit and plan approval is required for on-site underground fire protection water piping.
All fire protection contractors who work in the Vancouver City Limits shall possess a City of Vancouver Fire Protection Contractor Endorsement. VMC 16.04.095
Specific to this project:
Fire protection is required and shall be electronically supervised.
Add a note to the proposed civil water utility plans stating “Underground fire water lines are shown for reference only. A separate permit issued contractor with licensure in accordance with WAC 212-80 is required for this work.”
Add a note to the proposed civil water utility plans stating, “All fire protection system components shall be installed under separate permits to contractors holding a City of Vancouver Endorsement in accordance with VMC16.04.040.”
Fire department connection(s) shall be shown to be within 150 feet of a fire hydrant.
1 Submittal is fully complete (FC) for Fire if checked
0 Required for FC:
Nothing
Chad Lawry (360) 487-7237 chad.lawry@cityofvancouver.us

WATER ENGINEERING COMMENTS — Debi Davis 487-7173

EXISTING CONDITIONS:
City records show an existing 12" 14" & 16" DI NW Old Lower River Road, and a 16" DI in HWY (501), and a 10" DI in NW Harborside Drive (P) in the dock area.

FIRE PROTECTION:
It is estimated that at least 3500 gpm fire flow is currently available from hydrants in the proposed project area. Records show hydrants in the area The proposed project is within the City of Vancouver service area, therefore service can be provided if the conditions listed below are met.

REQUIREMENTS:
(?") = Size of pipe depends on the fire flow required by the Fire Marshal.

Area 600: Connect a new (?") water main to the existing 14" or 16" in Old Lower River Road extend on site to serve new water services, fire protection systems, and any required fire hydrant.

Area 200: Connect a new (?") water main to the existing 16" water main south of the tracks extend on site to serve new water services, fire protection systems, and any required fire hydrants.

Area 300: Connect a new (?") water main to the existing 16" water main in HWY(501) Extend on site as needed loop the main back to HWY(501) or connect to the existing 12" water main on the east side. Connect new water services fire protection systems, and any required fire hydrants to the new water main.

Area 400: Connect to the existing 12" water main in NW Harborside Drive (P), extend on site to serve new water services, fire protection systems, and any required fire hydrants.

Looping the water mains thru the Areas may be required depending on fire flow needed. All water mains, fire hydrants, and water meters will require an easement dedicated to the City of Vancouver.

Further requirements may be necessary depending on the final project configuration and will be determined through the engineering review process. If there are any questions, please contact Debi Davis via telephone @ 360-487-7173, or via email at debi.davis@cityofvancouver.us.

WATER SYSTEM STANDARDS:
All water lines, services, and hydrants constructed shall conform to the most current "City of Vancouver General Requirements and Details" for Water System design and construction along with the following:

The standard for main extensions is 8-inch diameter, or larger as master-planned or needed per hydraulic analysis and fire flow.

Fire hydrant locations are to be specified by the Fire Marshal. If new hydrants are required, they shall be served by water mains with a minimum of 8-inch diameter, except that a 6-inch main can be used for a dead-end run shorter than 50 feet to a hydrant.

Separate water services are required for each building. Water meters shall be located in a non-paved area, centered along the property frontage.

Back Flow Assemblies are required on irrigation systems, services larger than 2-inch, fire protection lines and if there is a potential for cross connection. Back Flow Assemblies must be constructed and installed per City of Vancouver "Standard Backflow Prevention Details."

SEWER ENGINEERING COMMENTS **Aaron Odegard 487-7153**

Two existing public sewers traverse the area from northwest to southeast.

Area 200 Unloading and Office: Existing private (Port) casings travel under the railroad tracks in the area. The casings were constructed in about 2010 with the Port of Vancouver West Vancouver Freight Access project (ENG2007-00173). The casings are shown on Sheet U-7 of the design drawings. Record drawings are not available.

ENG2010-00009: Public gravity sewer is located north of the proposed unload area in Old NW Lower River Road (P). Manhole #21025 marks the headwaters of the 18-inch gravity that flows southeast. The manhole also receives a private six-inch (6") HDPE force main from its the casing to the southwest. This sewer was constructed in 2010 with POV T5 Industrial Improvements. The area is shown on Sheets C3.1 and C3.2 of the record drawings.

ENG2010-00064: Southern portions of the force main were constructed in 2012 by the Port of Vancouver Terminal 5 Marine Cargo Laydown project. Piping is shown on sheet C4.0 of the record drawings (E10064021.tif).

Existing Private Sewer: A private sewer and a manhole is located in the access road near the CPU cooling towers. This sewer was built in 2003 with the CPU Warehouse project (ENG2002-00006). A plan view is shown on sheet C3.1 of the record drawings (E0200604.tiff) and the profile is shown on C3.2. A private utility easement is described in AF #4607523 and shown in its Exhibit D.

Area 300 Tanks: Public gravity sewer and several manholes front the south side of the site north of the rails. This sewer was constructed in 2012 with WVFA #9 (ENG2011-00026). Record drawings and other remaining file closure items have not yet been submitted. A plan view is shown on sheets U-04B and U-05B of the design drawings and the profile view is shown on Sheet U-16. An existing six-inch (6") service lateral extends north to the site from MH P9-7.

Area 400 Dock: An existing public gravity sewer is located north of the site and at the intersection of Gateway and Harborside and Vapor Option #2. A existing manhole (#14411) receives a private pressure sewer from the west and turns the sewer from the northeast to southeast. Sewers continue southeast within an existing public sewer easement.

SB1729: This sewer was constructed in 1999 with the Clark County Jail Work Center. A plan view is shown on C1.5 of the record drawings (WB203505.tif) and the profile is shown on Sheet C1.6.

Area 600 Boiler Building is located about 800 feet northwest of MH #21025 described for Area 200 above.

RUS-34550: A utility review has been prepared to accompany this pre-app report. Comments here are nearly identical to those in the review.

General Condition Requirements: Public sewer construction is not required. Install new service laterals to existing manholes, secure a pretreatment permit, pay fees, and connect building sewers.

S-1.4: Construct new service laterals to existing manholes using the methods and materials in the standard plans.

Proposed connection to the existing private sewer will require a private shared access and maintenance agreement.

IPP: Typically only domestic waste is allowed. Discharge of non-domestic or process water requires an Industrial Pretreatment permit and a related engineering report. Contact the pretreatment workgroup early in the process. Call or email Johnny Leuthold at 487-7192 or johnny.leuthold@cityofvancouve.us.

Application: Acknowledge the public sewer requirements in the narrative. Include a preliminary utility plan. Show existing and proposed sewers and connections.

Conditions: These and other conditions will appear in the staff report. Final civil project acceptance will be contingent on final for ENG2011-00026 WVFA #9.

Permits and Fees: Right-of-way, pretreatment, and sewer connection permits will all be required. Sewer connection fees will based on water meter size. Sewer main fees are not owing on any of the existing sewers in the area.

UPC: All onsite building sewers and connections are governed by the Plumbing Code. Permits and inspections will be required. Incorporate required pretreatment fixtures into the building plans and secure additional required pretreatment inspections.

Questions about these general conditions can be sent to Aaron A. Odegard at 487-7153 or aaron.odegard@cityofvancouver.us.

DRAINAGE ENGINEERING COMMENTS **Mike Swanson 487-7182**

EROSION PREVENTION AND SEDIMENT CONTROL (VMC 14.24):

- A separate Erosion/Sedimentation Control Plan in conformance with VMC 14.24, the City's General Requirements and Details and the Stormwater Management Manual for Western Washington Volume II shall be submitted and approved prior to demolition, street cuts, clearing, grading, filling or issuance of City permits.

- The plan shall show detailed existing and proposed topography of the site. The plan shall include measures to insure sediment and sediment laden runoff does not leave the site. Additional measures are required for offsite utility trenching.
- Department of Ecology Construction Stormwater General Permit - A permit is required for all soil disturbing activities (including grading, stump removal, demolition) where 1 or more acres will be disturbed, and stormwater will be discharged to a receiving water directly (e.g., wetlands, creeks, unnamed creeks, rivers, marine waters, ditches, estuaries), or to storm drains that discharge to a receiving water. *If all stormwater is retained on-site and cannot enter waters of the state under any condition, you do not need permit coverage.* Construction site operators must obtain a permit 60 days prior to discharging stormwater. Information about the permit requirements is available at the DOE website: http://www.ecy.wa.gov/programs/wq/stormwater/construction/.
- The following items signified with the * are required for the project submittal to be fully complete.
    - * The plan shall show detailed existing and proposed topography of the site including a minimum of 25 feet of adjacent properties.
    - * The plan shall show site specific erosion prevention BMPs.
    - * The plan shall include measures to insure sediment and sediment laden runoff does not leave the site.
- The proposed project sites are flat with predominately fill soils and silt, clay, sand mixtures. The rail and tank areas are currently undeveloped. Erosion hazard is low provided the contractor follows standard erosion control practices.
- A sediment pond will be required during construction if the contributing drainage area is 3 acres or more. The pond shall be sized per the stormwater manual. For projects with a contributing drainage area less than 3 acres, a sediment trap may be required.
- A sediment trap may be required for projects with a contributing drainage area less than 3 acres.

STORMWATER CONTROL (VMC 14.25):

- The proposed project must meet the runoff treatment (water quality) and flow control (water quantity) requirements as outlined in the city's NPDES Phase II Permit and the Surface Water General Requirement.
- The project will be subject to the provisions of the Stormwater Control ordinance because more than 2,500 square feet of impervious surfaces will be created (See figure 4.1 Surface Water General Requirements).
- The project will drain directly to the Columbia River which is a flow control exempt water body. No detention will be required.
- The project shall address the water quality storm event as defined in the 2005 Stormwater Management Manual for Western Washington (Stormwater Manual) and shall provide water quality treatment of stormwater runoff from Pollution Generating Impervious and Pervious Surfaces (PGIS & PGPS) through the use of approved BMP's. Water quality treatment BMPs shall be designed in accordance with VMC 14.25.210 and the City's General Requirements and Details.

- Water quality treatment facilities shall be selected, designed, and maintained in accordance with the Stormwater Manual and the General Requirements. Acceptable basic water quality BMP's include but are not limited to the following; WQ infiltration basin, WQ infiltration trench, wet pond, biofiltration swale, bio-infiltration swale, vegetative filter strip, linear sand filter, and StormFilter.
- The use of "Emerging Stormwater Treatment Technologies" and other alternative treatment BMP's must have Department of Ecology and city approval.
- LID practices shall refer to the Low Impact Development Technical Guidance Manual for Puget Sound (*LID Manual*) and Appendix III-C of the *Stormwater Manual* for design recommendations. All uses of LID practices shall meet applicable regulations and requirements, and may require specific approval from other City departments (for example Transportation or Building).
- If the proposed water quality facility is private, it shall have an access and inspection easement to the City of Vancouver. Refer to section 4-2.06 in the General Requirements.
- The applicant has indicated that drainage from the tank containment area will include a shutoff device to prevent spills from leaving the containment. This system shall be shown in detail and described in the hydrolic report.
- The applicant shall provide a stormwater report that outlines all aspects of the site hydrology, assumptions, and water quality design calculations. The applicant shall demonstrate in the hydrology report how stormwater from newly created impervious surfaces will be treated and disposed of in accordance with VMC 14.25 and VMC14.26. The report shall include details for existing stormwater facilities that the project will drain to showing that there is capacity for the additional flow from the site. The report should be formatted as outlined in the City's General Requirements and Details Section 4-2.
- An infiltration test and detailed soils report are required where infiltration is proposed. Infiltration testing and soil report shall be in accordance with the City's General Requirements and Details Section 4-5.07.
- Infiltration systems must be designed for a 100-year storm event in accordance with the City's General Requirements and Details Section 4-5.09.
- New infiltration wells (drywells, infiltration trenches) proposed are required to meet Washington Department of Ecology Underground Injection Control (UIC) requirements (WAC 173-218) and be registered with the Department of Ecology. For requirements and registration forms, see: http://www.ecy.wa.gov/programs/wq/grndwtr/uic/
- Conveyance system shall be designed for the 10-year storm event in accordance with the City's General Requirements and Details Section 4-3.
- An access and inspection easement dedicated to the City of Vancouver is required for private water quality facilities.
- If there are any questions, contact Mike Swanson at 360-487-7182 or email at mike.swanson@cityofvancouver.us.

WATER RESOURCES PROTECTION (VMC 14.26):

- Since the proposed facility will store petroleum products in large quantities it will be considered a "classified operation" and will be subject to the Greater Standards of the City's

Water Resources Protection Ordinance, VMC 14.26. The ordinance is available for review and downloading on the City's website: *www.cityofvancouver.us/waterprotection*

- To comply with the ordinance, a classified facility shall implement best management practices (BMP's) listed in the Greater Standards provisions of the ordinance - section 14.26.130.
- Above-ground tank storage (AST) areas shall include secondary containment systems capable of collecting and holding 110% of the largest tank or 10% of the aggregate tank volumes. Smaller containers of chemicals shall be stored inside or under a cover and will also require secondary containment capable of collecting and holding spills and leaks.
- Loading areas shall be designed, constructed and operated to contain spills and leaks that might occur during loading and unloading.
- A comprehensive Spill and Emergency Response Plan (SERP) shall be prepared within 90 days of occupancy and updated at least every 5 years. The SERP shall include the following details on the ASTs: 1) The tank inspection scope and schedule; 2) Where written inspection records will be stored at the site; 3) How tank leaks or leaks in the secondary containment will be detected; 4) The measures to be taken in the event of a tank leak; 5) A description and schedule of planned staff training for tank maintenance, leak detection and spill response.
- If a portion of an AST will be set below the ground surface then that portion should be coated to extend tank life. Or, the above-ground tank should be raised onto some type of support structure.
- The City does not allow the installation of floor or trench drains inside a work area unless approved by Industrial Pretreatment for connection to sanitary sewer. For approval to install and connect floor drains to the sanitary sewer system contact Pretreatment at 487-7130.
- All facilities and operations in Vancouver are also subject to the Minimum Standards of the City's Water Resources Protection Ordinance, VMC 14.26.120. These standards include maintenance of all stormwater treatment facilities and best management practices according the Stormwater Management Manual for Western Washington.
- The EPA has designated the Troutdale Aquifer underlying Vancouver as a "Sole Source Aquifer" (SSA). If this project design and construction incorporates federal funding, an SSA Report must be prepared and submitted to the EPA for review.
- For additional information on compliance with the ordinance contact Richard Hoiland in Water Protection at (360) 487-7130.

BUILDING COMMENTS	**Chris Drone 487-7842**

Title 17 Building and Construction

Scope of review: A complete building code review of plans is not performed during Pre-application or Site Plan review. Filing of building permit application with required fees and review material is required for a complete building code review. At this time, plans and information necessary to verify compliance with all applicable building code provisions is neither required nor provided.

Applicable codes: For building permit to be issued, the project must comply with building codes applicable at the time of building permit application. Title 17 of the Vancouver Municipal Code contains rules and regulations for the technical codes as they regulate site preparation and construction, alteration, moving, demolition, repair, use and occupancy of buildings, structures and building service equipment. In order to receive a building permit, the proposal must meet the minimum standards of the technical codes referred to in Title 17 with applicable state and local amendments. These include:

2009 International Building Code w/Washington Amendments
2009 International Residential Code w/Washington Amendments
2009 International Mechanical Code w/Washington Amendments
2009 Uniform Plumbing Code w/Washington Amendments
2008 National Electrical Code w/Washington Amendments- effective January 1, 2009
2009 Washington State Energy Code-effective January 1, 2011
ICC/ANSI A117.1-2003 Accessibility
2009 International Fuel Gas Code
WAC 51-50 Washington State Amendments
2009 Washington State Energy Code
Vancouver Municipal Code Title 17

The Washington State Codes and Amendments may be accessed at http://www.sbcc.wa.gov/sbccindx.html.

Within the City of Vancouver design data noted on structural plans and calculations engineers will be required to indicate 105mph 3 sec gust wind speed, seismic zone D1, exposure B unless in the Columbia River corridor. The 2012 I-Codes will be officially adopted effective July 1, 2013 in the State of Washington. All building permit applications submitted on or after that date are subject to review under those codes and associated Washington Amendments.

Site Plan Review process and related submittals are separate from the Building Permit application and related submittals. Approval of the Site Plan is a prerequisite to approval of the building plans but does not assure approval of the building plans or effect the necessary review time for the building plans.

Accessible routes within the site shall be provided from public transportation stops, accessible parking and accessible passenger loading zones and public streets or sidewalks to the accessible building entrance served.

Accessible parking spaces shall be required in accordance with IBC Chapter 11.

Allowable building height and area shall be based on occupancy group and type of construction in accordance with IBC Table 503.

All building plans for structures, tanks, and buildings shall require corresponding structural engineering and calculations.

Information on current codes can be obtained at www.cityofvancouver.us or by contacting building division staff.

ADDRESSING COMMENTS — Patti McEllrath 487-7893

Building numbers can be assigned in the final site plan process.

C-TRAN COMMENTS — Tom Shook 906-7452

No comments received

PARKS COMMENTS

No comments received

VESTING OF APPLICATIONS

Type I, Type II, and Type III applications (other than zone change proposals) shall be considered under the subdivision, zoning, and other land development codes in effect at the time a fully complete application is filed: PROVIDED, an application which is subject to pre-application review shall contingently vest on the date a pre-application is filed, which contingent vesting shall become final if a fully complete application for substantially the same proposal is filed within one-hundred eighty (180) calendar days of the issuance of the pre-application report.

SUBMITTAL OF DEVELOPMENT APPLICATIONS

Current applications are at:
http://www.cityofvancouver.us/developmentreview/applications.html

Current Vancouver Municipal Codes are at:
http://www.cityofvancouver.us/vmc/default.shtm

Type II and Type III applications will be accepted by appointment only. Please telephone (360) 487-7802 to schedule an appointment. Application materials can be submitted at the Community Development Department Permit Center– 415 W. 6th Street. Permit center hours are 8 a.m.–12:30 p.m. and 1:30 p.m.–4 p.m., except Wednesday, when permit center hours begin at 9 a.m. Applications for large projects must be submitted by 3 p.m.

FEE ESTIMATE

The following fees are required at time of application submittal:

Site Plan Review:

- Planning: (total of 3 buildings encompassing 9,300 square feet) $3,836.18
- Fire: (major) $696.50
- Stormwater: $1,209.06 + $0.04 per square foot of impervious surfaces up to .99 acres
  +$0.02 per square foot of impervious surfaces between 1 and 5 acres
  +$0.004 per square foot of impervious surfaces over 5 acres. TBD
- Transportation: (general case) $3,084.99

Grading Permit: (Separate Grading permit required. Grading permit fee will be based on total cubic yards of cut and fill. Grading permit plan review is due at time of project submittal. Please call (360) 487-7802 to obtain a fee quote.) TBD

SEPA: prepared by the Port of Vancouver $0

Level II Tree Plan Review: $197.52

Archaeological Predetermination: Base Fee $389.06 + $65.84/acre greater than 5 acres

Critical Areas Permits $1,795.65

Shoreline Substantial Development Permit $4,189.84

Concurrency:

- Concurrency Evaluation Review: $151.27
- Traffic Study Review: $301.45

Additional fees required after PRELIMINARY approval will be addressed in the preliminary approval staff report as conditions. This includes the impact fees (outlined in zoning section of this report), system development charges, latecomer fees and inspection fees.

ALL FEE QUOTES ARE AS OF THE DATE OF THIS REPORT AND ARE SUBJECT TO CHANGE BY CITY COUNCIL. FEES MAY BE DIFFERENT AT THE TIME OF ACTUAL APPLICATION AND ADDITIONAL FEES MAY BE ASSESSED BASED ON REVIEW OF PLANS SUBMITTED.

REQUIRED APPLICATIONS, STUDIES AND PLANS

Based upon the Pre-Application review, the following land use applications must be processed in conjunction with the project. Information regarding these required applications can be found in the preceding pages of the Pre-Application report.

- ☒ Archaeological Predetermination
- ☐ Binding Site Plan
- ☐ Boundary Line Adjustment
- ☐ Conditional Use Permit
- ☐ Flood Plain Permit
- ☒ Grading Permit
- ☐ Historic Commission Review
- ☐ Human Service Siting
- ☐ Joint Use Parking Agreement
- ☐ Ministerial Zoning Review
- ☐ Planned Development
- ☐ Design Review
- ☐ SEPA Application/Checklist
- ☐ Shoreline Enhancement Overlay
- ☐ Short Subdivision
- ☒ Shoreline Substantial Development/CUP
- ☒ Site Plan Review
- ☐ Subdivision Application
- ☒ Tree Plan/Tree Removal (Level II)
- ☐ Variance
- ☒ Wetland Predetermination
- ☐ Zone Change
- ☒ Other: Geologic Hazards
  Fish and Wildlife Habitat Conservation

In addition to information required in conjunction with the above applications (as stated on the checklists attached to the corresponding applications), the following studies, plans or information are required in order to process the proposed application:

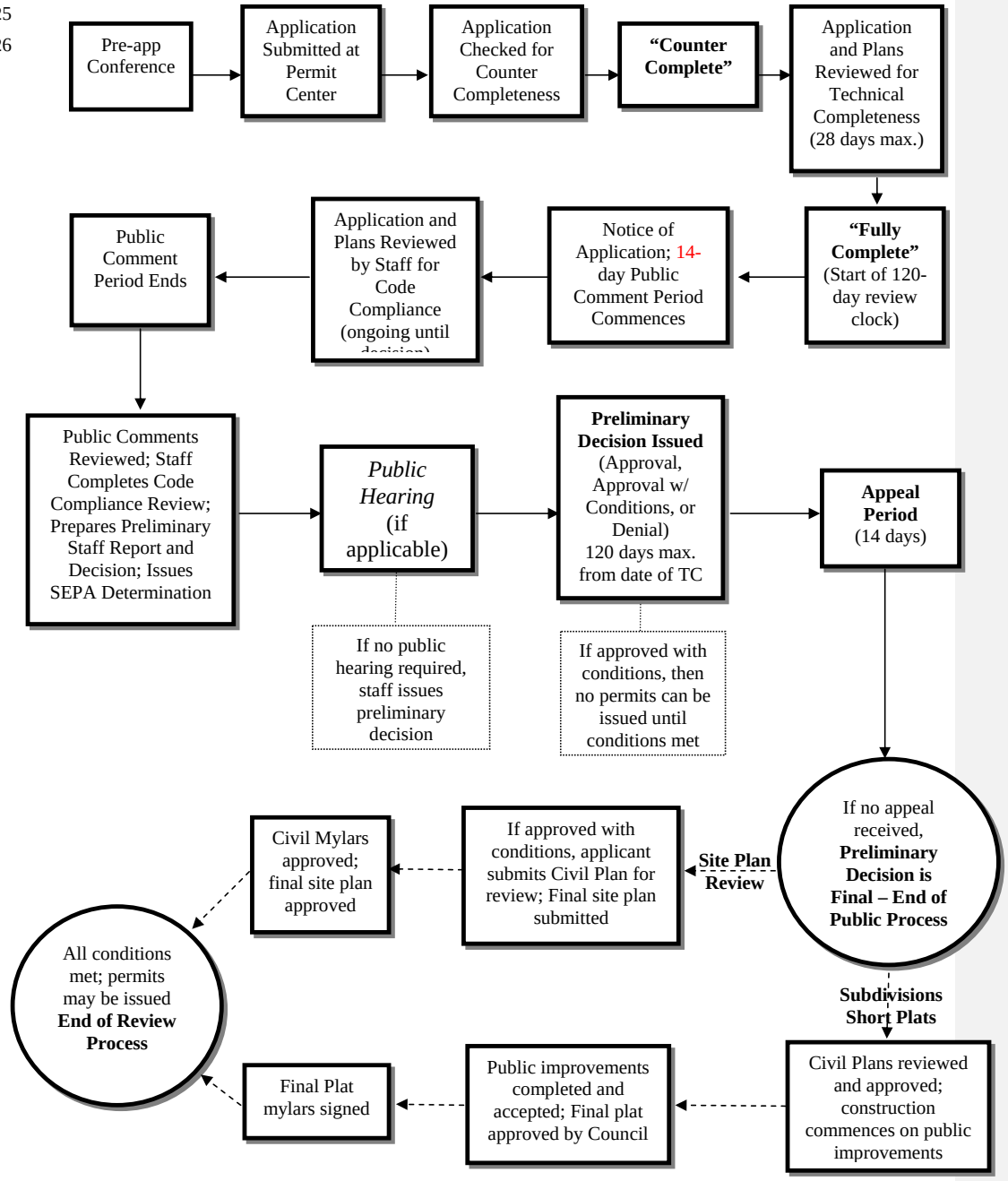
- ☒ Geotechnical/Soils Report (3 copies)
- ☒ Preliminary Civil Plans (see page 18)
- ☒ Preliminary Stormwater Report (3 copies)
- ☐ Clark County Health Department Development Review Evaluation
- ☐ Full Traffic Safety Analysis/Impact Study (4 copies) and Traffic Study Checklist
- ☐ Street Lighting Plan
- ☐ Traffic Generation and Distribution
- ☐ Other:
- ☐ Street Striping/Lane Configuration Plan
- ☒ Industrial Information Form
- ☐ Request for Road Modification (4 copies – Road Modification submittal must be packaged separately and must have completed Road Modification application.)

Unless otherwise stated above, the number of copies needed coincides with the number of copies required in the underlying land use permit (subdivision, site plan review, etc.).

Please note that the applications and information required on this page must be presented in order to be counter complete. The information shall be submitted as a consolidated package unless the Community Development Department Case Manager specifically allows an item to be submitted separately, as evidenced by a written letter or by a statement in the case notes of the Department's Permit*Plan permitting system.

Questions may be directed to Jon Wagner, Case Manager, at 360-487-7885.

City of Vancouver
Development Review Process



BergerABAM

1111 Main Street, Suite 300, Vancouver, Washington 98660-2958
360/823-6100 • 360/823-6101 Fax • www.abam.com

Memorandum

Date: August 22, 2013

Subject: City of Vancouver Shoreline Management Program Compliance

From: Brian Carrico, AICP, BergerABAM

To: David Corpron, Kelly Flint, Savage

Route to:

1.0 INTRODUCTION

The purpose of this technical memorandum is to discuss the provisions of the City of Vancouver (City) Shoreline Master Program (SMP) that apply to the Tesoro Savage Vancouver Energy Distribution Terminal (the Facility). The provisions were identified based on the policies and provisions identified by the City in the report of the pre-application conference. This memo also discusses how the Facility is consistent with the policies.

2.0 SHORELINE MASTER PROGRAM APPLICABILITY

Consistent with Section 2.1.1(a) on p. 2-1 of the SMP, the SMP applies to all shorelands and waters within the City limits that fall under the jurisdiction of Revised Code of Washington (RCW) 90.58 including the following geographic area that includes the project site:

> *On the Columbia River from the eastern boundary of Wintler Park downstream to the eastern boundary of Parcel #153105000 (also referred to as 'Port Parcel 3') shorelands shall include those lands extending two hundred (200) feet in all directions as measured on a horizontal plane from the ordinary high water mark (OHWM); floodways and contiguous floodplain areas landward two hundred (200) feet from such floodways; and all wetlands and river deltas associated with the streams, lakes and tidal waters that are subject to the provisions of this Program, as may be amended; the same to be designated as to location by Ecology, as defined by RCW 90.58.*

The SMP divides the shoreline jurisdiction on the site into two major environments: Aquatic and Upland. The Upland environment in the project area is designated as high-

intensity, and extends 200 feet landward of the Washington State Department of Ecology ordinary high water mark (OHWM).

The proposed project involves work below the Ecology OHWM of the Columbia River in the Aquatic shoreline environment and within 200 feet of the OHWM in the Urban High Intensity (UHI) shoreline environment. The following discussion addresses the consistency of the project with the City's SMP and its policies and regulations as they relate to both of these shoreline environments.

Table 1 identifies the specific Facility elements proposed within shoreline jurisdiction.

According to Table 6-1 Shoreline Use, Modification and Development Standards of the SMP, water-dependent uses are permitted in the Aquatic and High-Intensity shoreline environments. The proposed project is a facility that will receive crude oil by rail, store it on site, and ship it via the Columbia River. Its activities require direct access to the shoreline for operation and, as such, meet the definition of a water-dependent use:

> *198. Water-Dependent Use or Activity – A use or a portion of a use which requires direct contact with the water and cannot exist at a non-water location due to the intrinsic nature of its operations.*

Table 1: Facility Elements in Shoreline Jurisdiction

Shoreline Jurisdiction	Elements Falling within Shoreline Jurisdiction
Upland	• Portions of two designated rail tracks at Terminal 5. • Two transfer pipelines, each approximately 24 to 36 inches in diameter that will connect the storage tanks to the vessel loading system at Area 400. • A 6-inch return line that will return crude oil from the vessel loading system back to the storage tanks. • A 16- to 22-inch diameter line that will deliver hydrocarbon vapor generated during the loading of vessels to the marine vapor combustion unit (MVCU). • A vapor blower staging unit that will be constructed on an approximately 425-square foot concrete pad approximately 30 feet west of the Berth 13 access trestle. • Structures including: – An approximately 1,250-square foot single-story E-house located west of the Berth 13 access trestle. – An approximately 300-square foot single story motor control center (MCC) building located approximately 250 feet west of the Berth 13 access trestle. • 10 parking stalls that will be created in an existing gravel mobilization area approximately 110 feet east of the Berth 14 access trestle.

Shoreline Jurisdiction	Elements Falling within Shoreline Jurisdiction
	• MVCUs • An approximately 24-foot-wide access driveway
Aquatic	• Two transfer pipelines, each approximately 24 to 36 inches in diameter, that will be installed on the existing Berth 13 trestle and T dock to connect the storage tanks to the vessel loading system at Area 400. • A 6-inch return line that will be installed on the existing Berth 13 trestle and T dock to return crude oil from the vessel loading system back to the storage tanks. • Vessel loading equipment that will be installed on the dock and include crane(s), piping manifold, high pressure hoses, hose support equipment, crane control room, dock safety unit, and safety equipment including skiff, boom reels, and response equipment. • Modifications to the existing berths 13 and 14 dock including: – Removal of two mooring dolphins and two breasting dolphins including 48, 18-inch steel pipe piles and 8, 12 ¾-inch steel fender piles and approximately 1,330 square feet of existing concrete pile cap. – Installation of 4, new 27- foot diameter (approximately 2,150 square feet combined new, solid overwater coverage) mooring dolphins including 40, 36-inch steel pipe piles. – Removal of approximately 3,250 square feet of grated walkway associated with the existing breasting dolphins that will be removed. One existing 18-inch steel pipe pile supporting the walkways also will be removed. – Addition of 4 to 8, 24–inch steel pipe piles to Berth 13 dock platform. – Addition of 16, 24-inch steel pipe piles (all below the OHWM) to the existing bents at Berth 13 access trestle. – Addition of 6 to 12, 36-inch steel pipe piles at the existing trestle abutment at Berth 13, all above OHWM. – Installation of structural connection framing between the Berth 13 platform and the adjacent upstream and downstream breasting dolphins. Installation of grated walkways on top of the framing. Addition of 2, 24-inch steel pipe piles to support structural framing. – Addition of approximately 2,850 square feet of new grated walkways between mooring and breasting dolphins with 4, 24-inch steel piles to support the walkways. Grated walkways will mostly be reused portions of existing walkway that was removed. • Removal of existing structures and piles at Terminal 2.

3.0 CRITERIA FOR SDP

Per RCW Section 90.58.340, the local jurisdiction, in this case the City of Vancouver, is responsible for developing policies related to the use of its shorelines. These policies and the local shoreline management master program are required to implement the program contents identified in RCW 90.58.100. As such, the applicable policies and procedures per WAC 173-27-150 are those of the City's SMP.

Similarly, the provisions of WAC 173-27 generally reflect administrative provisions for the local municipality to adopt with its SMP. Thus, the regulations that apply are found in the City's SMP and addressed below. Sections 173-27-150 of the WAC identify the review criteria for shoreline substantial development permits (SDPs). They are as follows.

> ***WAC 173-27-150 Review criteria for substantial development permits.***
>
> *(1) A substantial development permit shall be granted only when the development proposed is consistent with:*
>
> *(a) The policies and procedures of the act;*
>
> *(b) The provisions of this regulation; and*
>
> *(c) The applicable master program adopted or approved for the area. Provided, that where no master program has been approved for an area, the development shall be reviewed for consistency with the provisions of chapter 173-26 WAC, and to the extent feasible, any draft or approved master program which can be reasonably ascertained as representing the policy of the local government.*
>
> *(2) Local government may attach conditions to the approval of permits as necessary to assure consistency of the project with the act and the local master program.*

4.0 SMP GENERAL SHORELINE USE AND DEVELOPMENT REGULATIONS

4.1 Shorelines of Statewide Significance (SMP Section 3.2)

The Columbia River is identified as a shoreline of statewide significance and the City has designated the shoreline environment within the project site as areas 200 feet landward of the OHWM and Aquatic for areas below the OHWM. The following language illustrates how the project complies with the state legislative intent for shorelines per RCW 90.58.020 and the City's shoreline management policies listed in Section 3.2 of the SMP.

1. *Preference shall be given to the uses that are consistent with the statewide interest in such shorelines. These are uses that: a. Recognize and protect the statewide interest over local interest; b. Preserve the natural character of the shoreline; c. Result in long term over short term benefit; d. Protect the resources and ecological function of the shoreline; e. Increase public access to publicly-owned areas of the shorelines; f. Increase recreational opportunities for the public in the shoreline; and g. Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary.*

   Response: The proposed project is consistent with these regulations because:

   - The site of the proposed project does not include a natural shoreline, and thus no "natural character of the shoreline" will be affected by this request.
   - The current riparian conditions of the project site reflect a developed and maintained industrial port. Most of the site is heavily disturbed by current industrial and port uses and, in addition, the surface of the project area is predominantly impervious because of paving, filling, and compacting of materials.
   - The shoreline at the project site is currently developed as a marine terminal and berth, is owned by the Port of Vancouver, and is not accessible to the public.
   - The proposed project establishes a water-dependent industrial use on an existing industrial site and repurposes and enhances existing Port assets for economic development. As such, the proposed project is not intended to increase recreational opportunities.

2. *Uses that are not consistent with these policies should not be permitted on SSWS.*

   Response: The proposed project is consistent with the applicable SMP policies and regulations as demonstrated by the responses that follow.

3. *Those limited shorelines containing unique, scarce and/or sensitive resources should be protected.*

   Response: Because of the history of development on the site, the limited amount of vegetation present, and the surrounding industrial activity, the project area provides low quality habitat with little functional value for native flora and fauna. (Part 3 of the Application for Site Certification discusses habitat on the site.) By designating the site as an Urban High Intensity (UHI) shoreline environment, the City has recognized the intent for water-dependent and water-related uses at the site.

4. *Implementation of restoration projects on shorelines of statewide significance should take precedence over implementation of restoration projects on other shorelines of the state.*

   Response: The project is not a restoration project and therefore this provision is not applicable.

5. *Development should be focused in already developed shoreline areas to reduce adverse environmental impacts and to preserve undeveloped shoreline areas. In general, SSWS should be preserved for future generations by 1) restricting or prohibiting development that would irretrievably damage shoreline resources, and 2) evaluating the short-term economic gain or convenience of developments relative to the long-term and potentially costly impairments to the natural shoreline.*

   Response: Like other upland industrial shoreline areas at the Port, the upland area of the site is designated UHI and the area waterward of the OHWM is designated Aquatic. Per Section 4.3.5.2 of the SMP, the UHI designation is intended for dense and developed urban areas with low to moderate ecological function and low to moderate opportunity for ecological restoration or preservation.

   Section 2.1 of the Application for Site Certification discusses the history of the site, which is within the former location of aluminum processing facilities owned and operated by Alcoa. The site has been the location of intensive historic industrial use, dating back to 1940 when Alcoa first developed the site for aluminum smelting operations. Given the developed condition of the project site and its continued industrial waterfront use, the City has designated the property appropriately.

   The project design and extensive operational protocols have been developed to avoid, minimize, and contain the inadvertent release of crude oil during operations. The project will implement several impact minimization measures and best management practices (BMPs) to minimize the potential for any construction-related temporary water quality impacts associated with leaks or spills or from temporarily increased turbidity. These measures include preparing and abiding by a spill prevention, control, and countermeasures (SPCC) plan, the operations manual, and the spill contingency plan; inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants or other petroleum products; and locating temporary material and equipment staging areas above the OHWM of the action area waterbody and

outside environmentally sensitive areas. With these measures, the project will be operated and managed in a manner that will ensure shoreline resources are not irretrievably damaged.

Lastly, given that the proposed project will use an existing developed marine terminal along a shoreline with low ecological function and the project involves a substantial long-term investment in the regional and local economies, the proposed development represents an appropriate use of the shoreline as described in SMP Section 3.2.

4.2 General Shoreline Use and Development Regulations (SMP Section 5.1)

As acknowledged in the City staff report for the pre-application conference, dated June 27, 2013, the following policy sections apply to the proposed project.

Table 2: SMP Policies and Regulations

Section	Associated Regulation(s)
5.1	1-2, 4-6, 11, 15
5.2	All
5.3	All
5.4	2
5.6.1	All
5.6.2	1-5
5.6.3	All
5.7	All
5.8.1	All
5.9	1-7
5A	All
Table 6-1	All
6.3.3.5	1, 4-5
6.3.6	1, 5-6
6.3.13	1-5

The responses below illustrate how the project complies with the applicable general shoreline use and development regulations described in Section 5.1 of the SMP.

1. *Shoreline uses and developments that are water-dependent shall be given priority.*

   Response: As indicated, the project is a water-dependent use. Consequently, the project is sited appropriately and is a prioritized use within the UHI shoreline designation.

2. *The applicant shall demonstrate all reasonable efforts have been taken to avoid and where unavoidable, minimize and mitigate impacts such that no net loss of critical area and shoreline ecological function is achieved. Mitigation shall occur in the following order of priority:*

   a. *Avoiding the impact altogether by not taking a certain action or parts of an action. This may necessitate a redesign of the proposal.*

   b. *Minimizing unavoidable impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts. The applicant shall seek to minimize fragmentation of the resource to the greatest extent possible.*

   c. *Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;*

   d. *Reducing or eliminating the impact over time by preservation and maintenance operations;*

   e. *Compensating for the impact by replacing, enhancing, or providing substitute resources or environments. The compensatory mitigation shall be designed to achieve the functions as soon as practicable.*

   f. *Monitoring the impact and the compensation projects and taking appropriate corrective measures.*

   Response: By locating the proposed project at an existing terminal, effects to the shoreline environment have been avoided and minimized. Construction BMPs will be employed as outlined in the Application for Site Certification to avoid and minimize effects during construction. Where unavoidable impacts result from the project, the development of the project incorporates mitigation.

3. *In addition to compensatory mitigation, unavoidable adverse impacts may be addressed through voluntary restoration efforts.*

   Response: No restoration activities are planned.

4. *Shoreline uses and developments shall not cause impacts that require remedial action or loss of shoreline ecological functions on other properties.*

   Response: The project design avoids direct impacts to adjacent properties by avoiding actions that could lead to changes in river dynamics that could affect adjacent properties. During construction, noise has the potential to affect properties beyond the project footprint. These impacts would be short term and, considering the developed nature of adjacent properties and the location of the project within an industrial zone with existing sources of noise, the impacts would not require remedial action or result in loss of ecological functions.

5. *Shoreline uses and developments shall be located and designed in a manner such that shoreline stabilization is not necessary at the time of development and will not be necessary in the future for the subject property or other nearby shoreline properties unless it can be demonstrated that stabilization is the only alternative that allows a reasonable and appropriate water-dependent use to become established or expand or protects public safety and existing primary structures.*

   Response: The activities proposed within the shoreline environment will not result in the need for shoreline stabilization. The shoreline along this reach of the Columbia River is armored with riprap and no activities are proposed at the shoreline that will destabilize the shoreline embankment.

6. *Land shall not be cleared, graded, filled, excavated or otherwise altered prior to issuance of the necessary permits and approvals including a statement of exemption for a proposed shoreline use or development to determine if environmental impacts have been avoided, minimized and mitigated to result in no net loss of ecological functions.*

   Response: No clearing, grading, or excavation activities will occur until all necessary permits and authorizations for such activities have been obtained.

9. *On navigable waters or their beds, all uses and developments should be located and designed to:*

   a. *Minimize interference with surface navigation;*
   b. *Consider impacts to public views; and*

c. *Allow for the safe, unobstructed passage of fish and wildlife, particularly species dependent on migration.*

Response: The facility improvements that are proposed will be outside the Columbia River navigational channel and will not affect surface navigation on the river. Because the proposed project has been sited to use an existing dock structure and berth, the condition of the shoreline will remain industrial and in marine terminal use. A visual assessment analyzing the impact of the proposed project on views from the Columbia River looking north toward the shoreline concluded that the project will have a low level of impact on views from the Columbia River. This low level of impact is because of the distance of upland facilities from the viewpoints and because the project is consistent with the existing industrial context of the viewshed. Section 4.2.3 of the Application for Site Certifications includes details about the visual assessment.

Lastly, the number of piles that will be installed to support the proposed modifications at the loading terminal is the minimum necessary to meet safety and structural requirements. Their installation will occur in the same general location as the existing in-water dock and is not expected to obstruct the passage of fish and/or wildlife. In addition, to compensate for benthic impacts, significantly more piles will be removed than installed.

11. *In-water work shall be scheduled to protect biological productivity (including but not limited to fish runs, spawning, and benthic productivity). In-water work shall not occur in areas used for commercial fishing during a fishing season unless specifically addressed and mitigated for in the permit.*

Response: In-water work will occur during the approved in-water work window as established by the US Army Corps of Engineers (USACE) and the Washington State Department of Fish and Wildlife (WDFW). In addition, to reduce the amount of in-water work required, construction above the level of the water surface but below the OHWM may occur outside the work window when water levels are low.

Commercial fishing on the Columbia River near the project site is limited and the timing varies by year according to anticipated run sizes. According to information from the Oregon Department of Fish and Wildlife (ODFW), the only commercial fishery that could coincide with the work window is the Columbia River mainstem late fall fishery, which typically occurs in September and October, although the exact period varies by year. Construction activities will be

limited to an area immediately surrounding the existing loading berth and will not obstruct fishing traffic.

12. *The effect of proposed in-stream structures on bank margin habitat, channel migration, and floodplain processes should be evaluated during permit review.*

Response: The riparian area within the proposed project site is mostly devoid of vegetation, with the exception of scattered trees and vegetation below the top of the bank. Vegetation within the riparian habitat at the site consists primarily of small-diameter black cottonwood (*Populus trichocarpa*) and willows (*Salix* spp.), and non-native false indigo bush (*Amorpha fruticosa*) and Himalayan blackberry (*Rubus armeniacus*). The bank is armored with riprap, and above the riprap there is a narrow band of ruderal grass/forb habitat. No riparian trees or vegetation will be removed, and no impacts to bank margin habitat are anticipated.

The floodplain is located at approximately the top of bank and is discussed in section 3.3.3 of the Application for Site Certification. No fill is proposed within the 100-year floodplain. Therefore, the proposed project will not affect the 100-year base flood elevation of the Columbia River.

Historically, the Columbia River experienced channel migration but shoreline development and maintenance of the navigation channel in the project vicinity mostly confine the river to areas within the 100-year floodplain. The 100-year base flood elevation is generally located at the top of the bank at terminals 4 and 5 and it is not anticipated that project activities will result in changes to channel migration or the channel migration process.

15. *Developments permitted in the Aquatic Shoreline Designation along the Columbia River shall be sited waterward of -15 feet CRD unless shallow water habitat will be created as mitigation.*

Response: Pile installation is proposed in the Aquatic shoreline designation of the Columbia River and will occur in shallow water areas above-15 feet Columbia River Datum. The project does not propose to eliminate shallow water habitat in place of deep water habitat. Using piles and over-water structures has an effect on the value of shallow water habitat, but the design minimizes these effects by placing structures in water that is as deep water as possible, by using the minimum possible number of piles, and by using grated structures to the extent practicable. The project will "create" shallow water habit by removing structures in a number that at least equals those being placed.

4.3 Archaeological, Cultural and Historic Resources (SMP Section 5.2)

1. *All shoreline uses and development shall comply with the applicable requirements of VMC 20.710, Archaeological Resource Protection.*

2. *When a shoreline use or development is in an area known or likely to contain archaeological artifacts and data, the applicant shall provide for a site inspection and evaluation by a professional archaeologist prior to issuance of any shoreline permit or approval including a statement of exemption. Work may not begin until the inspection and evaluation have been completed and the City has issued its permit or approval.*

3. *If any item of possible archaeological interest (including human skeletal remains) is discovered on site, all work shall immediately stop, and the City, State Department of Archaeology and Historic Preservation (DAHP), and affected Native American Tribes shall be notified of the discovery. A stop-work order will be issued. The shoreline permit will be temporarily suspended. All applicable state and federal permits shall be secured prior to commencement of the activities they regulate and as a condition for resumption of development activities. Development activities may resume only upon receipt of City approval.*

   Response: Section 4.2.5 of the Application for Site Certification addresses cultural resources and no impacts from the project are anticipated. The project's unanticipated discovery plan will include the cessation of work in the location of an unanticipated archaeological or historical resource discovery and the notification of EFSEC and other appropriate jurisdictional agencies.

4. *If the discovery includes human skeletal remains, the find must be secured and protected from further disturbance; the Clark County Medical Examiner and local law enforcement shall be notified in the most expeditious manner possible. The County Medical Examiner will assume jurisdiction over the site and the human skeletal remains, and will make a determination of whether they are crime-related. If they are not, DAHP will take jurisdiction over the remains and report them to the appropriate parties. The State Physical Anthropologist will make a determination of whether the remains are Native American and report that finding to the affected parties. DAHP will handle all consultation with the affected parties as to the preservation, excavation, and disposition of the remains.*

   Response: If evidence of burials is encountered, all ground-disturbing activity in the vicinity will be halted immediately, and the Department of Historic and Archaeological Preservation (DAHP), the Clark County Sheriff's Office, and the appropriate tribes will be notified.

4.4 Critical Areas Protection (SMP Section 5.3)

The following sections address the regulations in Section 5.3, Critical Areas Protection, of the SMP.

1. *In addition to the provisions of this section, critical areas (fish and wildlife habitat conservation areas, frequently flooded areas, geologic hazard areas, and wetlands) located within shoreline jurisdiction and their buffers are regulated and protected by Chapter 5A, VMC 20.740, Critical Areas Protection as modified for consistency with the Act and this Program. All shoreline development shall comply with VMC 14.26, Water Resources Protection.*

   Response: The critical areas located within the shoreline jurisdiction of the site include fish and wildlife habitat conservation areas, frequently flooded areas, and geologic hazard areas. Additional information regarding these elements is located in the following sections of the Application for Site Certification: section 3.4 for fish and wildlife, section 3.3.3 for frequently flooded areas, and section 3.1 for geologic hazards.

2. *Unless otherwise stated, no development shall be constructed, located, extended, modified, converted, or altered or land divided without full compliance with this Program whether or not a shoreline permit or written statement of exemption is required.*

   Response: This memo addresses the City's SMP and includes details about how the proposed project is consistent with the policies and regulations of the SMP.

3. *Any allowed use, development, or activity affecting a critical area proposed on a parcel located in the shoreline jurisdiction, whether or not exempt from obtaining a shoreline substantial development permit, shoreline conditional use, or shoreline variance, shall be regulated under the provisions of this Program.*

   Response: This narrative and the Application for Site Certification address the critical area provisions of the SMP.

4. *Shoreline uses and developments and their associated structures and equipment shall be located, designed and operated using best management practices to protect critical areas.*

   Response: The proposed project will be completed using BMPs to protect critical areas as described in sections of the Application for Site Certification.

5. *The applicant shall demonstrate all reasonable efforts have been taken to avoid and where unavoidable, minimize and mitigate impacts such that no net loss of critical area and shoreline ecological function is achieved. Mitigation shall occur in the following order of priority:*
    a. *Avoiding the impact altogether by not taking a certain action or parts of an action. This may necessitate a redesign of the proposal.*
    b. *Minimizing unavoidable impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts. The applicant shall seek to minimize fragmentation of the resource to the greatest extent possible.*
    c. *Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;*
    d. *Reducing or eliminating the impact over time by preservation and maintenance operations;*
    e. *Compensating for the impact by replacing, enhancing, or providing substitute resources or environments. The compensatory mitigation shall be designed to achieve the functions as soon as practicable.*
    f. *Monitoring the impact and the compensation projects and taking appropriate corrective measures.*

Response: Impacts to critical areas have been avoided, to a large degree, by locating the proposed facility at an existing marine terminal, thus forestalling many of the direct environmental effects that could be expected from a new in-water facility. Modifications to the structures on berths 13 and 14 are necessary and are described above including necessary mitigation to minimize and offset impacts to aquatic resources.

During construction, the primary source of potential effects will be the generation of in-water noise during pile installation. To reduce the potential effects, the following BMPs will be employed:

- Using a vibratory pile driver to the maximum extent feasible.
- Employing a bubble curtain or other similar noise attenuation method (such as sound attenuation pile caps, increased hammer size, etc.) during impact pile driving.

- Implementing a marine mammal monitoring plan during pile driving activities to reduce the risk of potential impacts to ESA-listed marine mammals.
- Driving piles only during daylight hours.
- Using watertight forms during overwater concrete work to reduce the potential for spills to the environment.

Benthic habitat impacts will be associated with the installation of steel piles and the over-water structure for the mooring dolphins and walkways; these potential impacts will be offset by the proposed removal of existing steel and wood piles and the over-water structures at berths 13 and 14 and Terminal 2.

6. *In addition to compensatory mitigation, unavoidable adverse impacts may be addressed through restoration efforts.*

   Response: No restoration efforts are planned.

4.5 Public Access (SMP Section 5.4)

1. *Provisions for adequate public access shall be incorporated into all shoreline development proposals that involve public funding unless the applicant demonstrates public access is not feasible due to one or more of the provisions of Section 5.4.2 (a-e). Where feasible, such projects shall incorporate ecological restoration.*

2. *Consistent with constitutional limitations, provisions for adequate public access shall be incorporated into all land divisions and other shoreline development proposals (except residential development of less than five (5) parcels), unless this requirement is clearly inappropriate to the total proposal. Public access will not be required where the applicant demonstrates one or more of the following:*

   a. *Unavoidable health or safety hazards to the public exist that cannot be prevented by any practical means;*

   b. *Inherent security requirements of the use cannot be satisfied through the application of alternative design features or other solutions;*

   c. *The cost of providing the access, easement, alternative amenity, or mitigating the impacts of public access are unreasonably disproportionate to the total proposed development;*

   d. *Significant environmental impacts that cannot be mitigated will result from the public access; or*

   e. *Significant undue and unavoidable conflict between public access requirements and the proposed use and/or adjacent uses would occur,*

provided that the applicant has first demonstrated and the City determines that all reasonable alternatives have been evaluated and found infeasible, including but not limited to:

i. *Regulating access by such means as maintaining a gate and/or limiting hours of use;*

ii. *Designing separation of uses and activities (including but not limited to, fences, terracing, use of one-way glazings, hedges, landscaping); and*

iii. *Provisions for access at a site geographically separated from the proposal such as a street end, vista or trail system.*

Response: The project does not involve the use of public funds. Vessel loading and unloading areas at the Port are off-limits to the public in accordance with the requirements of the Maritime Security (MARSEC) system and the National Terrorism Advisory System (NTAS). In addition, the shoreline in the vicinity of the project site is devoted to heavy industrial activities and facilities, including ship loading and unloading, heavy vehicle use, and sand and gravel operations. Thus, public access to the shoreline at the project site is not allowed or appropriate and public access will not be incorporated into the project design.

4.6 Site Planning and Development – General (SMP Section 5.6.1)

1. *Land disturbing activities such as grading and cut/fill shall be conducted in such a way as to minimize impacts to soils and native vegetation and shall comply with VMC 14.24, Erosion Prevention & Sediment Control and VMC 14.25, Stormwater Control.*

Response: Ground-disturbing activities such as excavation for building foundations and site grading will be limited to the minimum areas necessary to construct the project. Land-disturbing activity in the shoreline area will be limited to excavating for building and pipeline foundations, modifying the trestle abutment, and constructing the driveway and potential ground improvements to address liquefaction and lateral movement during earthquake events. Site-specific BMPs for temporary erosion and sediment control are identified in the stormwater pollution prevention plan (SWPPP) and erosion and sediment control plans. BMPs will be used in accordance with the erosion control plan to ensure consistency with City and state regulations.

2. *Development shall be designed and land disturbing activities conducted to avoid impacts to healthy trees such that they are likely to become hazard trees.*

Response: Proposed project construction activities will occur primarily on areas of existing impervious surface and in areas disturbed by past development

activities and will not affect healthy trees in the shoreline areas. No tree removal is anticipated within the shoreline jurisdiction.

3. *Impervious surfaces shall be minimized to the extent feasible so as not to jeopardize public safety. Impervious surfacing for parking lot/space areas, trails, and pathways shall be minimized through the use of alternative surfaces where feasible.*

   Response: Project elements within shoreline jurisdiction will be constructed primarily in areas of existing impervious surface. The construction of the MVCU and the proposed access driveway will create some additional impervious surface within the shoreline. These surfaces are the minimum necessary for installing the equipment and driveway and will be located beyond the limits of the regulatory buffers for the SMA and SB.

4. *When feasible, existing transportation corridors shall be utilized. Ingress/egress points shall be designed to minimize potential conflicts with and impacts upon vehicular and pedestrian traffic. Pedestrians shall be provided with safe and convenient circulation facilities.*

   Response: The project will use existing transportation corridors to the extent feasible for site access for rail and auto traffic. There is no pedestrian access to the project area. At Terminal 5, two additional rail loops will be located in an existing rail corridor landward of existing and permitted tracks. At Terminal 4, access will be provided by the construction of a driveway from the existing Harborside Drive connecting with the existing access road along the shoreline. This driveway will not conflict with existing roadways and will eliminate conflicts with the access to Berth 10, which is used for auto imports. During vessel unloading, access from the east would be restricted because of vehicles exiting the vessels.

5. *Vehicle and pedestrian circulation systems shall be designed to minimize clearing, grading, alteration of topography and natural features, and designed to accommodate wildlife movement.*

   Response: The proposed new driveway will be located perpendicular to the shoreline, reducing the length that will be in the shoreline. Minor grading will be necessary where the proposed driveway crosses existing stormwater facilities.

6. *Parking, storage, and non-water dependent accessory and appurtenant structures and areas shall be located landward from the OHWM and landward of the water-oriented portions of the principal use.*

   Response: A 10-stall parking area will be restriped in an area of existing parking landward of the OHWM along berths 13 and 14 to accommodate workers at the loading berth.

7. *Trails and uses near the shoreline shall be landscaped or screened to provide visual and noise buffering between adjacent dissimilar uses or scenic areas, without blocking visual access to the water.*

   Response: Adjacent uses along the shoreline are industrial and are similar to the proposed project. There are no trails or public access areas immediately adjacent to project elements in shoreline jurisdiction that will require visual or noise buffering.

8. *Elevated walkways shall be utilized, as appropriate, to cross sensitive areas such as wetlands.*

   Response: The proposed project will not require access across sensitive areas or wetlands. Therefore, no elevated walkways are proposed.

9. *Fencing, walls, hedges, and similar features shall be designed in a manner that does not significantly interfere with wildlife movement.*

   Response: The shoreline area of berths 13 and 14 is completed surrounded by security fencing as mandated by federal regulations. Fencing may be modified or added based on the needs of the project. Fencing will not be located in the water or along the existing vegetated areas of the bank. Since there are no other adjacent habitat areas or significant areas of wildlife use except for the river, the new fencing will not interfere with wildlife movement.

10. *Exterior lighting shall be designed, shielded and operated to:*

    a. *Avoid illuminating nearby properties or public areas;*

    b. *Prevent glare on adjacent properties, public areas or roadways;*

    c. *Prevent land and water traffic hazards; and*

    d. *Reduce night sky effects to avoid impacts to fish and wildlife.*

    Response: Exterior lighting within the shoreline will be installed on the dock to illuminate the shiploading area for safety as ship loading will include nighttime operations. Lighting will be shielded and directed toward work areas to prevent

glare and avoid illuminating areas (such as the water surface) where there is no need for lighting. Adjacent areas are devoted to industrial uses and light and glare will not result in adverse effects to these areas. See section 4.2.2 of the Application for Site Certification for further information on lighting and glare.

4.7 Clearing, Grading, Fill and Excavation (SMP Section 5.6.2)

1. *Land disturbing activities such as clearing grading, fill and excavation shall be conducted in such a way as to minimize impacts to soils and native vegetation and shall comply with VMC 14.24, Erosion Prevention & Sediment Control; 14.25, Stormwater Control; and VMC Chapter 17.12, International Building Code.*

   Response: Section 2.11 of the Application for Site Certification addresses overall stormwater management. Within the shoreline, most of the proposed project will be constructed on existing impervious surfaces and prior disturbed areas along an existing industrial waterfront. By locating on an existing and prior developed site, the project's grading plans are designed to minimize and control erosion and sedimentation. Using BMPs in accordance with the erosion control plan will ensure compliance with City and state regulations. Further, the site contains no native vegetation that would be removed with the construction of the proposed project in the shoreline area.

2. *Clearing, grading, fill, and excavation activities shall be scheduled to minimize adverse impacts, including but not limited to, damage to water quality and aquatic life.*

   Response: Clearing and grading will be minimized within shoreline jurisdiction. Clearing, grading, and fill activities will only be conducted upland and will be of limited extent; therefore, specific schedules will not be necessary.

4. *Developments shall comply with the VMC 14.24, Erosion Prevention & Sediment Control during construction and shall ensure preservation of native vegetation for bank stability. Disturbed areas shall be stabilized immediately and revegetated with native vegetation.*

   Response: Excavation for the pipelines and structures and for the placement of the two additional rail lines within the Terminal 5 loop will occur within the shoreline area. Project construction will use appropriate BMPs to manage potential erosion or turbidity concerns. No impacts to native vegetation within the shoreline area are anticipated and, as a consequence, the project will not require the re-establishment of native vegetation.

6. *Fills shall be permitted only in conjunction with a permitted use, and shall be of the minimum size necessary to support that use. Speculative fills are prohibited.*

   Response: No fill, as defined in the SMP, is planned within the 100-year floodplain. Minor fill will be necessary to place the planned access driveway across the existing stormwater facilities located north of the berth area.

7. *Any fill activity shall comply with the fill provisions of VMC Chapter 17.12. Fill shall consist only of clean materials.*

   Response: Fill materials will comply with VMC Chapter 17.12 and will consist only of clean materials.

8. *Soil, gravel or other substrate transported to the site for fill shall be screened and documented that it is uncontaminated. Use of any contaminated materials as fill is prohibited.*

   Response: All soil, gravel or other minerals brought on site for project construction will consist of clean materials from an approved offsite source consistent with VMC 17.12 and Port protocols.

9. *Fills shall be designed and placed to allow surface water penetration into groundwater supplies where such conditions existed prior to filling.*

   Response: Fill will be placed only to accommodate the proposed driveway. Because the fill will be capped by impervious surfaces, it will not allow surface water penetration to groundwater. Runoff from the driveway will directed to a stormwater system for discharge to the Columbia River. The subject site is not within an aquifer recharge zone (see section 3.3.4 of the Application for Site Certification).

10. *Fills must protect shoreline ecological functions, including channel migration processes.*

    Response: Fill is proposed for an area that does not currently provide shoreline ecological functions because it is isolated from the river by existing development and is above the OHWM.

11. *Fill waterward of OHWM shall only be allowed as a conditional use, and then only when it is necessary: a. To support a water-dependent or public access use.*

    Response: No fill is proposed below the OHWM.

12. *In the Columbia River, fills shall be prohibited between the OHWM and minus fifteen (-15) feet CRD, unless shallow water habitat will be created as mitigation.*

    Response: Consistent with these provisions, no fill is proposed below the OHWM of the Columbia River.

14. *Upon completion of construction, remaining cleared areas shall be replanted with native species on the City's Native Plant List available from the Shoreline Administrator. Replanted areas shall be maintained such that within three (3) years' time the vegetation is fully re-established.*

    Response: The proposed project will not remove any riparian vegetation on the site. However, any exposed soils that may result from proposed construction within the shoreline jurisdiction will be stabilized by re-establishing the area to pre-existing developed conditions.

4.8 Building Design (SMP Section 5.6.3)

1. *Non-single- family structures shall incorporate architectural features that provide compatibility with adjacent properties, enhance views of the landscape from the water, and reduce scale to the extent possible.*

   Response: Two new buildings are proposed in shoreline jurisdiction, proximate to berths 13 and 14. They consist of an approximately 300-square-foot and 15-foot-tall control room / E-house and an approximately 300-square-foot and 15-foot-tall MCC building. Both will be single-story and metal-clad, consistent with the industrial character of other structures at the Port. They are small structures, ancillary to the loading operations, and are significantly smaller than other existing and planned structures in the vicinity, such as the FarWest Steel facility approximately 1,900 feet north of the shoreline and the planned bulk potash handling facility approximately 2,000 feet to the west at Terminal 5. Therefore, compared to existing surrounding industrial structures, these structures in shoreline jurisdiction will be inconspicuous and will not dominate views of the shoreline at Terminal 4.

2. *Building surfaces on or adjacent to the water shall employ materials that minimize reflected light.*

   Response: The only buildings proposed within shoreline jurisdiction are the control room/E-house and MCC buildings which will be located near berths 13 and 14 and will support the unloading operations at the marine terminal. These structures will include metal clad siding and will be painted in gray or earth tones to minimize the light reflected towards offsite locations.

3. *Façade treatments, mechanical equipment and windows in structures taller than two (2) stories, shall be designed and arranged to prevent bird collisions using the best available technology. Single-family residential structures are exempt from this provision.*

   Response: Only single-story structures are proposed within shoreline jurisdiction. Mechanical equipment, including the stack associated with the MVCU, the crane(s) on the dock, and the lighting towers, may be 45 feet in height or taller. Because the project will not employ reflective surfaces, large moving surfaces, solid red lights, guy wires, lattice towers, or other elements that present a hazard of bird strikes, no specific design measures are necessary to prevent bird strikes.

4. *Interior and exterior structure lighting shall be designed, shielded, and operated to: a. Avoid illuminating nearby properties or public areas; b. Prevent glare on adjacent properties, public areas or roadways; c. Prevent land and water traffic hazards; and d. Reduce night sky effects to avoid impacts to fish and wildlife.*

   Response: Lighting within shoreline jurisdiction will be necessary for safe operation at night. In Area 400 within shoreline jurisdiction, four light poles are proposed to be located on the dock, with an additional four light poles along the causeway and two light poles located along the roadway in front of the dock area on either side of the causeway. In addition, two lighting fixtures will be located at the maintenance parking stalls near the MCC and the Control Room. The lighting fixtures will be shielded and directed toward work areas and no off-site glare impacts are expected to result from their use. Lighting on the proposed site will be designed to ensure compliance with VMC 20.935.030.D, which prohibits off-site glare impacts from direct or reflected light sources.

5. *Accessory uses, including parking, shall be located as far landward as possible while still serving their intended purposes.*

   Response: The project will restripe an existing parking area at berths 13 and 14 within the shoreline area. This parking area is landward of the OHWM and, because of the limited depth of the area around berths 13 and 14 and the existing access road and stormwater facilities, the parking area cannot be located further from the shoreline.

4.9 Vegetation Conservation (SMP Section 5.7)

1. *Existing native vegetation within shoreline jurisdiction shall be retained and allowed to grow naturally in the riparian area.*

Response: Previous development and remediation activities filled, paved, and/or capped most of the project site. As a result, vegetation on the site is primarily limited to grasses, non-native weedy herbaceous vegetation, and shrubs located between the top of the bank of the Columbia River and the riprap at the water's edge. No removal of native vegetation is proposed.

2. *Removal of native vegetation outside the riparian area shall be avoided. Where removal of native vegetation cannot be avoided, it shall be minimized and mitigated to result in no net loss of shoreline ecological functions. Lost functions may be replaced by enhancing other functions provided that no net loss in overall functions is demonstrated and habitat connectivity is maintained. Mitigation shall be provided consistent with an approved mitigation plan. See Chapter 5A, 20.740.030(B)(1)(f) on maintaining fire-defensible space.*

   Response: No native vegetation will be removed within shoreline jurisdiction.

3. *If non-native vegetation is removed, it shall be replaced with native vegetation within the shoreline jurisdiction.*

   Response: Approximately 7,500 square feet of vegetation will be removed from areas near the stormwater facilities north of berths 13 and 14 to accommodate the pipelines, MVCU, and driveway. These areas will be covered by development and replanting is not feasible. If areas are cleared outside the limits of the new impervious surfaces, they will be planted with an appropriate groundcover native seed mix.

4. *Development shall be located to avoid clearing and grading impacts to more mature or multi-storied plant communities and to retain habitat connectivity.*

   Response: There are no mature or multi-storied plant communities within the shoreline jurisdiction that will be disturbed by the project.

5. *Vegetation (such as a mature stand of trees) that cannot be replaced or restored within twenty (20) years shall be preserved.*

   Response: No mature vegetation within the shoreline jurisdiction will be cleared with the proposed project.

6. *Maintaining vegetated riparian areas to protect shoreline stability and shoreline ecological functions takes precedence over vegetation clearing to preserve or create views.*

   Response: No vegetation will be cleared within the shoreline area to preserve or create views.

4.10 Visual Access (SMP Section 5.8.1)

1. *Visual access shall be maintained, enhanced, and preserved as appropriate on shoreline street-ends, public utility rights-of-way above and below the ordinary high water mark, and other view corridors.*

   Response: Visual impacts are assessed in section 4.2 of the Application for Site Certification. None of the proposed shoreline elements will occur at a shoreline street end or along a public right of way that provides a view corridor through the site.

   The SMP defines view corridors as follows:

   > *…portion of a viewshed, often between structures or along thoroughfares. View corridors may or may not be specifically identified and reserved through development regulations for the purpose of retaining the ability of the public to see a particular object (such as a mountain or body of water) or a landscape within a context that fosters appreciation of its aesthetic value.*

   As section 4.2.3 of the Application for Site Certification shows, the shoreline areas of the project site do not adjoin existing residential uses or neighborhoods and are not part of their viewshed. Residential areas, including street ends and public parks, that are located approximately 1.75 miles or more northeast of the project site have general territorial views of the Port. The distance and intervening trees and buildings prohibit direct views of berths 13 and 14. While the crane on the existing dock may be visible from certain areas, it will occupy a very small portion of the viewshed and will be smaller in scale than existing cranes and shiploading features currently developed along the shoreline.

2. *Development on or over the water shall be constructed to avoid interference with views from surrounding properties to the adjoining shoreline and adjoining waters to the extent practical.*

   Response: The surrounding properties are in current industrial use and the over-water structures are not located within a scenic vista from adjacent properties.

3. *Maintaining vegetated riparian areas to protect shoreline stability and shoreline ecological functions takes precedence over vegetation clearing to preserve or create views.*

   Response: No vegetation will be cleared to preserve or create views.

4.11 Water Quality and Quantity (SMP Section 5.9)

1. *The location, design, construction, and management of all shoreline uses and activities shall protect the quality and quantity of surface and ground water adjacent to the site.*

   Response: Runoff from any new and/or reconstructed areas of impervious surface within shoreline jurisdiction will be collected via catch basins, routed through a stormwater quality facility designed to comply with VMC 14.25, and ultimately conveyed to the Columbia River via existing Port outfalls. Stormwater management facilities will be designed to meet all necessary regulatory requirements to protect the quantity and quality of surface- and groundwater on and adjacent to the site. Details regarding the proposed stormwater system are contained in section 2.11 of the Application for Site Certification.

2. *All shoreline development shall comply with the applicable requirements of the VMC Chapter 14.24, Erosion Prevention & Sedimentation Control; 14.25, Stormwater Control; and 14.26, Water Resources Protection.*
3. *Best management practices [BMPs] for control of erosion and sedimentation shall be implemented for all shoreline development.*
4. *Potentially harmful materials, including but not limited to oil, chemicals, tires, or hazardous materials, shall not be allowed to enter any body of water or wetland, or to be discharged onto the land except in accordance with VMC 14.26. Potentially harmful materials shall be maintained in safe and leak-proof containers.*

   Response: The project will be constructed using appropriate BMPs, as described in section 2.11 of the Application for Site Certification, to manage potential erosion or turbidity concerns consistent with permits issued for the project and the requirements of VMC Chapter 14. Design and operation measures to minimize and respond to inadvertent releases of harmful materials are described in section 2.10 of the Application for Site Certification.

5. *Herbicides, fungicides, fertilizers, and pesticides shall not be applied within twenty-five (25) feet of a waterbody, except by a qualified professional in accordance with state and federal laws. Further, pesticides subject to the final ruling in Washington Toxics Coalition, et al., v. EPA shall not be applied within sixty (60) feet for*

ground applications or within three hundred (300) feet for aerial applications of the subject water bodies and shall be applied by a qualified professional in accordance with state and federal law.

Response: The construction of the proposed project does not involve the application of fungicides, fertilizers, and/or pesticides. If, in the operation of the facility, the management of invasive vegetation is required, it will be conducted in conformance with these provisions.

6. *Any structure or feature in the Aquatic shoreline designation shall be constructed and/or maintained with materials that will not adversely affect water quality or aquatic plants or animals. Materials used for decking or other structural components shall be approved by applicable state agencies for contact with water to avoid discharge of pollutants.*

Response: Additional steel piles and concrete decking will be necessary for structural improvements at the dock. WAC 220-11-060 contains technical provisions for dock construction established by WDFW. These provisions address the use of treated wood decking and structural elements. No wood elements are proposed consistent with these provisions.

7. *Conveyance of any substance not composed entirely of surface and stormwater directly to water resources shall be in accordance with VMC 14.26.*

Response: The project does not propose to convey anything other than stormwater to the Columbia River. Process water from the operation of the facility will be conveyed to the City sanitary sewer system for treatment and discharge.

4.12 SMP Chapter 5A Critical Areas Regulations

For this project, fish and wildlife habitat conservation areas, frequently flooded areas, and geologic hazard areas fall within the shoreline jurisdiction and are subject to compliance with the critical area standards contained in Chapter 5A of the SMP.

VMC 20.740.060 Approval Criteria

Any activity or development subject to this chapter, unless otherwise provided for in this chapter, shall be reviewed and approved, approved with conditions, or denied based on the proposal's ability to comply with all of the following criteria. The City may condition the proposed activity as necessary to mitigate impacts to critical areas and their buffers and to conform to the standards required by this chapter. Activities shall protect the functions of the critical areas and buffers on the site. Mitigation shall occur in the following order of priority:

A. *Avoid Impacts. The Applicant shall first avoid all impacts that degrade the functions and values of (a) critical area(s) by not taking a certain action or parts of an action. This may necessitate a redesign of the proposal.*

B. *Minimize Impacts. The applicant shall minimize the impacts of the activity by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce the impacts. The applicant shall seek to minimize the fragmentation of the resource to the greatest extent possible.*

C. *Rectify Impacts. The applicant shall rectify the impacts by repairing, rehabilitating, or restoring the affected environment.*

D. *Reduce Impacts. The applicant shall reduce or eliminate the impacts over time by preservation and maintenance operations.*

E. *Compensatory Mitigation. The applicant shall compensate for the impacts by replacing, enhancing, or providing substitute resources or environments. The compensatory mitigation shall be designed to achieve the functions as soon as practicable.*

F. *Monitor Impacts and Mitigation. The applicant shall monitor the impacts and the compensation projects and take appropriate corrective measures.*

Response:

Fish and Wildlife Habitat Conservation Area – Impacts to fish and wildlife habitat conservation areas have been avoided, to a great extent, by locating the proposed facility at an existing marine terminal, thus forestalling many of the direct environmental effects that could be expected from a new in-water facility. The only project elements located in these conservation areas are the proposed dock improvements located waterward of the top of the bank. These modifications are the minimum necessary to obtain an optimal mooring configuration and to meet current seismic standards. To offset the additional piles and overwater structure, the project will remove existing piles and overwater structures at the project site, Terminal 5, and Terminal 2. See section 3.4 of the Application for Site Certification for additional discussion of impacts and mitigation to the aquatic habitat.

Frequently Flooded Areas – No fill is planned for the project within the 100-year floodplain. As a consequence, the proposal will not result in a net rise in the 100-year base flood elevation. Furthermore, no structures, other than improvements to the existing dock, will be located in the 100-year floodplain. See

section 3.3.3 of the Application for Site Certification for an additional discussion of floodplain.

Geologic Hazard Areas – Clark County GIS data indicate that soils within the area of the project site have moderate-to-high potential for liquefaction or dynamic settlement during seismic events. This condition occurs over the entire site and across much of the land at the Port. Therefore, avoiding geologic hazard areas is not possible. Generally, critical area requirements for geologic hazard areas consist of compliance with the building code. A discussion of geologic hazards, risks, and mitigation is contained in sections 2.18 and 3.1 of the Application for Site Certification.

G. *Type and Location of Mitigation. Compensatory mitigation shall be in-kind and on-site, when feasible, and sufficient to maintain the functions of the critical area, and to prevent risk from a hazard posed by a critical area to a development or by a development to a critical area.*

Response: Mitigation for effects to conservation areas is described above and will occur primarily onsite through the design of the project and on other areas of the Port. Geologic hazard areas do not possess an ecological function that requires maintenance through mitigation or compensation. Rather, the geologic hazard is simply an indicator that the project must comply with building code standards regarding seismic hazards. As noted above, sections 2.18 and 3.1 of Application for Site Certification contain a discussion of geologic hazards, risks, and mitigation.

H. *In addition to mitigation, unavoidable adverse impacts may be addressed through restoration efforts.*

Response: No restoration is planned.

I. *No Net Loss. The proposal protects the critical area functions and values and results in no net loss of critical area functions and values.*

Response: The proposed project will not result in a net loss of critical area functions and values. The additional in-water construction will be offset by the removal of existing structures as shown in section 3.4 of the Application for Site Certification.

J. *Consistency with General Purposes. The proposal is consistent with the general purposes of this chapter and does not pose a significant threat to the public health, safety, or welfare on or off the development proposal site;*

Response: Per VMC Section 20.740.010 as referenced in Section 5A of the SMP, the general purposes of the critical area provisions are: (A) to designate and protect ecologically sensitive and hazardous areas (critical areas) and their functions and values, while also allowing the reasonable use of property; (B) protect critical areas (wetlands, fish and wildlife habitat conservation areas, geologically hazardous areas and frequently flooded areas); and (C) implement the goals and policies of the Vancouver Comprehensive Plan.

Consistent with these general purposes, the proposed project will use an existing port terminal and adjacent shoreline areas with limited ecological function to develop a new export facility that will expand economic opportunities in the City and the region. The shoreline development that is proposed will occur within existing developed areas and will not disturb or degrade environmentally sensitive areas. As described in section 4.3.3 of the Application for Site Certification, the development of the facility will include extensive systems to avoid, contain, respond to, and mitigate for any potential spill that could occur in the transfer of crude oil. As such, the proposal does not pose a significant threat to the public health, safety, or welfare on or off the development proposal site.

K. *Performance Standards. The proposal meets the specific performance standards of Fish and Wildlife Habitat Conservation Areas VMC 20.740.110, Frequently Flooded Areas VMC 20.740.120, Geologic Hazard Areas VMC 20.740.130, and Wetlands VMC 20.740.140, as applicable.*

Response: Per the performance standard provisions for fish and wildlife habitat conservation areas, frequently flooded areas, and geologic hazard areas, the proposed project has been designed to ensure:

- No net loss of critical area functions;
- No increase in the base flood elevation; and
- Compliance with the seismic code provisions adopted by VMC Title 17, Building and Construction.

4.13 VMC 20.740.110 Fish and Wildlife Habitat Conservation Areas

This code section identifies the following fish and wildlife habitat conservation areas:

- Habitat used by any life stage of state or federally designated endangered, threatened, and sensitive fish and wildlife species
- Priority habitats and associated priority species (PHS)
- Water bodies
- Habitats of local importance
- Riparian management areas and riparian buffers

The Columbia River, a Type 1 water/Type S shoreline of the state, supports resident and anadromous fish species. The river is designated as priority habitat by WDFW and is designated critical habitat for several salmonids and bull trout listed under the Endangered Species Act (ESA). The river also provides migration and foraging habitat for outmigrant juvenile salmonids. Marine mammals that occur in the river include California sea lions (*Zalophus californianus*), Steller sea lions (*Eumatopius jubatus*), and harbor seals (*Phoca vitulina*).

The City has established riparian management areas (RMA) and riparian buffers (RB) for the Columbia River. The RMA is defined as land 100 feet from the OHWM; the RB extends an additional 75 feet landward from the RMA along the Columbia River. However, Section 2.740.110(A)(1)(e)(A) specifies that where impervious surfaces from previous development functionally isolate the RMA and RB from the waterbody, the regulated area extends to the impervious surfaces. The Terminal 4 area was developed in 1993 and 1994 and included the installation of guardrails at the top of the bank and parking and other impervious surfaces landward of the guardrail. Therefore, the regulatory RMA/RB is limited to the riprap bank below the guardrail. At Terminal 4, vegetation within the functional portion of the riparian habitat at the site consists primarily of three small diameter black cottonwood, willows, non-native false indigo bush, and Himalayan blackberry below the top of the bank. The bank is armored with riprap, and above the riprap, there is a narrow band of ruderal grass/forb habitat. No vegetation clearance or disturbance is proposed within these limited functional areas of riparian habitat; therefore, the proposed project will not reduce the function of the fish and wildlife habitat conservation areas on the site.

4.14 VMC 20.740.120 Frequently Flooded Areas

As stated above, no net fill will occur within the 100-year floodplain of the site. Therefore, the project will not affect the 100-year base flood elevation and the proposed project is consistent with VMC 20.740.120.

4.15 VMC 20.740.130 Geologic Hazards

As previously stated, Clark County GIS data indicated moderate-to-high potential for liquefaction or dynamic settlement within the project site area. The project will incorporate necessary structural and foundation design to comply with the seismic requirements of the building code.

4.16 Specific Shoreline Use Regulations (SMP Chapter 6)

These responses illustrate how the project complies with the applicable specific shoreline use regulations described in Chapter 6 of the SMP.

4.16.1 Shoreline Use, Modification and Development Standards (SMP Table 6-1)

Table 6-1 in the SMP identifies development standards for uses in the shoreline. Shoreline uses included in the proposed project are identified in Table 3 below.

Table 3. Shoreline Uses

Shoreline Use	Proposed Uses	Aquatic	Urban: High Intensity
Industrial Use (Water-Dependent) Industrial Use (Water Dependent	• A 24- to 36-inch-diameter pipe that will connect the storage tanks to loading berths 13 and 14. • A 6-inch return line that will allow oil to return to the storage tanks in case of a shutdown of the shiploading system. • A 16- to 22-inch-diameter line that will deliver hydrocarbon vapor generated during the loading of vessels to a new MVCU. • A vapor blower staging unit that will be constructed on a concrete pad approximately 30 feet west of the Berth 13 access trestle. • Marine vapor recovery units for handling emissions for the ship holds during loading. The units will be installed on concrete slab and will include approximately 8, 25-foot-tall stacks. • An approximately 300-square-foot single-story control room / E-house that will be located immediately east of the Berth 13 access trestle. • An approximately 300-square-foot single-story MCC building that will be located approximately 250 feet west of the Berth 13 access trestle.	Permitted	Permitted

Shoreline Use	Proposed Uses	Aquatic	Urban: High Intensity
	• Improvements to the existing dock structure, including – Removal of two existing mooring dolphins – Placement of four new mooring dolphins including catwalks connecting to the existing trestle and dock. – Removal of an existing breasting dolphin and catwalks. – Replacement of the existing pile fender system with a cone fender system. – Adding more structural piles to the access trestle and dock. • Placement of a crane(s), dock safety unit, crane control building, and other equipment on the dock for shiploading.		
Setback= 0' Minimum in UHI / N/A in Aquatic	• Facilities proposed below OHWM and are in compliance as no minimum setback is required for a water-dependent facility.		
Height = Unlimited in both UHI and Aquatic	• The tallest structure within shoreline jurisdiction is 45 feet upland and approximately 60 feet above the OWHM in the aquatic zone		
Parking (Accessory Use)	• Proposed use of 11 existing parking stalls adjacent to Berth 13 in the HI designation.	N/A	Permitted
Setback= 50' in UHI and N/A in Aquatic	• The parking area is approximately 60 feet north of the OHWM of the Columbia River.		
Transportation Uses (Railroads)	• The addition of 5,600 linear feet of rail associated with the construction of two additional rail loops no closer than 100 feet from the OHWM at Terminal 5.	N/A	Permitted

4.16.2 Moorage Facilities: Docks, Piers, and Mooring Buoys (SMP Section 6.3.3.5)

1. *Mooring buoys shall be used instead of docks and piers whenever feasible.*

   Response: The proposed project will utilize the existing marine terminal at berths 13 and 14 in Area 400. Loading the vessel requires a direct ship-to-shore connection. Mooring buoys are not feasible for the type of loading and vessels needed for the proposed use as a direct connection with the shoreline is necessary for the loading process.

4. *Docks and piers for water-dependent commercial and industrial uses shall be allowed to the outer harbor line or combined U.S. Pierhead/Bulkhead line but no more than that required for the draft of the largest vessel expected to moor at the facility. These provisions are also applicable to multiple-use facilities where the majority use is water-dependent and public access can safely be provided.*

   Response: The proposed project will maintain the waterward line of the existing dock at berths 13 and 14 in Area 400 and will not extend the dock southward toward the Columbia River navigational channel.

5. *Bulk storage (non-portable storage in fixed tanks) for gasoline, oil and other petroleum products for any use or purpose is prohibited on docks and piers.*

   Response: The proposed facility will transfer crude oil from upland storage at the storage tank area at Area 300 via above- and below-ground steel transfer pipelines to the vessel loading system in Area 400. Consistent with this provision, gasoline, oil, and other petroleum products will not be stored on the dock.

4.16.3 Industrial Uses (SMP Section 6.3.6)

1. *Water-oriented industrial uses and development are preferred over nonwater oriented industrial uses and development.*

   Response: Consistent with this provision, the proposed petroleum terminal is a water-dependent facility and therefore is sited appropriately in shoreline jurisdiction.

5. *Proposed developments shall maximize the use of legally-established existing industrial facilities and avoid duplication of dock or pier facilities before expanding into undeveloped areas or building new facilities. Proposals for new industrial and port developments shall demonstrate the need for expansion into an undeveloped area.*

   Response: Consistent with this provision, the proposed petroleum terminal will use an existing industrial site and will not expand into an undeveloped area. The marine terminal will use an existing legally established dock thereby avoiding the duplication of dock and pier facilities.

6. *Proposed large-scale industrial developments or major expansions shall be consistent with an officially-adopted comprehensive scheme of harbor improvement and/or long-range port development plan.*

   Response: The proposed petroleum terminal is consistent with the Port's mission to provide economic benefit to the community through leadership, stewardship, and partnership in marine and industrial development. The project is also consistent with the Port's strategic plan goals which include the development of new rail-served marine terminals to grow economic benefits for the community. The Port has indicated that the project does not require an amendment to its adopted Comprehensive Scheme of Harbor Improvements.

4.16.4 Transportation Uses (SMP Section 6.3.13)

1. *All transportation facilities in shoreline areas shall be constructed and maintained to cause the least possible adverse impacts on the land and water environments, shall respect the natural character of the shoreline, and make every effort to preserve wildlife, aquatic life and their habitats.*

   Response: The proposed project will require the placement of two rail loops on Terminal 5, portions of which are within shoreline jurisdiction. These rail tracks will be installed landward of existing rail loops in areas that are currently impervious gravel surfaces. The site of the relocated tracks is devoid of vegetation and provides no riparian habitat function. Therefore, the proposed rail lines will not involve adverse effects to the land and water environment at Terminal 5.

2. *New or expanded surface transportation facilities not related to and necessary for the support of shoreline activities shall be located outside the shoreline jurisdiction wherever possible, or set back from the ordinary high water mark far enough to make shoreline stabilization, such as rip rap, bulkheads or jetties, unnecessary.*

Response: The proposed rail lines will serve the petroleum terminal, which is a water-dependent use; the lines are located landward of the existing rail lines. Thus, there is a direct connection between the proposed rail relocation and the shoreline activities of the proposal. Additionally, the relocated rail lines will not require modifications to the armored embankment at Terminal 5.

3. *Transportation facilities shall not adversely impact existing or planned water-dependent uses by impairing access to the shoreline. All roads shall be set back from water bodies and shall provide buffer areas of compatible, self-sustaining native vegetation. Shoreline scenic drives and viewpoints may provide breaks in the vegetative buffer to allow open views of the water.*

   Response: The proposed rail lines will not obstruct access to the shoreline at Terminal 5, as an existing access roads and rail lines are located between the proposed tracks and the shoreline. The proposed driveway addition to allow access to Area 400 will be perpendicular to the shoreline and will provide access to a water-dependent use.

:bc

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TECHNICAL REPORT

Tesoro Savage Vancouver Energy Distribution Terminal Transportation Impact Analysis

Date:	August 22, 2013	Project #: 13574.0
To:	Helen Devery, Berger ABAM	
From:	Brian J. Dunn P.E., Chris Brehmer, P.E., and Anais Malinge	

This report documents the results of the transportation impact analysis (TIA) prepared by Kittelson & Associates, Inc. (KAI) for the proposed Tesoro Savage Vancouver Energy Distribution Terminal in Vancouver, Washington. The proposed development site is located along the south side of Lower River Road (SR 501), within the Port of Vancouver.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Tesoro Savage Petroleum Terminal LLC (the Applicant) is proposing to construct a facility to receive petroleum by rail, store it on site, and ship it via the Columbia River to various users/refiners on the West Coast. The proposed facility involves three separate Port property areas; Terminal 5, Parcel 1A, and Berths 13 and 14 along the Columbia River. These areas are all zoned appropriately for the

proposed industrial use and are currently used for marine cargo laydown, temporary storage of scrap metal and a marine lay berth.

The proposed development will begin operations in 2015 and reach peak operations by 2020. At that time, the proposed facility will be handling a maximum of 360,000 barrels of petroleum per day, an average of 4 unit trains per day, and is expected to reach peak employment of 110 workers.

Traffic associated with the proposed site development will primarily access the Port's Terminal 5 area via Lower River Road (SR 501) west, Old Lower River Road south, and the Old Alcoa Facility Access Road to the east. From this road, access driveways will be established to separate parking lots adjacent to the facility's administrative and support buildings (Facility Area 200), just north of the loop track.

A site vicinity map is shown in Figure 1 with the proposed site plan shown in Figure 2.

Study Findings and Recommendations

This study concludes that acceptable levels of traffic operations and safety can be maintained at the study intersections with the build-out of the proposed development. Key study findings and recommendations are as follows:

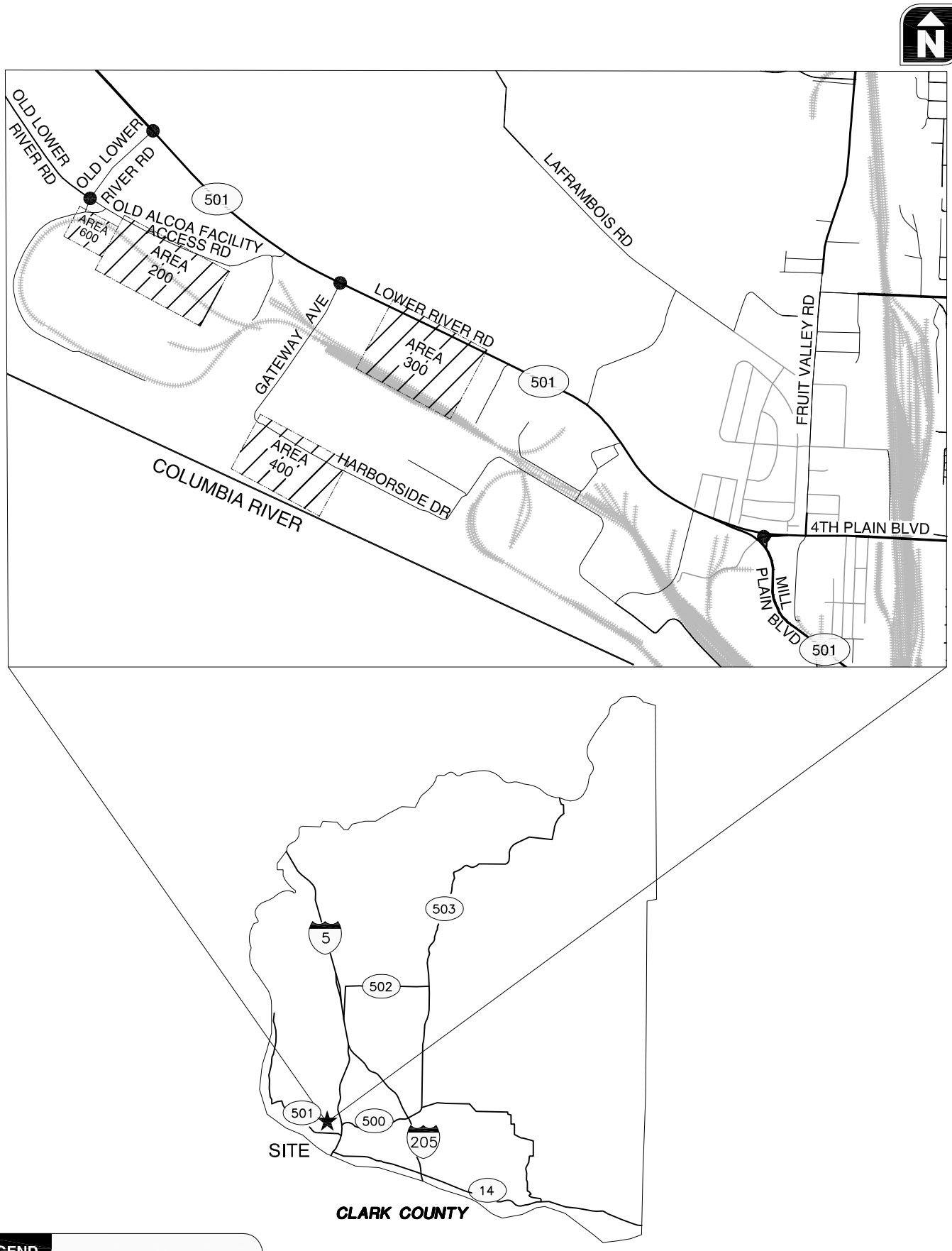
Findings

- All study intersections currently operate acceptably during the weekday a.m. and p.m. peak hours and are projected to continue to do so in 2020 and 2025 with site development.
- A review of historical crash data identified no safety-related mitigation needs at the study intersections.
- Intersection sight distance is adequate at all study intersections.
- The proposed development is estimated to generate 332 average daily trips, 48 weekday a.m. peak hour trips (40 in, 8 out), and 46 weekday p.m. peak hour trips (10 in, 36 out).

Recommendations

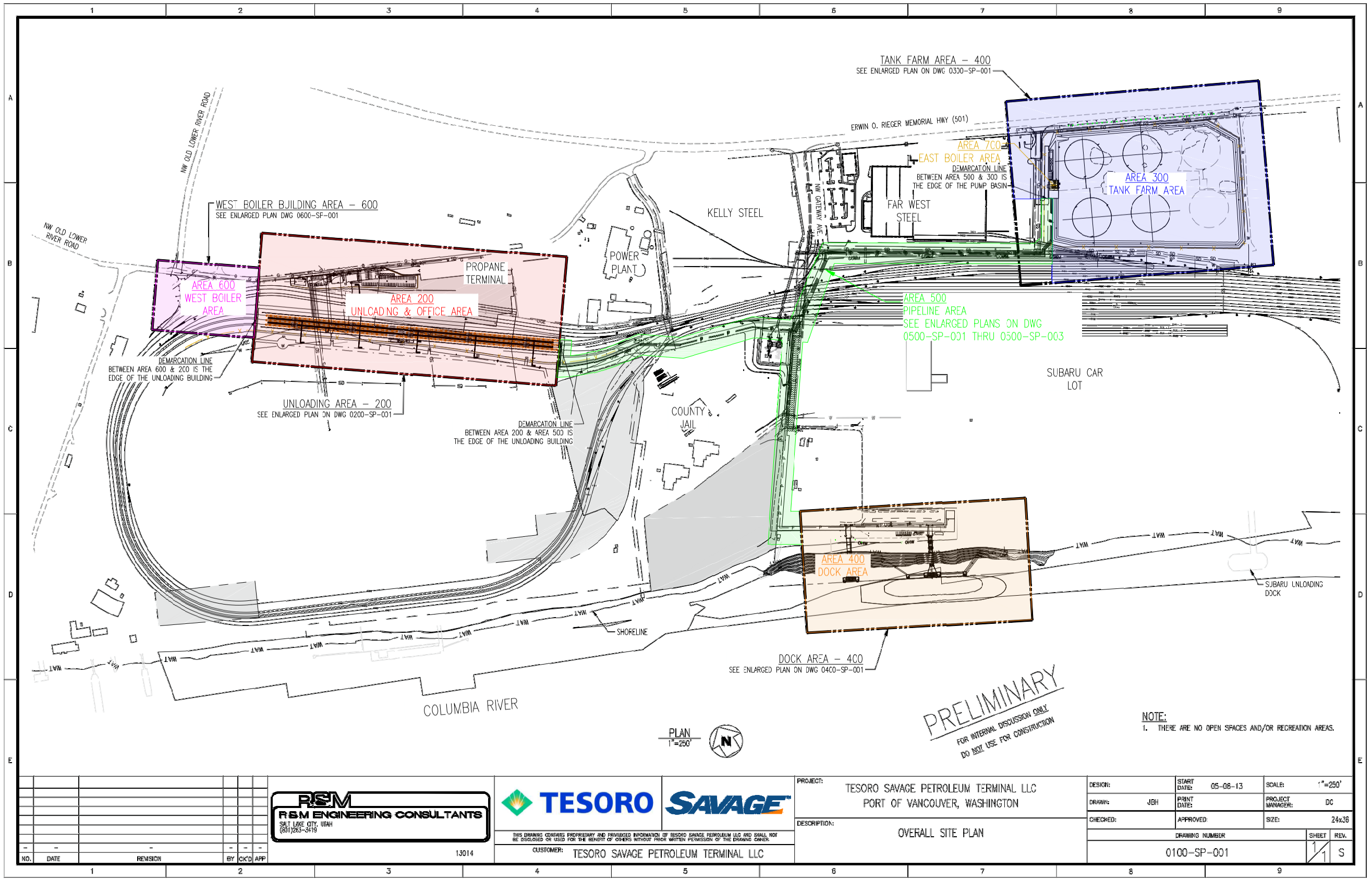
- The applicant should work with the Port of Vancouver and City of Vancouver to post a 25 MPH speed limit on Old Lower River Road south of SR 501, where no posted speed sign exists.
- The applicant should work with the Port and WSDOT to post a YIELD sign to control the channelized northbound right-turn maneuver from Old Lower River Road onto SR 501.
- The applicant should work with the Port and City of Vancouver to reconfigure traffic control devices at the Old Lower River Road/Old Alcoa Facility Access Road intersection.

- The applicant should work with the Port to add texturing/coloring treatments to the striped crosswalk on the private access approach to Lower River Road (SR 501), between the Far West Steel operation and the proposed Storage Tank area.
- The applicant should properly locate and maintain any new landscaping, signage, and/or above-ground utilities installed along the site frontage and internal roadways to ensure that adequate sight distance continues to be available.



SITE VICINITY MAP
VANCOUVER, WA

FIGURE 1



NO.	DATE	REVISION	BY	CK'D	APP
–	–	–	–	–	–

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TESORO SAVAGE

CUSTOMER: TESORO SAVAGE PETROLEUM TERMINAL LLC

PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: OVERALL SITE PLAN

DESIGN:	START DATE: 05-06-13	SCALE:	1"=250'
DRAWN: JBH	PRINT DATE:	PROJECT MANAGER:	DC
CHECKED:	APPROVED:	SIZE:	24x36
DRAWING NUMBER		SHEET	REV.
0100-SP-001		1/1	S

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SITE PLAN PROVIDED AUGUST 2013 BY BERGERABAM

PROPOSED SITE PLAN
VANCOUVER, WA

FIGURE **2**

Additional details on the analysis, pertinent findings and recommendations are documented in the remaining sections of this report.

SCOPE OF REPORT

This transportation impact analysis determines the transportation-related impacts associated with the proposed site development. The study intersections and overall study area for this project were determined based on a review of existing travel patterns, the traffic impact analysis requirements pursuant to Vancouver Municipal Code (VMC) Sections 11.80.130 and 11.80.080, the City's *Traffic Study Guidelines*, the City of Vancouver's Concurrency Ordinance (VMC 11.70), and direction provided by City of Vancouver staff through the project scoping process.

Transportation Concurrency Corridors and Study Intersections

The study site is located within Transportation Analysis Zone (TAZ) #38. In accordance with Vancouver's Transportation Concurrency ordinance, this report summarizes the number of weekday p.m. peak hour site-generated trips impacting each of the City's adopted concurrency corridors. Site-generated trips within the City were tracked to the following City-modeled concurrency corridors:

- Fourth Plain Boulevard (Port of Vancouver to I-5)
- Mill Plain Boulevard (Fourth Plain Boulevard to I-5)

Analysis Periods

Weekday morning (6:00 - 9:00 a.m.) and evening (4:00 - 6:00 p.m.) peak hour traffic conditions were modeled at the study intersections.

Study Intersections

Per the VMC and City staff direction, operational analysis was prepared at the following study intersections:

- Old Lower River Road/Lower River Road (SR 501)
- Gateway Avenue/Lower River Road (SR 501)
- Fourth Plain Boulevard/Mill Plain Boulevard (SR 501)
- Old Lower River Road/ Old Alcoa Facility Access Road

Report Format

The remaining sections of this report address the following transportation issues:

- Existing site conditions, surrounding land uses, and transportation system conditions within the site vicinity;
- Vehicle crash histories at study intersections;
- In-process developments, anticipated regional traffic growth trends, and planned transportation improvements in the study area;
- Future year 2020 and 2025 background traffic conditions at all study intersections during the weekday a.m. and p.m. peak hours;
- Trip generation and distribution estimates for the proposed site development;
- Future year 2020 and 2025 total traffic conditions at the study intersections with full build-out of the site during the weekday a.m. and p.m. peak hours;
- Vehicle queuing and sight distance at key study intersections;
- On-site access and circulation;
- Access spacing;
- Transportation concurrency corridor trip assignment;
- Analysis of construction traffic impacts; and,
- Potential traffic mitigation measures.

Conclusions and recommendations are provided following the analysis and documentation herein.

INTERSECTION ANALYSIS METHODOLOGY

All level-of-service (LOS) and volume-to-capacity (v/c) ratio analyses described in this report were performed in accordance with the procedures stated in the *2000 Highway Capacity Manual* (Reference 1). *A description of level of service, how it is measured, the criteria by which it is determined, and generally acceptable ranges of level of service are presented in Appendix "A".*

The peak 15-minute flow rate was used in the evaluation of all intersection operations to ensure that this study was based on a reasonable worst-case scenario. For this reason, the operations analyses reflect conditions that are only likely to occur for 15 minutes out of each average weekday a.m. and p.m. peak hour. Traffic conditions during all other weekday hours will likely operate under better conditions than those described in this report.

For the intersections operations analyses, *Synchro Version 8.0* software was used to analyze the study intersections along SR 501. Due to the unique traffic control characteristics of the Old Lower River Road/Old Alcoa Facility Access Road intersection, a separate software program, *SIDRA Version 5.1* was used to properly model the delay associated with stop-controlled and free-flow movements.

Intersection Operating Standards

VMC Section 11.80.130B requires signalized intersections under City jurisdiction to maintain LOS "E" and a v/c ratio less than 0.95. Unsignalized intersections must maintain a v/c ratio less than 0.95 for the critical movement and/or approach.

SR 501, which overlaps Lower River Road and then Mill Plain Boulevard to the southeast, is under the jurisdiction of the Washington State Department of Transportation (WSDOT). Therefore, intersections along SR 501 are subject to WSDOT's traffic operation standards, which require LOS "D" or better.

EXISTING CONDITIONS

The existing conditions analysis identifies site conditions and current operational and geometric characteristics of roadways within the study area. This section creates a basis for comparison to future conditions. The study site was visited and inventoried in July 2013. At that time, information was collected regarding site conditions, adjacent land uses, existing traffic conditions, and transportation facilities in the study area.

Site Conditions and Adjacent Land Uses

The proposed development site is located in three separate Port of Vancouver properties: a portion of Terminal 5, all of Parcel 1A, and Berths 13 and 14 along the Columbia River. At Terminal 5, two additional railroad loop tracks will be added inside the current loop tracks (constructed in 2010) to unload petroleum from incoming rail cars (see Areas 200 and 600 on site plan). Parcel 1A, just east of the Farwest Steel operation, is currently used for marine cargo laydown and temporary storage of steel scrap and will be the location of a series of holding tanks (a.k.a. Product Storage Tanks) designed to temporarily store petroleum (see Area 300 on site plan). Lastly, Berths 13 and 14 along the Columbia River, just south of the Subaru of America lot, will be used to transfer petroleum onto barges and ships (see Area 400 on site plan).

Recent completion of the loop track at Terminal 5 is part of ongoing efforts by the Port to complete the West Vancouver Freight Access project. Construction efforts are currently underway to complete a new grade-separated crossing for Gateway Avenue to pass over the adjacent rail line. These improvements will provide access to Terminal 5 properties south of the rail line, including the Clark County Corrections Jail Work Center and Subaru of America Lot along Harborside Drive. Terminal 5 is also the location of the future BHP Billiton Bulk Potash Handling Facility; preliminary construction has begun and the facility is expected to be completed in in mid-2015.

There are a variety of other marine and industrial businesses in the vicinity of the Tesoro Savage Vancouver Energy Distribution Terminal site. Other nearby industrial businesses include Subaru of America, Kelly Steel, Tri-Star, FarWest Steel Corporation, West Van Materials Recovery Center, and Tidewater. There is also a propane terminal (operated by Keyera) and a gas fired turbine power plant

(operated by Clark County Public Utilities) located at the east end of the Old Alcoa Facility Access Road, which is a private roadway. The Clark County Jail Work Center is located west of Gateway Avenue and the Subaru facility.

Adjacent Roadway Facilities

Table 1 summarizes key characteristics of the local study area roadways.

Table 1: Existing Transportation Facilities and Roadway Designations

Roadway	Classification	Cross-Section	Speed Limit	Side-walks?	Bicycle Lanes?	Median?	On-Street Parking?
Fourth Plain Boulevard	Principal Arterial	3-5 lane	35 mph	Partial	Yes	TWLTL[1]	No
Mill Plain Boulevard (SR 501)	Principal Arterial (State Highway Route)	5-lane	35 mph	Yes	Yes	Raised	No
Lower River Road (SR 501)[2]	Principal Arterial (State Highway Route)	2-5 lane[3]	45-50[4] mph	No[5]	No[6]	No	No
Gateway Avenue	Local Public Street	2-lane	Not Posted	Partial (east side)	No	No	Yes
Old Lower River Road	Local Public Street	2-lane	Not Posted	No	No	No	No
Old Alcoa Facility Access Road	Private Street	2-lane	15 mph	No	No	No	No

[1] Two-Way Left-Turn Lane with exclusive turn lanes at major street intersections.
[2] Lower River Road (SR 501) is both a City-designated Principal Arterial and State designated Highway Route from Fourth Plain Boulevard to the City Limits, and then only a State Highway Route west of Gateway Avenue.
[3] Cross-section changes from 5 lanes east of 26th Avenue to 2 lanes west of 26th Avenue, with left-turn lanes at major intersections.
[4] Posted speed changes from 45 MPH east of Centennial Industrial Park to 50 MPH west of Centennial Industrial Park.
[5] There is a new two-way multiuse trail along the south side of Lower River Road (SR 501) extending from Gateway Avenue east along the Far West Steel property as well as the proposed Tesoro Savage Petroleum Terminal site frontage for the Tank Farm Area.
[6] Although not formally designated as bike lanes, there is fog line striping and sufficient paved shoulder on both sides of SR 501 for bicycle travel.

SR 501

State Route (SR) 501 is operated and maintained by WSDOT. West of I-5, this highway leads west out of the downtown Vancouver area along Mill Plain Boulevard and then along Lower River Road west of the Fourth Plain Boulevard/Mill Plain Boulevard intersection. As Mill Plain Boulevard, the highway has 5 lanes of travel and urban design features including a landscaped median, bicycle lanes and sidewalks. West of the Fourth Plain Boulevard intersection, the highway becomes more rural in nature, where it reduces down to 2 travel lanes with left-turn lanes provided at major intersections. The highway generally has wide paved shoulders and fog line striping for bicycle travel and there is a multi-use path at intermittent locations along the south side of the road.

Gateway Avenue

Gateway Avenue is the main entrance to Terminal 5 at the Port of Vancouver. The roadway is a private road with two travel lanes, partial sidewalks and on-street parking is allowed.

Old Lower River Road

Old Lower River Road extends south from Lower River Road (SR 501) and then west to provide access to local industrial businesses before it circles back to SR 501 to the northwest. It is a public local road with two lanes of travel, no sidewalks or bicycle lanes, and no on-street parking.

Old Alcoa Access Facility Road

The Old Alcoa Access Facility Road extends east from where Old Lower River Road turns southbound-to-westbound. This private road has two travel lanes, a posted speed of 15 MPH and no sidewalks. It leads east to the Keyera propane facility and a gate that prevents further travel east.

Bicycle and Pedestrian Facilities

Sidewalks and bicycle lanes are installed along Mill Plain Boulevard and Fourth Plain Boulevard. While there are no designated bicycle lanes along Lower River Road (SR 501), a two-way multiuse path was recently installed along the south side of SR 501 starting at Gateway Avenue and proceeding east along the FarWest Steel property frontage. This path also extends along the site frontage of the Tank Farm area of the Tesoro Savage project and includes a striped crosswalk and signage at the private access to SR 501 between the FarWest Steel and the proposed Storage Tank area.

No continuous sidewalks or bicycle lanes are installed on the local streets that lead directly to the site, namely Gateway Avenue and Old Lower River Road.

Transit Facilities

The nearest fixed-route public transit service to the site is provided at the Mill Plain Boulevard/Fourth Plain Boulevard intersection, and provided by C-Tran (Reference 2). The intersection is roughly 0.75 miles east of the easternmost portion of the site. *Route #25* serves the intersection and provides service between 39th Street/Fruit Valley Road, downtown Vancouver, and the 99th Street Transit Center. Service is provided on weekdays at approximately 35-minute headways and on weekends at approximately 50-minute headways. *Route #25* travels on Fruit Valley Road, Fourth Plain Boulevard, and Mill Plain Boulevard.

The Port of Vancouver is in the process of developing a multi-modal path along Lower River Road (SR 501) to the bus service line at the Mill Plain/Fourth Plain intersection.

Crash Analysis

A five-year crash history of all study intersections (data reported from January 2008 through December 2012) was obtained from WSDOT in an effort to identify potential safety issues. Key crash variables (e.g., type, severity, etc.) were reviewed at each intersection to assess whether any crash patterns might be identifiable.

Table 2 presents a summary of the 5-year crash history at the study intersections in terms of crashes by type, severity, and per million entering vehicles (MEV). The City's *Traffic Study Guidelines* identify a crash rate greater than or equal to 1.0 crashes/MEV as a threshold that determines the need for additional evaluation and potential mitigation.

Table 2: 2008-2012 Crash Data Summary

Intersection	# of Crashes	Crash Type				Crash Severity		Crashes per MEV[2]
		Rear -End	Side-swipe	Angle	Overturned Vehicle	PDO[1]	Injury	
Old Lower River Rd/Lower River Rd (SR 501)	1	-	1	-	-	-	1	0.35
Gateway Ave/Lower River Road (SR 501)	1	-	-	-	1	1	-	0.25
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	4	-	2	1	1	3	1	0.33
Old Lower River Rd/Old Alcoa Facility Access Rd	0	-	-	-	-	-	-	0.00
Lower River Road/Private Driveway (FarWest Steel)[3]	0	-	-	-	-	-	-	0.00

[1] PDO: Property Damage Only
[2] MEV: Million Entering Vehicles
[3] The private drive intersection with Lower River Road (SR 501) between the Far West Steel property and the proposed Tesoro Savage Tank Farm area was established in the last two years and no crash data was available for this intersection. Given the limited use of this road, its recent construction in accordance with City design standards and sufficient intersection sight distance (as observed and noted in the previous section of this report), there are no apparent traffic safety issues at this location.

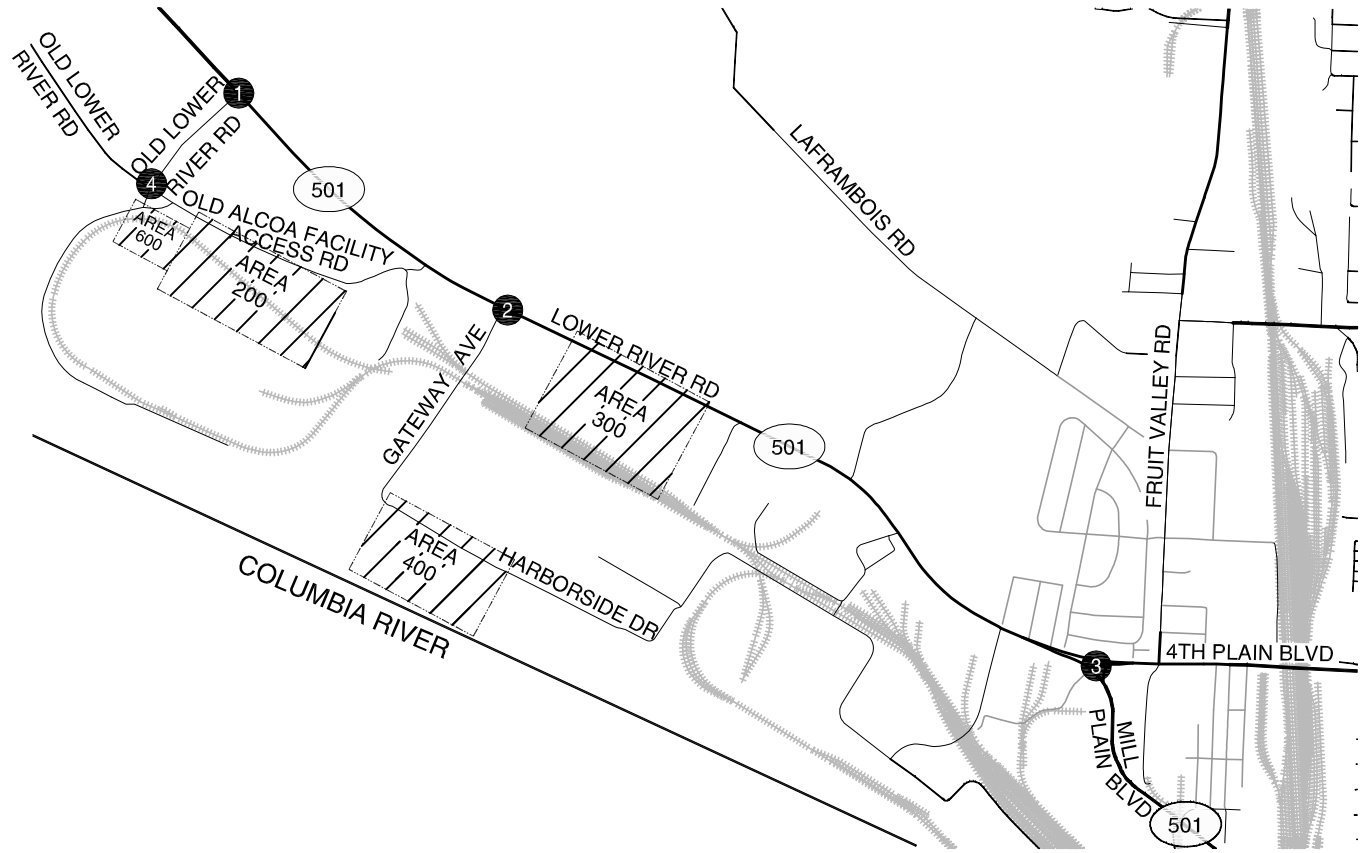
As shown in the previous table, the study intersections have a crash rate of less than one crash per million entering vehicles. Based on the crash review, and in accordance with City requirements for thresholds exceeding 1.0 crashes/MEV, no apparent safety hazards or safety-based mitigation measures were identified. *Appendix "B" contains the crash data used for the crash analysis.*

Existing Lane Configurations and Traffic Control Devices

Figure 3 illustrates the existing lane configurations and traffic control devices at the study intersections. Each of the intersections is also described below.

Fourth Plain Boulevard/Mill Plain Boulevard (SR 501)

This four-legged intersection is signalized and operates with protected left-turn phasing on the mainline approaches of Mill Plain Boulevard and permitted left-turn phasing on the Fourth Plain and St. Francis Lane approaches. The traffic signal is isolated, and therefore, not coordinated with other signals along Mill Plain Boulevard. Crosswalks with pedestrian signal control are installed on the southwest and southeast intersection approaches. Pedestrians are not accommodated on the other two approaches. The westbound approach on Fourth Plain Boulevard has a free right turn lane that merges with northbound-to-westbound Mill Plain Boulevard traffic at speed.



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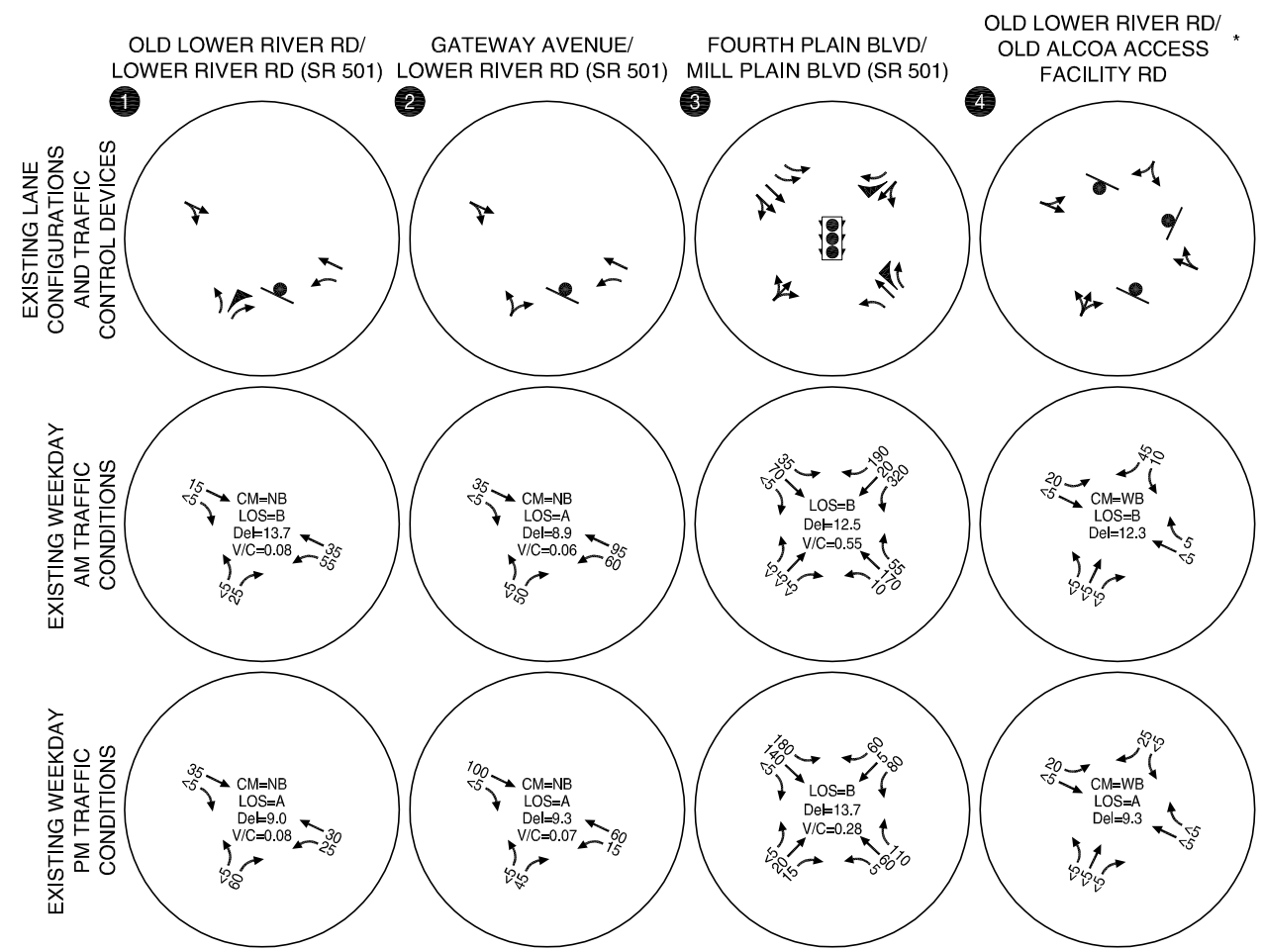

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
STOP SIGN
TRAFFIC SIGNAL

* Southbound approach has "Right Turn Permitted Without Stopping" Sign

EXISTING TRAFFIC CONDITIONS
WEEKDAY AM & PM PEAK HOURS
VANCOUVER, WA

FIGURE 3

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Gateway Avenue/Lower River Road (SR 501)

This T-shaped intersection operates with stop-control on the minor street approach of Gateway Avenue. An exclusive left-turn lane is provided for movements off the highway.

Old Lower River Road /Lower River Road (SR 501)

This T-shaped intersection operates with stop-control on the minor street approach of Old Lower River Road; however, the northbound right-turn movement from Old Lower River Road is channelized with no posted traffic control. That impact analysis conservatively assumes the northbound right-turn movement is stop-controlled for delay calculation purposes, even though drivers may only yield before merging with mainstream traffic.

Old Lower River Road /Old Alcoa Facility Access Road

This four-legged intersection is intersected by the public portion of Old Lower River Road (north and west legs only), the private portion of the Old Alcoa Facility Access Road (east leg), and an outbound-only driveway coming from the rail loop track and "perimeter road" at Terminal 5. Traffic control is as follows:

- Southbound approach: stop-controlled with a "Right Turn Permitted Without Stopping" sign
- Northbound approach: stop controlled
- Eastbound approach: uncontrolled
- Westbound approach: stop-controlled

The traffic control configuration allows the current primary southbound-to-westbound and eastbound-to-northbound movements on the public section of Old Lower River Road to occur freely while stopping all other movements.

Existing Traffic Conditions

Traffic counts were obtained at the study intersections on mid-week days in May 2013 during the weekday morning (6:00 – 9:00 a.m.) and afternoon (4:00 – 6:00 p.m.) peak periods. The counts were compiled and reviewed to identify the peak hour periods for the street system, which occurred from 7:00 – 8:00 a.m. and 4:00 – 5:00 p.m.

As shown in Figure 3 and in Table 3, all study intersections currently operate within acceptable operations thresholds during the weekday a.m. and p.m. peak hours.

Table 3: Existing Traffic Conditions Summary

Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/Lower River Rd (SR 501)	AM	B	0.08	LOS "D"	Yes
	PM	A	0.08		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.06	LOS "D"	Yes
	PM	A	0.07		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.55	LOS "D"	Yes
	PM	B	0.28		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	B	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	A	NA		Yes

Appendix "C" contains the traffic count data sheets used in this study and Appendix "D" contains the operational analysis worksheets prepared for the existing conditions weekday a.m. and p.m. peak hour analysis periods.

BASELINE TRAFFIC CONDITIONS

The baseline traffic conditions analysis estimates operating conditions for the year 2020, when the proposed Tesoro Savage Vancouver Energy Distribution Terminal is expected to operate at full capacity and at full employment. Also, a baseline future forecast for the year 2025 was prepared, per the City's TIA requirements, to identify how the study area's transportation system will operate five years after completion of the proposed development.

This baseline analysis includes general traffic growth in the region, vehicle trips generated by in-process developments in the site's vicinity, but does not include traffic from the proposed development. It also accounts for planned transportation improvement projects not associated with the proposed site development.

Planned Roadway Improvements

As noted earlier in this report the Port of Vancouver is completing several street improvement projects to improve access to Terminal 5 and other areas of the Port. The Port has constructed a "perimeter road" around the outside of the loop track connecting Old Lower River Road with Harborside Drive and a new grade-separated structure for Gateway Avenue to convey the roadway over the railroad tracks. Access to Berths 13 and 14 along the Columbia River will also be established. These improvements will help reduce internal site traffic use of Lower River Road (SR 501) traveling between site areas. No other funded street improvements were identified in the study area.

Build-Out Year 2020 Baseline Traffic Conditions

A 1.5-percent linear annual growth rate was applied to existing year 2013 peak hour traffic volumes over a 7-year period to develop year 2020 baseline traffic volumes for the weekday a.m. and p.m. peak hours. This growth rate was applied to major traffic movements at the study intersections along SR 501 intersections, but not at minor connections related to Port properties such as Gateway Avenue and Old Lower River Road.

One in-process development was identified and included in the 2020 baseline traffic volumes; the Terminal 5 Bulk Potash Handling Facility. The approved Bulk Potash Handling Facility development is to be located west of the proposed site. The vehicle trips generated from this in-process development were assigned to the study intersections based on the trip generation and assignment contained in the *Bulk Potash Handling Facility Transportation Impact Analysis* (Reference 3).

Figures 4 and 5 and Table 4 illustrate the build-out year 2020 baseline traffic conditions for the respective weekday a.m. and p.m. peak hour periods. As shown, the study intersections are forecast to continue to operate acceptably under these scenarios during the weekday a.m. and p.m. peak hours.

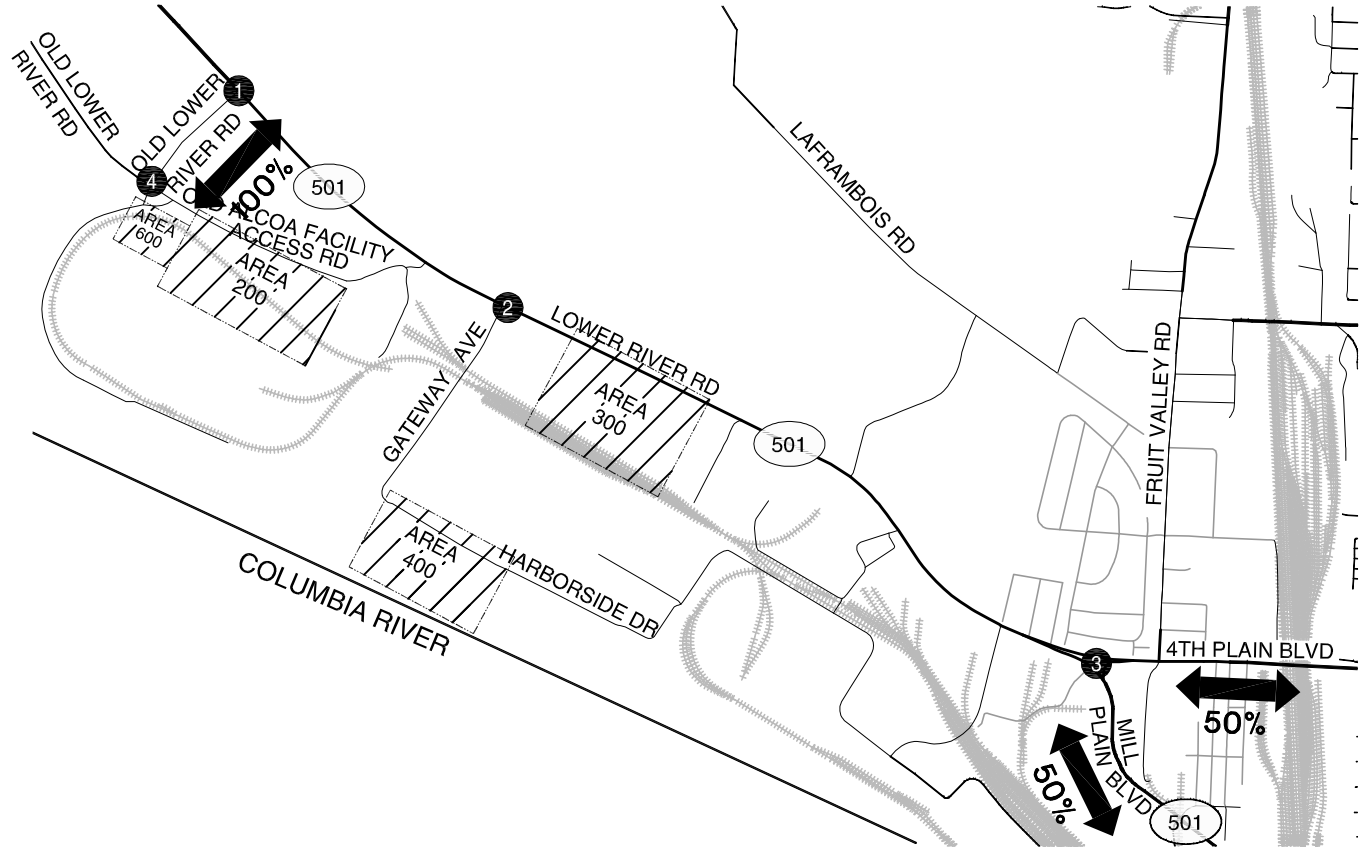
Table 4: Build-Out Year 2020 Baseline Traffic Conditions Summary

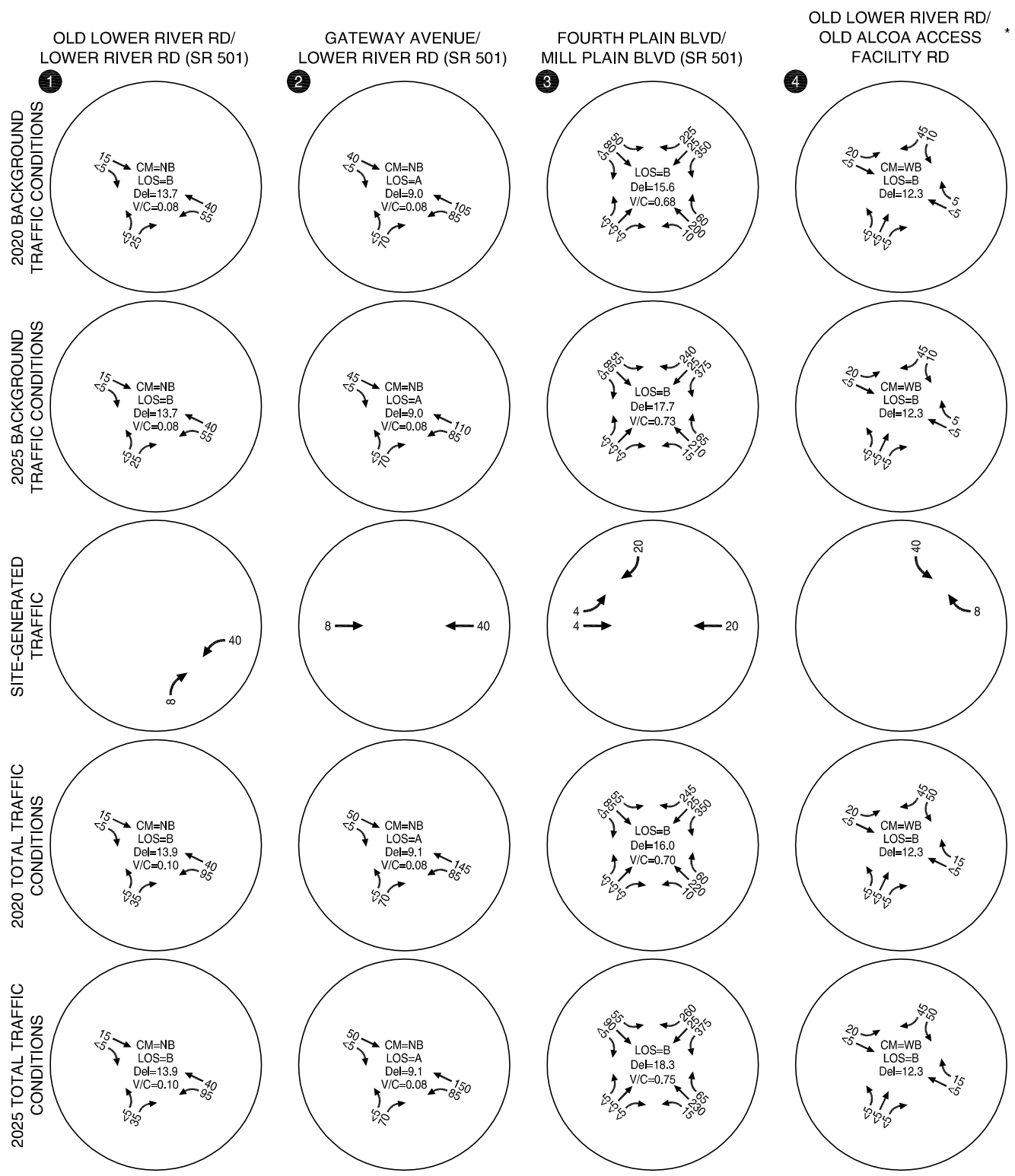
Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/Lower River Rd (SR 501)	AM	B	0.08	LOS "D"	Yes
	PM	A	0.08		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.08	LOS "D"	Yes
	PM	A	0.07		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.68	LOS "D"	Yes
	PM	B	0.34		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	B	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	A	NA		Yes

Appendix "E" includes in-process development trips. Appendix "F" contains the 2020 baseline traffic conditions operational analysis worksheets prepared for the a.m. and p.m. peak hour periods.

Forecast Year 2025 Baseline Traffic Conditions

Year 2020 baseline traffic volumes were further increased by a 1.5 percent linear annual growth rate to develop year 2025 baseline traffic volumes. Consistent with the 2020 analysis, the growth rate was applied to major traffic movements of study intersections along SR 501. No additional in-process developments or planned roadway improvements were identified at the study intersections for the 2025 forecast year.





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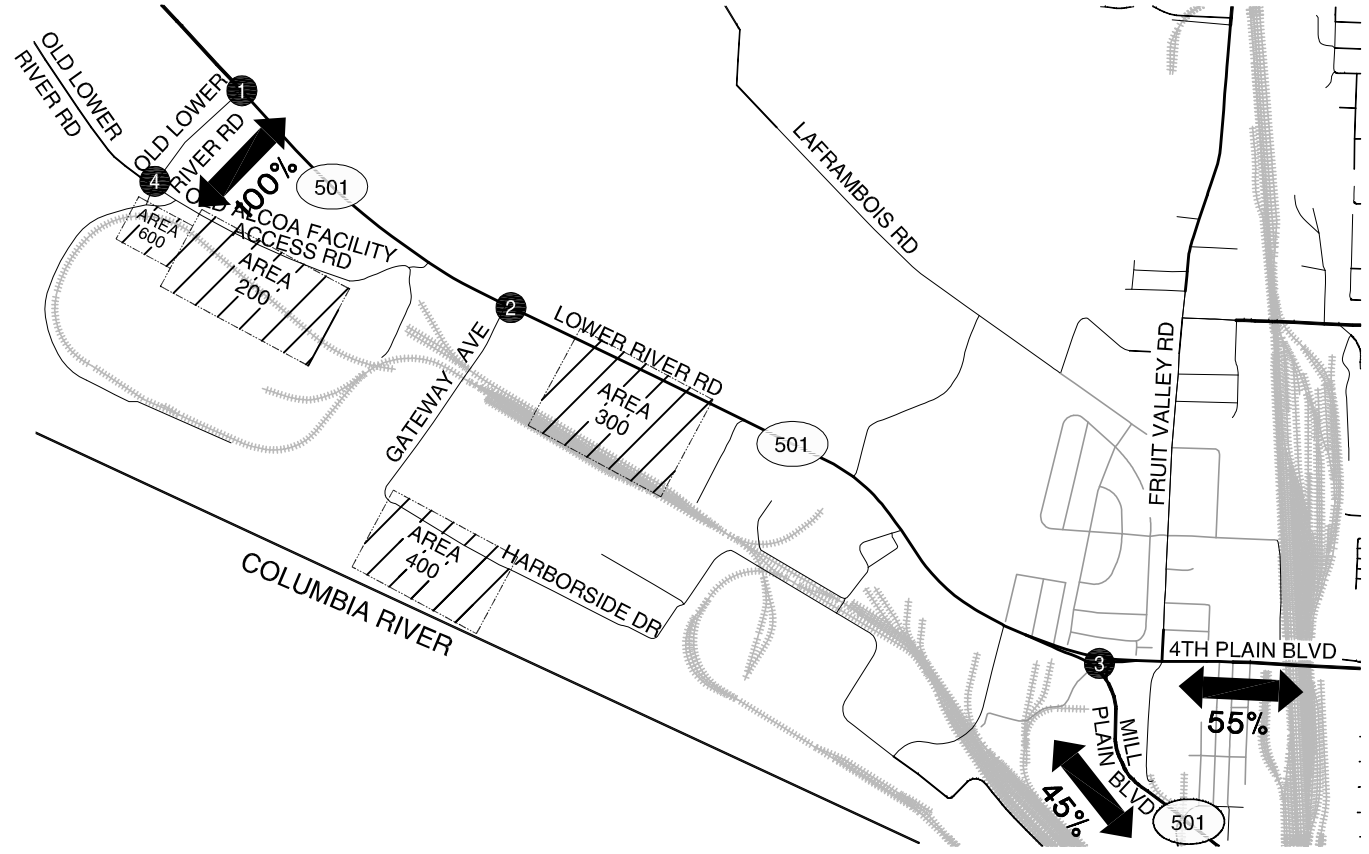
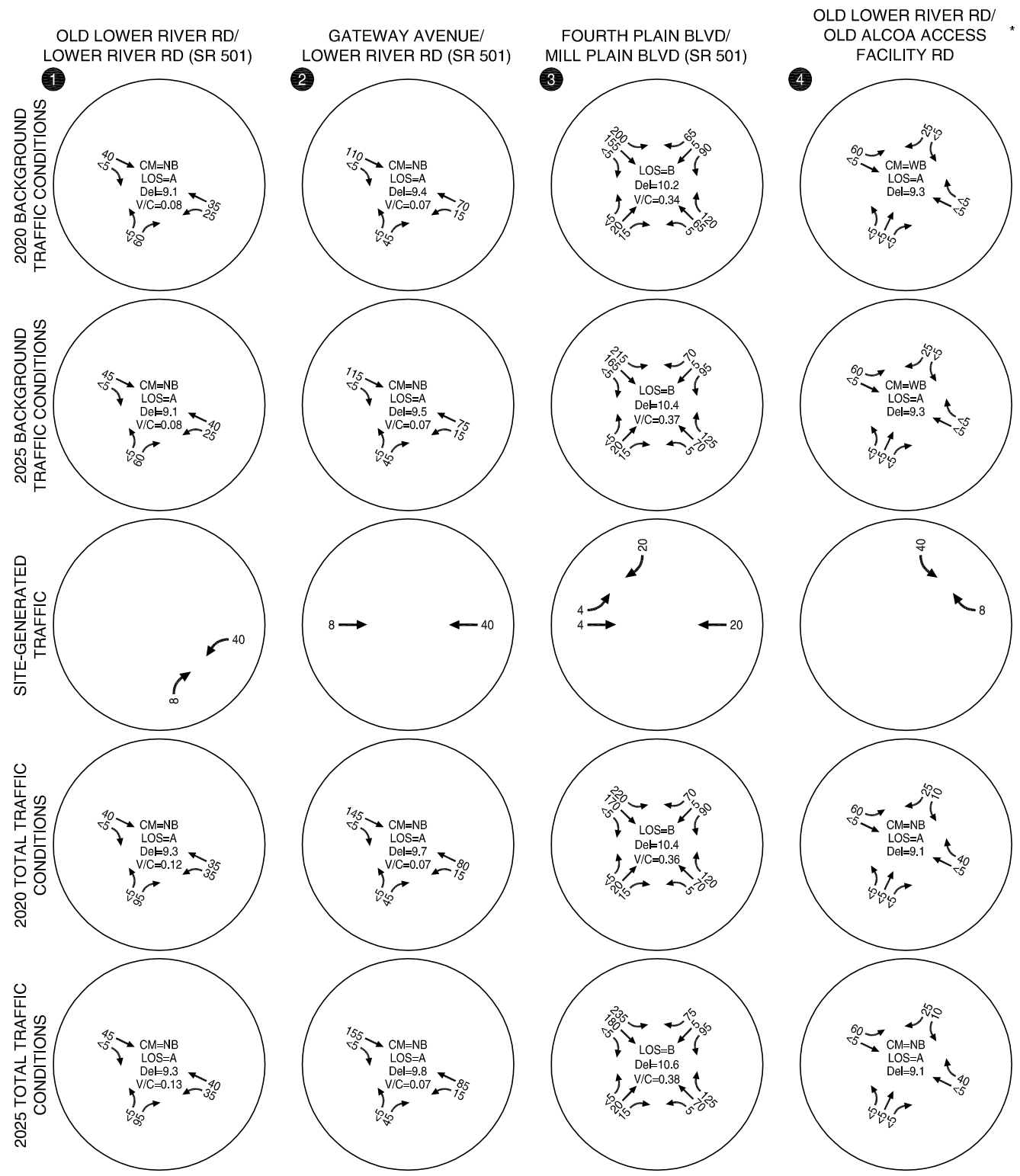
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

* Southbound approach has "Right Turn Permitted Without Stopping" Sign

FUTURE TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
VANCOUVER, WA

FIGURE 4





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V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

* Southbound approach has "Right Turn Permitted Without Stopping" Sign

FUTURE TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
VANCOUVER, WA

FIGURE 5

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As shown in Figures 4 and 5 and in Table 5, all study intersections are forecast to continue to operate acceptably in the year 2025 during the weekday a.m. and p.m. peak hours.

Table 5: Forecast Year 2025 Baseline Traffic Conditions Summary

Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/Lower River Rd (SR 501)	AM	B	0.08	LOS "D"	Yes
	PM	A	0.08		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.08	LOS "D"	Yes
	PM	A	0.07		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.73	LOS "D"	Yes
	PM	B	0.37		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	B	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	A	NA		Yes

Appendix "G" contains the 2025 baseline traffic conditions operational analysis worksheets prepared for the a.m. and p.m. peak hour periods

TOTAL TRAFFIC CONDITIONS

This report section presents the proposed development plan, its anticipated trip generation, trip distribution and assignment, the operational impacts of site trips on the study intersections, and required trip assignment to the City of Vancouver's concurrency corridors.

Proposed Development Plan

Tesoro Savage Petroleum Terminal LLC (the applicant) is proposing to construct a facility to receive petroleum by rail, store it on site, and ship it via the Columbia River to various users/refiners on the West Coast. The development proposal, known as the Tesoro Savage Vancouver Energy Distribution Terminal, is to begin operations in 2015 and reach peak operations (full staffing) by the year 2020. At that time, the proposed facility will be processing a maximum of 360,000 barrels of petroleum per day, an average of 4 unit trains per day, and reach peak employment of 110 workers. Descriptions of the facility processing areas comprising the site are described in the following sections.

Terminal 5

The portion of Terminal 5 associated with this project is located along the south side of the Old Alcoa Facility Access Road. It involves Area 600 (West Boiler Area) and Area 200 (Uloading & Office Area) as shown in the site plan. In this area, the applicant is proposing to construct new loop track lines within the existing loop track along with a structure used to unload petroleum delivered by unit trains. A boiler/steam plant and a series of small office buildings will be built north of the loop track

and along the south side of the Old Alcoa Facility Access Road. The buildings will be used by facility employees to park their personal vehicles during the workday, begin and end their workday, and to conduct normal business operations.

Vehicular access to this portion of Terminal 5 will occur from Lower River Road (SR 501) via the public access to Old Lower River Road, and then the Old Alcoa Facility Access Road.

Parcel 1A

Parcel 1A is located along the south side of Lower River Road (SR 501) just east of the FarWest Steel Corporation site. A series of storage tanks will be built as shown in the site plan (Area 300 – Storage) for temporary storage of petroleum. Parking at the storage tank are will be limited to a few stalls and will be used for occasional routine maintenance; no peak hour "commute" trips to this area are anticipated. Vehicular access to the storage tank area will be provided via SR 501 and the existing private drive located along the east side of FarWest Steel Corporation.

Berths 13 and 14

Berths 13 and 14 to the Columbia River are located southeast of Terminal 5 and just south of the Subaru America car lot. These berths, as shown in the site plan (Area 400 -Marine Terminal) will be used to pump petroleum onto barges or ships.

Vehicular access to the berths will be provided by a new connection to Harborside Drive and Gateway Avenue as part of a Port project. Like the storage tank area, vehicle parking at the berths will be limited to a few stalls and no peak hour "commute" trips to this area are anticipated.

Site Trip Generation

Trip generation estimates of daily and weekday a.m. and p.m. peak hour vehicle trip ends for the proposed development were calculated using the standard reference manual, *Trip Generation, 9th Edition*, published by the Institute of Transportation Engineers (Reference 4). ITE trip rates for land use code 110 (Light Industrial) were used as the basis for estimating vehicle trips. These rates, using permanent employees as the independent variable, are based on empirical observations at other similar industrial developments.

Table 6 shows the estimated trip generation for the proposed industrial use.

Table 6: Trip Generation Estimate

Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Light Industrial	110	110 employees	332	48	40	8	46	10	36

Truck Traffic

Because the primary function of the proposed facility is to transfer petroleum from rail cars onto nearby barges, post-construction operations of the proposed development are not expected to generate tractor-trailer trucks trips on the external street network on typical days. Instead, typical delivery and service vehicle trips are expected. A separate discussion of contractor trips and construction-related truck trips is provided later in this report.

Site Trip Distribution and Assignment

The estimated vehicle trip distribution pattern was based on a review of the existing weekday a.m. and p.m. traffic counts at the Lower River Road (SR 501)/Old Lower River Road intersection, (where all external trips are expected to enter and exit the site) as well as the existing patterns observed at the Mill Plain Boulevard (SR 501)/Fourth Plain Boulevard intersection.

As shown in Figures 4 and 5, all weekday a.m. and p.m. peak hour site trips were assigned to points east along SR 501, reflecting the location of the Port of Vancouver and major destinations to the east such as the downtown area of Vancouver and I-5.

Build-Out Year 2020 Total Traffic Conditions

The year build-out year 2020 total traffic analysis identifies how the study area's transportation system will operate with the proposed development complete and operating at full capacity and full employment. This analysis includes general regional traffic growth, traffic generated due to in-process developments and the vehicle trips generated from the proposed development.

Figures 4 and 5 and Table 7 also illustrate the year 2020 total traffic conditions. As shown, all study intersections are forecast to continue to operate adequately during the weekday a.m. and p.m. peak hours.

Table 7: Build-Out Year 2020 Total Traffic Conditions Summary

Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/Lower River Rd (SR 501)	AM	B	0.10	LOS "D"	Yes
	PM	A	0.12		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.08	LOS "D"	Yes
	PM	A	0.07		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.70	LOS "D"	Yes
	PM	B	0.36		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	B	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	A	NA		Yes

Appendix "H" contains the 2020 with project traffic conditions operational analysis worksheets.

Forecast Year 2025 Total Traffic Conditions

The forecast year 2025 total traffic analysis identifies how the study area's transportation system will operate five years after the proposed development reaches its peak capacity and full employment. Figures 4 and 5 and Table 8 illustrate the future year 2025 total traffic conditions and show that the study intersections are forecast to continue to operate acceptably during the weekday a.m. and p.m. peak hours.

Table 8: Forecast Year 2025 Total Traffic Conditions Summary

Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/Lower River Rd (SR 501)	AM	B	0.10	LOS "D"	Yes
	PM	A	0.13		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.08	LOS "D"	Yes
	PM	A	0.07		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.75	LOS "D"	Yes
	PM	B	0.38		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	B	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	A	NA		Yes

Appendix "I" contains the 2025 total traffic condition operational analysis worksheets prepared for the a.m. and p.m. peak hour periods.

Vehicle Queuing Analysis

Vehicle queuing analyses were using the *SimTraffic* software for the study intersections along Lower River Road (SR 501) and using the *SIDRA* software for the Old Lower River Road/Old Alcoa Facility Access Road intersection. Tables 9 and 10 show the forecast 95th percentile vehicle queues for the year 2020 and 2025 weekday a.m. and p.m. peak hour conditions, both without and with the development project. One vehicle was assumed to occupy 25 feet of space for this analysis. *Appendix "J" includes the queuing analysis worksheets.*

Table 9: Forecast 95th Percentile Vehicle Queues, Weekday a.m. Peak Hour

Intersection	Approach	Movement	95th Percentile Queue (feet)				Storage Length Available (feet)
			2020 Baseline	2020 Total	2025 Baseline	2025 Total	
Old Lower River Rd/ Lower River Rd (SR 501)	Westbound	Left	<25	25	<25	<25	750
	Northbound	Left	<25	<25	25	<25	125
		Channelized Right	75	75	75	75	250
Gateway Ave/ Lower River Rd (SR 501)	Westbound	Left	<25	25	<25	25	200
	Northbound	Left/Right	75	75	75	75	200
Old Lower River Rd/ Old Alcoa Facility Access Rd	Westbound	Through/Right	<25	<25	<25	<25	175
	Northbound	Left/Through/Right	<25	<25	<25	<25	150
	Southbound	Left	<25	25	<25	25	>500

Table 10: Forecast 95th Percentile Vehicle Queues, Weekday p.m. Peak Hour

Intersection	Approach	Movement	95th Percentile Queue (feet)				Storage Length Available (feet)
			2020 Baseline	2020 With Project	2025 Baseline	2025 With Project	
Old Lower River Rd/ Lower River Rd (SR 501)	Westbound	Left	<25	<25	<25	<25	750
	Northbound	Left	50	50	25	50	125
		Channelized Right	75	75	75	75	250
Gateway Ave/ Lower River Rd (SR 501)	Westbound	Left	<25	<25	<25	<25	200
	Northbound	Left/Right	50	50	50	75	200
Old Lower River Rd/ Old Alcoa Facility Access Rd	Westbound	Through/Right	<25	<25	<25	<25	175
	Northbound	Left/Through/Right	<25	<25	<25	<25	150
	Southbound	Left	<25	<25	<25	<25	>500

As shown in the previous two tables, the forecast queues can be accommodated within the available storage at the identified study intersections, during both the a.m. and p.m. peak periods.

INTERSECTION SIGHT DISTANCE

Per VMC Section 11.80.140, public and private streets must comply with the sight distance standards specified in *A Policy on Geometric Design of Highways and Streets standards* (AASHTO, Reference 5). To address this requirement, the proposed development plan was reviewed to ensure that drivers associated with the site development (normal traffic & construction traffic) have adequate intersection sight distance at key intersections in the site vicinity. Table 11 shows the results of the sight distance analysis for stop-controlled movements at key intersections. As shown in the following table, all locations currently have adequate intersection sight distance.

Table 11: Intersection Sight Distance Analysis Results

Intersection	Approach	Available Sight Distance (Feet)[1]	Minimum AASHTO Standard (Feet)[2]	Is Sight Distance Adequate?
Lower River Road (SR 501)/ Old Lower River Road	Northbound	>1,000 WB & EB	555 feet	Yes
Lower River Road (SR 501)/ Gateway Avenue	Northbound	>1,000 WB & EB	555 feet	Yes
Lower River Road (SR 501)/ Private Access -FarWest Steel[3]	Northbound	>1,000 WB & EB	555 feet	Yes
Old Lower River Road/ Old Alcoa Facility Access Road	Northbound Southbound Westbound	650 WB, >1,000 NB 550 WB 650 WB	280 WB, 610 NB 280 WB 280 WB	Yes Yes Yes

[1] Distances shown reflect approaching free-flow traffic movements only.

[2] Minimum AASHTO distances shown reflect posted speed of roadway, which is 50 MPH along Lower River Road (SR 501). Where posted speed is not provided (i.e. Old Lower River Road) and no other data is available, the Basic Rule speed of 55 MPH was assumed. An 85th percentile speed of 24 MPH was recorded along Old Lower River Road, west of the Old Alcoa Facility Access Road.

[3] This intersection was included in the sight distance analysis to ensure adequate sight distance for vehicles potentially related to the proposed site development.

It should be noted that the private drive access along the east side of the FarWest Steel property and its connection with Lower River Road (SR 501) was included in the sight distance analysis, given this connection has the potential to be used by site traffic. Additionally, there is no posted speed limit on Old Lower River Road, south of SR 501. Therefore, the 55 MPH Basic Rule speed was assumed to apply to free-flowing traffic approaching from Old Lower River Road, except west of the Old Alcoa Facility Access Road intersection, where a speed survey conducted along Old Lower River Road indicated an 85th percentile travel speed of 24 MPH . *Appendix "K" contains the results of this speed survey.*

ON-SITE ACCESS AND TRAFFIC CIRCULATION

On-site access and traffic circulation was evaluated based on the proposed site plan. As stated in the trip generation section of this report, most, if not all, site trips will travel to/from the administrative and support buildings on the Terminal 5 property (Area 200- Unloading and Office). Traffic will access this location using Lower River Road (SR 501) and Old Lower River Road. After making a left-turn onto the Old Alcoa Facility Access Road, site traffic will have the option of using one of several new driveways to separate parking lots next to the administrative buildings.

Any site trips associated with the storage tank area on Parcel 1A (Area 300 – Storage) to the northeast will use Lower River Road (SR 501) to access the private access drive east of FarWest Steel. Any trips associated with the petroleum loading operation at Berths 13 and 14 along the Columbia River will use a new driveway connection to Harborside Drive, which will connect with Gateway Avenue and the internal ring road around the loop track which leads to Old Lower River Road and the administrative buildings on the Terminal 5 property.

ACCESS SPACING

The proposed development relies on taking access to public and private street connections that are already established and in conformance with City of Vancouver access spacing requirements, per VMC Section 11.080.110.

CONSTRUCTION TRAFFIC IMPACTS

The proposed Tesoro Savage Vancouver Energy Distribution Terminal will generate traffic during facility construction. To account for the traffic-related impacts, construction worker and truck delivery traffic have been estimated and analyzed.

Construction Year 2014 Baseline Traffic Conditions

Construction of the proposed development is estimated to occur over a 9-month period in 2014. An annual growth rate of 1.5 percent, consistent with build-out and forecast year growth, was applied to

major traffic movements at the study intersections along SR 501 intersections, but not at minor connections related to Port properties such as Gateway Avenue and Old Lower River Road. In addition to background traffic growth, the construction traffic associated with the BHP Billiton site was accounted for as in-process traffic. As per the Terminal 5 Transportation Management Plan, 177 daily construction workers and 64 daily truck deliveries are estimated during a majority of BHP Billiton site construction (KAI, Reference 6). The associated freight access plan was referenced to determine site access and circulation patterns for these workers and trucks during the a.m. and p.m. peak hours. The resulting construction year 2014 a.m. and p.m. peak hour background traffic volumes and operations results are presented in Table 12 Figures 6 and 7, respectively. As shown, the study intersections operate acceptably in both the a.m. and p.m. peak hours.

Appendix "L" includes the in-process trip generation and freight route from the Terminal 5 TMP.

Table 12: Construction Year 2014 Baseline Traffic Conditions Summary

Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/Lower River Rd (SR 501)	AM	B	0.09	LOS "D"	Yes
	PM	B	0.31		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.06	LOS "D"	Yes
	PM	B	0.09		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.65	LOS "D"	Yes
	PM	B	0.32		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	C	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	B	NA		Yes

Site Construction Trip Generation

During the 9-month construction period, the proposed development site will generate construction worker and truck delivery traffic. Tesoro Savage estimates a total of 125 daily construction workers and 83 daily, round trip truck deliveries.

Table 13 shows the estimated trips generated due to construction of the proposed development.

Table 13: Estimated Construction Trip Generation

Trip Type	Size	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
			Total	In	Out	Total	In	Out
Construction Workers	125 employees	250	125	125	0	125	0	125
Truck Deliveries	83 deliveries	166	16	8	8	16	8	8
Net New Trip Generation		**416**	**141**	**133**	**8**	**141**	**8**	**133**

The 125 construction workers were assumed to arrive during the a.m. peak period and depart during the p.m. peak period. The 83 roundtrip truck deliveries were distributed across the 10-hour daily construction schedule; as such, an estimated 16 total truck deliveries were assumed during both the a.m. and p.m. peak periods (8 in, 8 out), respectively.

Site Construction Trip Distribution and Assignment

Based on trip distribution pattern estimates by Tesoro Savage, all construction worker traffic will use the Old Lower River Road entrance from Lower River Road (SR 501). Tesoro Savage also estimates that 11% of trucks will use Old Lower River Road entrance from Lower River Road (SR 501), 3% will use Gateway Avenue, and 86% will use the private access drive east of FarWest Steel.

Construction Year 2014 Total Traffic Conditions

The impact of construction site generated trips on intersection operations are shown in Table 14 as well as Figures 6 and 7 for the a.m. and p.m. peak periods, respectively. As shown, the study intersections operate acceptably in both the a.m. and p.m. peak hours.

Table 14: Construction Year 2014 Total Traffic Conditions Summary

Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/Lower River Rd (SR 501)	AM	B	0.10	LOS "D"	Yes
	PM	B	0.32		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.06	LOS "D"	Yes
	PM	B	0.35		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.70	LOS "D"	Yes
	PM	B	0.37		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	C	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	B	NA		Yes

Appendix "M" contains the construction year 2014 traffic conditions operational analysis worksheets.

Construction Truck Traffic

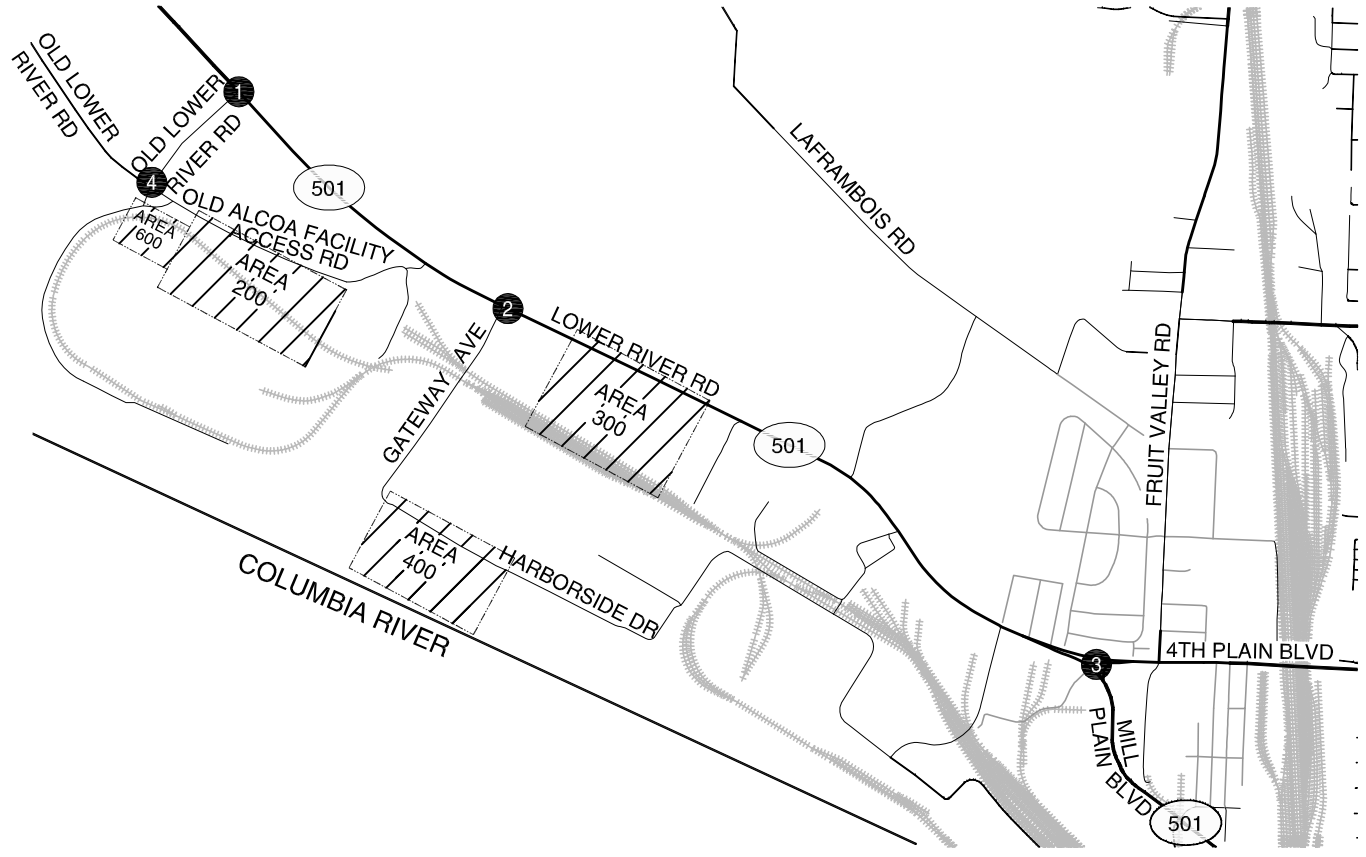
As stated previously, there will be up to an estimated 83 round-trip truck deliveries (83 in, 83 out) occurring on weekdays at the site over the course of the 9-month construction schedule. These trips will generally occur within the construction staging period between 7:00 a.m. and 8:00 p.m. During peak traffic periods on the adjacent major street network, only 16 trucks (8 in, 8 out) are estimated to occur during the a.m. and p.m. peak hours, respectively.

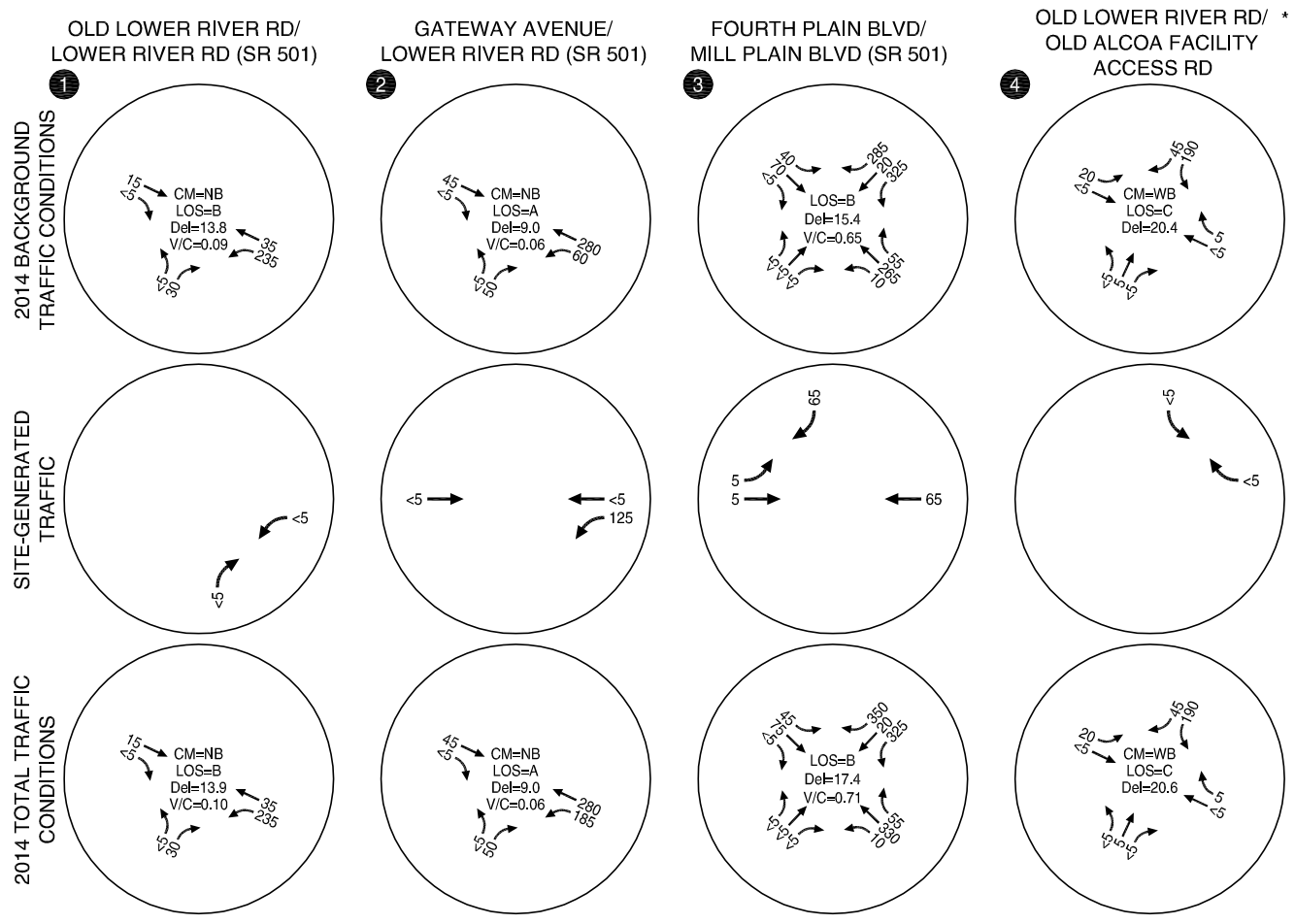
All construction truck deliveries are projected to travel to and from I-5, and the two designated truck routes intended to be used by drivers are Mill Plain Boulevard and Fourth Plain Boulevard. On

occasion, when traffic congestion occurs along I-5, truck drivers may use the designated truck route along Fruit Valley Road via either 39th Street or 78th Street. However, the magnitude of truck trips is anticipated to be small, given the low peak hour truck trip projections and presence of other truck route options. The Applicant will make best efforts to require construction truck drivers to route their deliveries via Mill Plain Boulevard and Fourth Plain Boulevard.

It should also be emphasized, again, that the primary function of the proposed facility is to transfer petroleum from rail cars onto nearby barges. Therefore, post-construction operations of the proposed development are not expected to generate any significant truck traffic on the external street network save for typical delivery and service vehicles.

(NO SCALE)





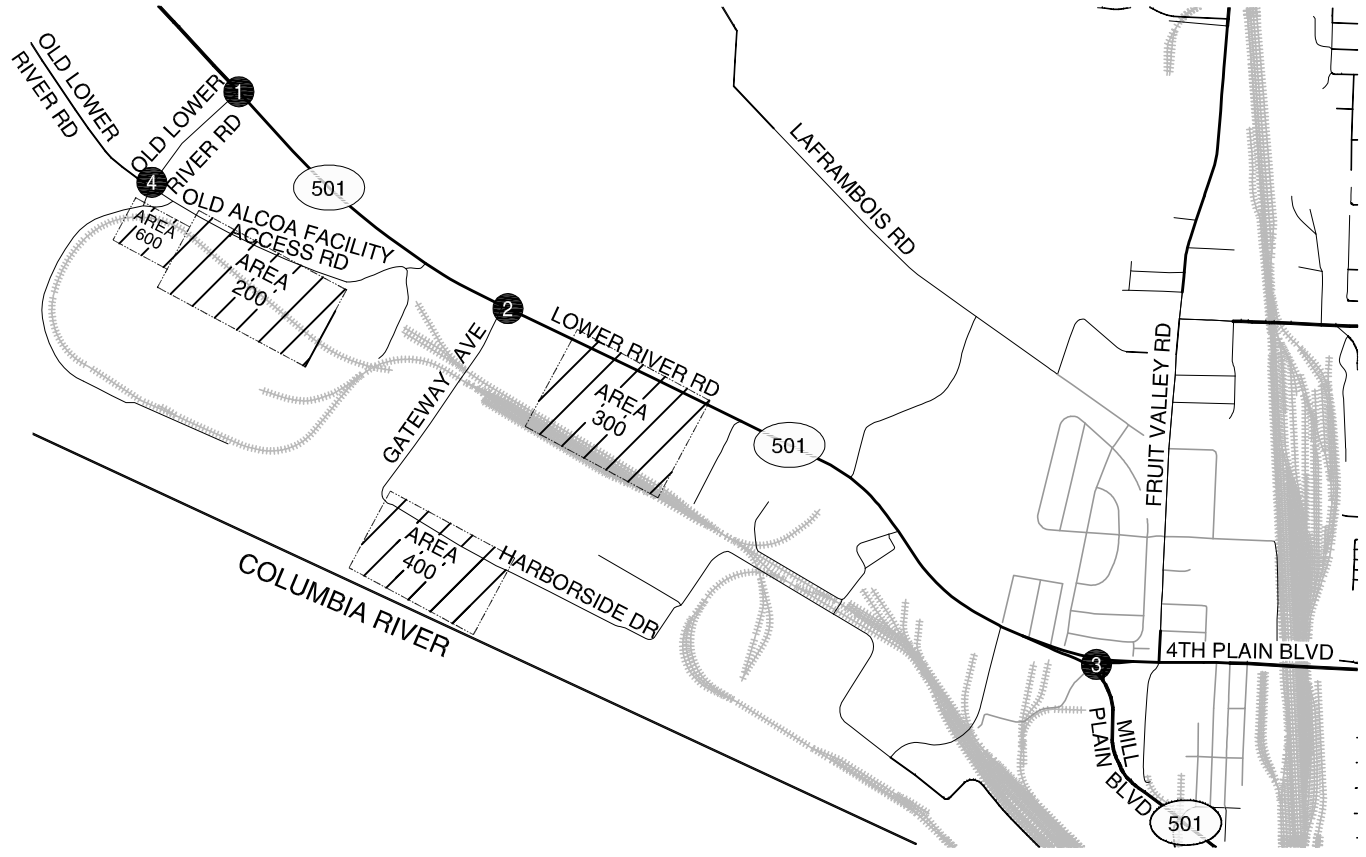
LEGEND

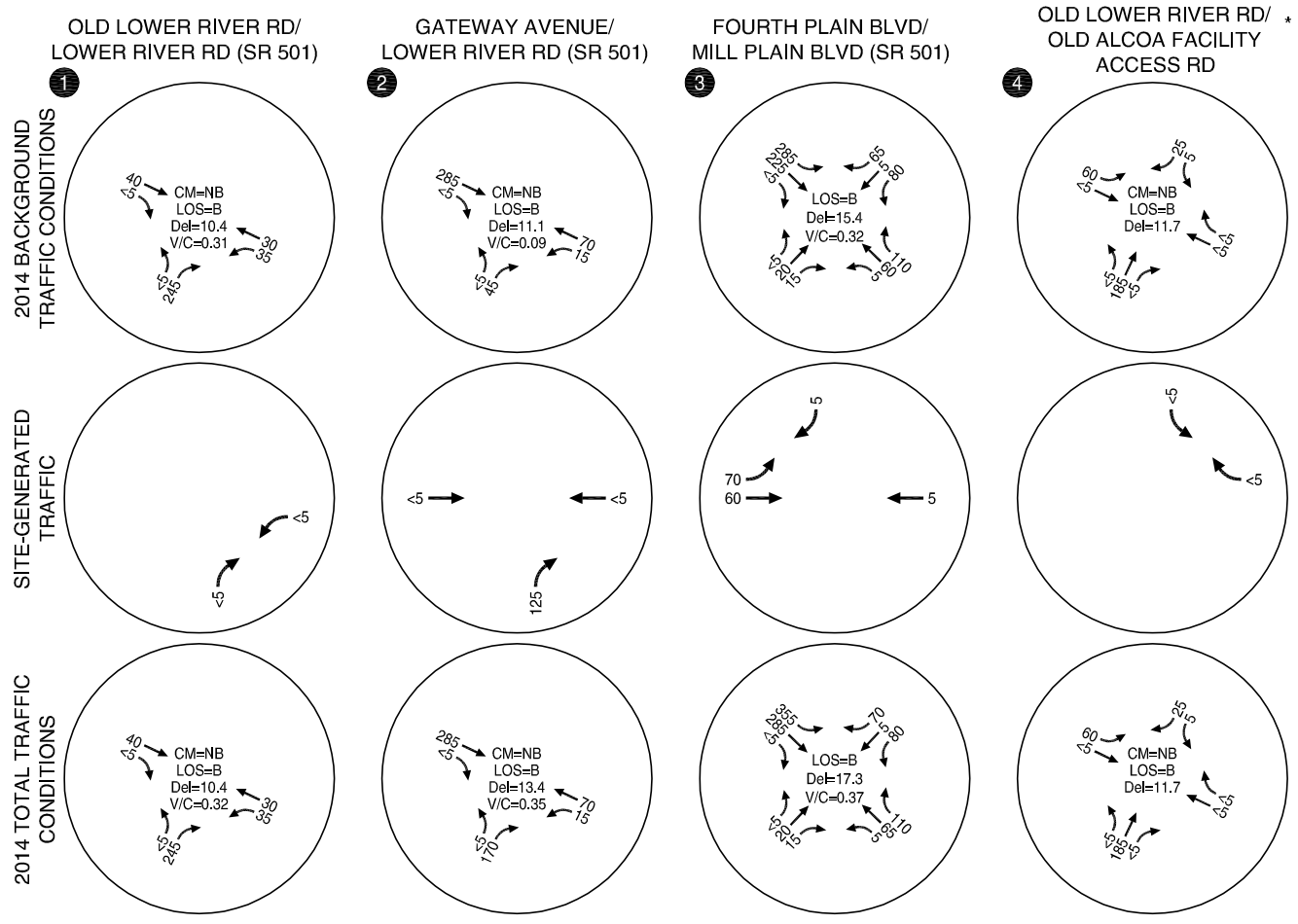
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

* Southbound approach has "Right Turn Permitted Without Stopping" Sign

CONSTRUCTION YEAR 2014 TRAFFIC
WEEKDAY AM PEAK HOUR
VANCOUVER, WA

FIGURE **6**





LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

* Southbound approach has "Right Turn Permitted Without Stopping" Sign

CONSTRUCTION YEAR 2014 TRAFFIC
WEEKDAY PM PEAK HOUR
VANCOUVER, WA

FIGURE **7**

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

INTERSECTION TRAFFIC CONTROL CHANGES

While the operational analyses documented in this report found adequate capacity is available at the study intersections, four traffic control changes and/or enhancements are recommended as described below[1].

- The applicant should work with the Port of Vancouver and City of Vancouver to post a 25 MPH speed limit on Old Lower River Road south of SR 501, where no posted speed sign exists.
- Based on a review of turn movement patterns, intersection configuration, and the Manual on Uniform Traffic Control Devices (MUTCD, Reference 7), the applicant should work with the Port and WSDOT to post a YIELD sign to control the channelized northbound right-turn maneuver from Old Lower River Road onto SR 501. A YIELD sign is appropriate given that northbound right-turn drivers have sufficient sight distance to make a decision to enter and merge with the highway traffic stream, and the ability to enter the highway without stopping reduces the time and distance drivers need to fully merge into the through lane, benefiting both side street and highway traffic.
- The applicant should work with the Port and City of Vancouver to reconfigure traffic control devices at the Old Lower River Road/Old Alcoa Facility Access Road intersection.
- The applicant should work with the Port to add texturing/coloring treatments to the striped crosswalk on the private access approach to Lower River Road (SR 501), between the Far West Steel operation and the proposed Storage Tank area. This treatment is intended to enhance the safety of bicyclists and pedestrians using this crosswalk as part of the adjacent multi-use path.

CONCURRENCY CORRIDOR TRIP ASSIGNMENT

As part of the transportation impact analysis, the number of trips assigned to the City of Vancouver's Transportation concurrency corridors has been evaluated. The two corridors impacted by the development are Mill Plain Boulevard (Fourth Plain Boulevard to I-5) and Fourth Plain Boulevard (Mill Plain Boulevard to I-5).

Table 15 summarizes the total number of weekday p.m. peak hour trips entering each of the City's adopted concurrency corridors. Assigned trips were recorded counting trips only once along each of the specified sections.

[1] Regardless of site development, the changes below could also be implemented by the Port of Vancouver in advance of site development, subject to local agency and Port approval.

Table 15: Concurrency Corridor Weekday PM Peak Hour Trip Assignment

Corridor Name	Corridor Limit	PM Peak Hour Trips to Corridor
Mill Plain Blvd.	Fourth Plain to I-5	20
	I-5 to Andresen	0
	Andresen to I-205	0
	I-205 to 136th Ave.	0
	136th Ave. to 164th Ave.	0
	164th Ave. to 192nd Ave.	0
St. Johns / Ft. Van Way	Mill Plain to 63rd St.	0
Fourth Plain Blvd.	Mill Plain to I-5	26
	I-5 to Andresen	0
	Andresen to I-205	0
	I-205 to 162nd Ave.	0
Andresen Road	Mill Plain to SR500	0
	SR500 to 78th St.	0
112th Avenue	Mill Plain to 28th St.	0
	28th St. to 51st St.	0
164th/162nd Avenue	SR14 to SE 1st St.	0
	SE 1st St. to Fourth Plain	0
Burton Road / 28th Street	18th St. to 112th Ave.	0
	112th Ave. to 138th Ave.	0
	138th Ave. to 162nd Ave.	0
18th Street	112th Ave. to 138th Ave.	0
	138th Ave. to 164th Ave.	0
136th/137th Avenue	Mill Plain to 28th St.	0
	28th St. to Fourth Plain	0
192nd Avenue	SR14 to NE 18th St.	0

FINDINGS AND RECOMMENDATIONS

Based on the results of the transportation impact analysis, the proposed Tesoro Savage Vancouver Energy Distribution Terminal can be developed while maintaining acceptable levels of service and safety on the surrounding transportation system. The analysis developed the following findings and recommendations.

Findings

- All study intersections currently operate acceptably during the weekday a.m. and p.m. peak hours and are projected to do so in 2020 and 2025 with site development.

- A review of historical crash data identified no safety-related mitigation needs at the study intersections.
- Intersection sight distance is adequate at all study intersections.
- The proposed development is estimated to generate 332 additional daily trips, 48 weekday a.m. peak hour trips (40 in, 8 out), and 46 weekday p.m. peak hour trips (10 in, 36 out).

Recommendations

- The applicant should work with the Port of Vancouver and City of Vancouver to post a 25 MPH speed limit on Old Lower River Road south of SR 501, where no posted speed sign exists.
- The applicant should work with the Port and WSDOT to post a YIELD sign to control the channelized northbound right-turn maneuver from Old Lower River Road onto SR 501.
- The applicant should work with the Port and City of Vancouver to reconfigure traffic control devices at the Old Lower River Road/Old Alcoa Facility Access Road intersection.
- The applicant should work with the Port to add texturing/coloring treatments to the striped crosswalk on the private access approach to Lower River Road (SR 501), between the Far West Steel operation and the proposed Storage Tank area.
- Any new landscaping, signage, and/or above-ground utilities installed along the site frontage and internal roadways should be properly located and maintained to ensure that adequate sight distance continues to be available.

We trust this report adequately addresses the traffic impacts and associated with the proposed Tesoro Savage Vancouver Energy Distribution Terminal. Please contact us if you have any questions or comments regarding the contents of this report or the analyses performed.

REFERENCES

1. Transportation Research Board. *Highway Capacity Manual 2000*. 2000.
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APPENDICES

A. Level-of-Service Descriptions
B. Crash Data
C. Traffic Count Data
D. 2013 Existing Traffic Conditions Level-of-Service Worksheets
E. In-Process Development
F. Build-Out Year 2020 Baseline Traffic Conditions Level-of-Service Worksheets
G. Forecast Year 2025 Baseline Traffic Conditions Level-of-Service Worksheets
H. Build-Out Year 2020 Total Traffic Conditions Level-of-Service Worksheets
I. Forecast Year 2025 Total Traffic Conditions Level-of-Service Worksheets
J. 95th Percentile Queuing Analysis Worksheets
K. Speed Survey Results for Old Lower River Road
L. Construction In-Process Development
M. Construction Year 2014 Traffic Conditions Level-of-Service Worksheets

Appendix A Description of Level-of-Service Methods and Criteria

Level of Service Concept

Level of service (LOS) is a concept developed by traffic engineers to gauge the overall quality of the travel experience through an intersection or roadway segment as it is perceived by the traveler. Six categories are used to denote the various levels of service, which range from A to F.

Signalized Intersections

At signalized intersections, level of service is defined by a single performance measure: average control delay per vehicle. Control delay is defined to include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Table A1 provides a qualitative description of each LOS category as it applies to signalized intersections, and Table A2 identifies the average control delay threshold point used as the boundary for each LOS category. LOS thresholds for the specific reviewing jurisdiction(s) are described in the body of the report.

Table A1
Level of Service Definitions (Signalized Intersections)

Level of Service	Average Delay per Vehicle
A	Very low average control delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Average control delay is greater than 10 seconds per vehicle and less than or equal to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for a level of service A, causing higher levels of average delay.
C	Average control delay is greater than 20 seconds per vehicle and less than or equal to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Average control delay is greater than 35 seconds per vehicle and less than or equal to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Average control delay is greater than 55 seconds per vehicle and less than or equal to 80 seconds per vehicle. This is usually considered to be the limit of acceptable delay. These high delay values generally (but not always) indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Average control delay is in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such high delay values, even when the volume/capacity ratio is significantly below 1.0.

Table A2
Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Unsignalized Intersections

Unsignalized intersections include two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections. The *2000 Highway Capacity Manual* provides models for estimating average control delay at both TWSC and AWSC intersections. Table A3 provides a qualitative description of each LOS category as it applies to unsignalized intersections, and Table A4 identifies the average control delay threshold point used as the boundary for each LOS category. LOS thresholds for the specific reviewing jurisdiction(s) are described in the body of the report.

Table A3
Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Delay per Vehicle to Minor Street
A	• Nearly all drivers find freedom of operation with very little time spent waiting for an acceptable gap. • Very seldom is there more than one vehicle in queue.
B	• Some drivers begin to consider the average control delay an inconvenience, but acceptable gaps are still very easy to find. • Occasionally there is more than one vehicle in queue.
C	• Average control delay becomes noticeable to most drivers, even though acceptable gaps are found on a regular basis. • It is not uncommon for an arriving driver to find a standing queue of at least one additional vehicle.
D	• Average control delay is long enough to be an irritation to most drivers. Average control delay is long because acceptable gaps are hard to find, because there is a standing queue of vehicles already waiting when the driver arrives, or both.
E	• Drivers find the length of the average control delay approaching intolerable levels. • Average control delay is long because acceptable gaps are hard to find, because there is a standing queue of vehicles already waiting when the driver arrives, or both. • There may or may not be substantial excess capacity remaining at the intersection when this condition is encountered.
F	• Most drivers encountering this condition consider the length of the average control delay to be too long. • Average control delay is long because acceptable gaps are hard to find, because there is a standing queue of vehicles already waiting when the driver arrives, or both. • There may or may not be substantial excess capacity remaining at the intersection when this condition is encountered.

Table A4
Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

It should be noted that the level of service criteria for unsignalized intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, there are a number of driver behavior considerations that combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, while drivers on the minor street approaches to TWSC intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, the control delay threshold for any given level of service has been set to be less for an unsignalized intersection than for a signalized intersection. **While overall intersection level of service is calculated for AWSC intersections, level of service is only calculated for the minor approaches and the major street left turn movements at TWSC intersections.** No delay is assumed to the major street through movements. For TWSC intersections, the overall intersection level of service remains undefined: level of service is only calculated for each minor street lane.

In the performance evaluation of unsignalized intersections, it is important to consider other measures of effectiveness (MOE's) in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th-percentile queue lengths. By focusing on a single MOE for the worst movement only, such as delay for the minor-street left turn, users may make inappropriate traffic control decisions.

Appendix B Crash Data

Reported collisions that occurred on State Route 501 (mp 1.69 to 4.12) from the Mill Plain/4th Plain intersection to NW Old Lower River Rd as well as (See Cover letter).....2008 - 2012

UNDER 23 UNITED STATES CODE , SECTION 409, THIS DATA CANNOT BE USED IN DISCOVERY OR AS EVIDENCE AT TRIAL IN ANY ACTION FOR DAMAGES AGAINST THE WSDOT, OR ANY JURISDICTION INVOLVED IN THE DATA

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DIST FROM REF POINT	Mi or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME	*REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDAL	JUNCTION RELATIONSHIP	WEATHER	ROADWAY SURFACE CONDITIONS	LIGHTING CONDITIONS	FIRST COLLISION TYPE / OBJECT STRUCK	VEHICLE 1 TYPE	VEH 1 ACTION	MV DRIVER CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 2 (UNIT 1)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEHICLE 2 TYPE	VEH 2 ACTION	MV DRIVER CONT CIRC 1 (UNIT 2)	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO	PEDCYCLIST ACTION (UNIT 2)	PEDCYCLIST CONT CIRC 1 (UNIT 2)	IMPACT LOCATION (City, County & Misc Trafficways - 2010 forward)
City Street	NW LOWER RIVER RD		6800		800	F	W	NW ERWIN D RIEGER HWY	3241661	07/12/09	7:57 PM	Possible Injury	1	0	1		Not at Intersection and Not Related	Raining	Wet	Daylight	Vehicle overturned	Motorcycle	Going Straight Ahead	Under Influence of Alcohol	Under Influence of Drugs	West	East								
City Street	FRUIT VALLEY RD				75	F	N	W FOURTH PLAIN BLVD	3319581	07/08/10	5:12 PM	No Injury	0	0	2		At Driveway	Clear or Partly Cloudy	Dry	Daylight	Entering at angle	Passenger Car	Making Left Turn	Did Not Grant RW to Vehicle		East	South	Motorcycle	Going Straight Ahead	None	South	North			Lane of Primary Trafficway
City Street	NW LOWER RVR RD				0.25	M	W	W MILL PLAIN BLVD	2988391	11/01/08	11:02 AM	No Injury	0	0	2		At Driveway	Raining	Wet	Daylight	One car entering driveway access	Passenger Car	Making Left Turn	Did Not Grant RW to Vehicle	Driver Distractions Outside Vehicle	East	South	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	None	West	East			
City Street	FRUIT VALLEY RD			4 PLAIN BLVD					C700870	01/04/08	7:30 AM	No Injury	0	0	2		At Intersection and Related	Overcast	Dry	Daylight	From same direction - both going straight - one stopped - rear-end	Passenger Car	Going Straight Ahead			North	South	Pickup,Panel Truck or Vanette under 10,000 lb	Stopped at Signal or Stop Sign		North	Vehicle Stopped			
City Street	FRUIT VALLEY RD			FOURTH PLAIN BLVD					C708538	05/18/08	4:05 PM	Possible Injury	1	0	2		At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - one stopped - rear-end	Pickup,Panel Truck or Vanette under 10,000 lb	Stopped at Signal or Stop Sign			South	Vehicle Stopped	Not Stated			South	North			
City Street	W 4 PLAIN BLVD			FRUIT VALLEY RD					2815573	04/07/09	10:04 AM	Unknown	0	0	2		At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight	Entering at angle	Pickup,Panel Truck or Vanette under 10,000 lb	Making Right Turn	Improper Turn	Driver Distractions Outside Vehicle	North	West	Pickup,Panel Truck or Vanette under 10,000 lb	Stopped for Traffic	None	West	Vehicle Stopped			
City Street	W FOURTH PLAIN BLVD		2000	NW FRUIT VALLEY RD					3432316	08/30/11	9:50 PM	No Injury	0	0	2		At Intersection and Related	Clear or Partly Cloudy	Dry	Dark-Street Lights On	Entering at angle	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	Disregard Stop and Go Light		West	East	Passenger Car	Making Left Turn	None	South	West			Lane of Primary Trafficway
City Street	FRUIT VALLEY RD			W FOURTH PLAIN BLVD					3241765	12/11/09	4:05 PM	No Injury	0	0	2		At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - one stopped - rear-end	Passenger Car	Going Straight Ahead	Follow Too Closely		North	South	Pickup,Panel Truck or Vanette under 10,000 lb	Stopped at Signal or Stop Sign	None	North	Vehicle Stopped			
City Street	NW FRUIT VALLEY RD		2600	W FOURTH PLAIN BLVD					3432569	09/03/11	11:26 PM	No Injury	0	0	1		At Intersection and Related	Clear or Partly Cloudy	Dry	Dark-Street Lights On	Street Light Pole or Base	Making Left Turn	Under Influence of Alcohol	Exceeding Reas. Safe Speed		West	North								Past the Outside Shoulder of Primary Trafficway
City Street	NW FRUIT VALLEY RD		2600	W FOURTH PLAIN BLVD					3432701	06/05/11	8:15 PM	No Injury	0	0	2		At Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - both going straight - sideswipe	Passenger Car	Going Straight Ahead	Over Center Line		South	North	Passenger Car	Going Straight Ahead	None	North	South			Lane of Primary Trafficway
State Route	501	2.03							3319664	06/26/10	12:37 PM	Evident Injury	1	0	1		At Intersection and Not Related	Unknown	Dry	Daylight	Vehicle overturned	Motorcycle	Going Straight Ahead	None		South	North								Lane 1 Increasing Milepost
State Route	501	2.03							2998685	08/12/08	12:09 PM	No Injury	0	0	2		At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - one left turn - one straight	Passenger Car	Making Left Turn	Did Not Grant RW to Vehicle		Northeast	Southeast	Passenger Car	Going Straight Ahead	None	Southwest	Northeast			Lane 2 Decreasing Milepost
State Route	501	2.03							3327378	06/15/10	11:36 AM	No Injury	0	0	2		At Intersection and Not Related	Clear or Partly Cloudy	Wet	Daylight	From same direction - both going straight - both moving - sideswipe	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	Other		North	South	Bus or Motor Stage	Going Straight Ahead	None	North	South			Lane 1 Decreasing Milepost
State Route	501	2.03							2814245	10/05/10	12:04 AM	No Injury	0	0	2		At Intersection and Related	Clear or Partly Cloudy	Dry	Dark-No Street Lights	Same direction - both turning left - both moving - sideswipe	Not Stated	Making Left Turn	Improper Turn		West	North	Truck Tractor & Semi-Trailer	Making Left Turn	None	West	North			Intersecting Road Increasing Milepost
State Route	501	2.14							3322720	04/30/11	7:07 PM	Possible Injury	2	0	3		Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - both moving - rear-end	Motorcycle	Going Straight Ahead	Follow Too Closely		West	East	Pickup,Panel Truck or Vanette under 10,000 lb	Changing Lanes	Inattention	West	East			Lane 2 Decreasing Milepost
State Route	501	2.14							E2032234	10/30/12	1:02 PM	Possible Injury	1	0	2		Driveway Related but Not at Driveway	Raining	Wet	Daylight	From same direction - both going straight - both moving - rear-end	Passenger Car	Going Straight Ahead	Follow Too Closely		East	West	Pickup,Panel Truck or Vanette under 10,000 lb	Slowing	None	East	West			Lane 1 Increasing Milepost
State Route	501	2.32							3788961	05/09/08	4:33 PM	Possible Injury	3	0	2		Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	From same direction - both going straight - one stopped - rear-end	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	Unknown Driver Distraction		Northwest	Southeast	Pickup,Panel Truck or Vanette under 10,000 lb	Stopped for Traffic	None	Northwest	Vehicle Stopped			Lane 1 Decreasing Milepost
State Route	501	2.36							3241092	11/05/09	5:09 PM	Possible Injury	1	0	1	1	At Driveway	Clear or Partly Cloudy	Dry	Daylight	Vehicle - Pedalcyclist	Pickup,Panel Truck or Vanette under 10,000 lb	Making Left Turn	Fail to Yield Row to Pedestrian		Southeast	Southwest						Riding with Traffic	None	Right Shoulder Decreasing Milepost
State Route	501	2.39							2813749	03/21/09	5:22 AM	Possible Injury	1	0	1		Not at Intersection and Not Related	Raining	Wet	Dark-Street Lights On	Roadway Ditch	Passenger Car	Going Straight Ahead	Apparently Asleep		Southeast	Northwest								Past Right Shoulder Increasing Milepost
State Route	501	2.45							E091902	02/13/11	8:47 PM	No Injury	0	0	1		Not at Intersection and Not Related	Clear or Partly Cloudy	Wet	Dark-Street Lights On	Tree or Stump (stationary)	Passenger Car	Going Straight Ahead	Apparently Ill	Over Center Line	Southeast	Northwest								Past Right Shoulder Decreasing Milepost
State Route	501	2.50							2815057	05/04/08	1:01 AM	Serious Injury	3	0	1		Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Dark-No Street Lights	Other Objects	Passenger Car	Going Straight Ahead	Exceeding Reas. Safe Speed		Northwest	Southeast								Past Right Shoulder Decreasing Milepost
State Route	501	2.51							2993460	02/05/08	3:12 PM	Evident Injury	1	0	1		Driveway Related but Not at Driveway	Raining	Wet	Daylight	Vehicle overturned	Truck (Flatbad,Van,etc)	Going Straight Ahead	Inattention		Southeast	Northwest								Past Right Shoulder Increasing Milepost
State Route	501	2.53							3598429	08/14/12	8:05 PM	Evident Injury	1	0	2		Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	From opposite direction - both moving - head-on	Motorcycle	Going Straight Ahead	Exceeding Reas. Safe Speed	Over Center Line	West	East	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	None	East	West			Lane 1 Increasing Milepost
State Route	501	2.63							3319469	04/17/11	1:17 AM	Serious Injury	4	0	1		Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Dark-No Street Lights	Vehicle overturned	Passenger Car	Going Straight Ahead	Exceeding Stated Speed Limit		Northwest	Southeast								Past Right Shoulder Decreasing Milepost
State Route	501	2.65							3432519	09/28/11	5:40 AM	Evident Injury	1	0	1		Not at Intersection and Not Related	Clear or Partly Cloudy	Wet	Dark-No Street Lights	Over Embankment - No Guardrail Present	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	Unknown Driver Distraction		Southeast	Northwest								Past Right Shoulder Increasing Milepost
State Route	501	3.41							3613647	11/04/12	7:32 AM	No Injury	0	0	1		Overcast	Wet	Unknown	Over Embankment - No Guardrail Present	Passenger Car	Going Straight Ahead	Other		Southeast	Northwest								Past Right Shoulder Increasing Milepost
State Route	501	3.44							3322175	05/29/10	5:46 PM	Possible Injury	1	0	1		Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	Tree or Stump (stationary)	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	Other		Southeast	Northwest								Past Right Shoulder Increasing Milepost
State Route	501	4.10							2998687	08/20/08	10:29 AM	Possible Injury	2	0	2		At Intersection and Related	Raining	Wet	Daylight	From opposite direction - one left turn - one straight	Passenger Car	Making Left Turn	Did Not Grant RW to Vehicle		Southeast	Southwest	Pickup,Panel Truck or Vanette under 10,000 lb	Going Straight Ahead	None	Northwest	Southeast			Lane 1 Decreasing Milepost

Collision not at study intersection

Prepared by: WSDOT/STCDO/CDAB/MB
6/24/13

*As of 1/1/2009 citizen reports are no longer being captured (Report # begins with "C")

ACCIDENT ANALYSIS

Project Name:	Tesoro/Savage Petroleum Terminal
Project Number:	13574
Analyst:	AXM
Date:	07/03/2013
Filename:	C:\Users\amalinge\AppData\Local\Microsoft\Window

KITTELSON & ASSOCIATES, INC.
610 SW Alder, Suite 700
Portland, Oregon 97205
(503) 228-5230
Fax: (503) 273-8169

INTERSECTION ANALYSIS

Intersection: NW Old Lower River Rd/SR 501 Mile Post

Vehicles Entering Intersection =		1,570		
Number of Accidents =		1		
Time Period =		5		
Accident Rate =		1	1,000,000	**0.35** *Accidents / mev*
	1,570	365	5	

Intersection: NW Gateway Ave/SR 501 Mile Post

Vehicles Entering Intersection =		2,190		
Number of Accidents =		1		
Time Period =		5		
Accident Rate =		1	1,000,000	**0.25** *Accidents / mev*
	2,190	365	5	

Intersection: W Fourth Plain Blvd/W Mill Plain Blvd Mile Post

Vehicles Entering Intersection =		6,670		
Number of Accidents =		4		
Time Period =		5		
Accident Rate =		4	1,000,000	**0.33** *Accidents / mev*
	6,670	365	5	

Intersection: NW Old Lower River Rd/NW Old Lowe Mile Post

Vehicles Entering Intersection =		780		
Number of Accidents =		0		
Time Period =		5		
Accident Rate =		0	1,000,000	**0.00** *Accidents / mev*
	780	365	5	

Appendix C Traffic Count Data

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: NW Old Lower River Rd (North) -- SR 501

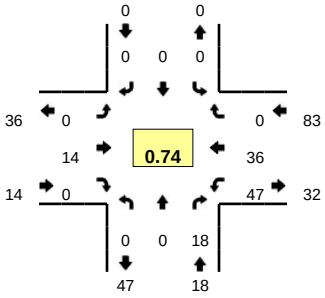
QC JOB #: 10972018

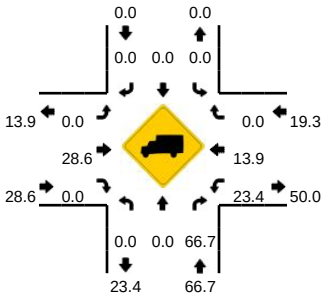
CITY/STATE: Vancouver, WA

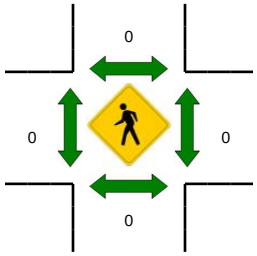
DATE: Thu, May 30 2013

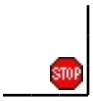
Peak-Hour: 7:00 AM -- 8:00 AM

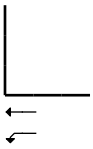
Peak 15-Min: 7:45 AM -- 8:00 AM

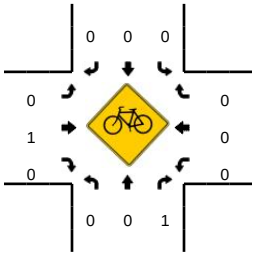


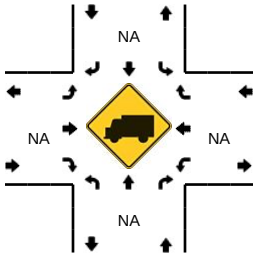


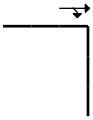


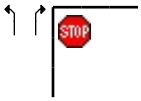


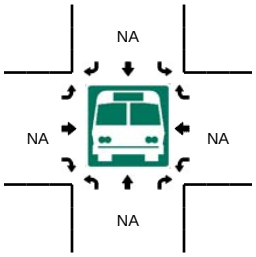












5-Min Count Period Beginning At	NW Old Lower River Rd (North) (Northbound)				NW Old Lower River Rd (North) (Southbound)				SR 501 (Eastbound)				SR 501 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	2	0	0	0	0	0	0	1	0	0	5	0	0	0	8	
6:35 AM	0	0	6	0	0	0	0	0	0	2	0	0	5	1	0	0	14	
6:40 AM	0	0	0	0	0	0	0	0	0	0	0	0	14	3	0	0	17	
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	9	
6:50 AM	0	0	2	0	0	0	0	0	0	0	0	0	5	0	0	0	7	
6:55 AM	0	0	2	0	0	0	0	0	0	0	0	0	3	2	0	0	7	93
7:00 AM	0	0	1	0	0	0	0	0	0	4	0	0	3	3	0	0	11	100
7:05 AM	0	0	0	0	0	0	0	0	0	1	0	0	4	0	0	0	5	101
7:10 AM	0	0	1	0	0	0	0	0	0	0	0	0	2	2	0	0	5	103
7:15 AM	0	0	1	0	0	0	0	0	0	2	0	0	2	6	0	0	11	103
7:20 AM	0	0	1	0	0	0	0	0	0	0	0	0	4	1	0	0	6	103
7:25 AM	0	0	2	0	0	0	0	0	0	0	0	0	9	0	0	0	11	111
7:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	2	3	0	0	6	109
7:35 AM	0	0	3	0	0	0	0	0	0	2	0	0	6	1	0	0	12	107
7:40 AM	0	0	1	0	0	0	0	0	0	1	0	0	6	1	0	0	9	99
7:45 AM	0	0	2	0	0	0	0	0	0	1	0	0	5	5	0	0	13	103
7:50 AM	0	0	2	0	0	0	0	0	0	1	0	0	4	8	0	0	15	111
7:55 AM	0	0	3	0	0	0	0	0	0	2	0	0	0	6	0	0	11	115
8:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	3	3	0	0	7	111
8:05 AM	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	5	111
8:10 AM	0	0	2	0	0	0	0	0	0	2	0	0	2	2	0	0	8	114
8:15 AM	0	0	1	0	0	0	0	0	0	1	0	0	5	4	0	0	11	114
8:20 AM	0	0	3	0	0	0	0	0	0	1	0	0	6	3	0	0	13	121
8:25 AM	0	0	1	0	0	0	0	0	0	1	0	0	4	3	0	0	9	119

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	28	0	0	0	0	0	0	16	0	0	36	76	0	0	156
Heavy Trucks	0	0	16		0	0	0		0	4	0		4	12	0		36
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:34 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

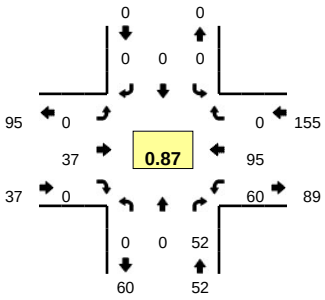
Type of peak hour being reported: User-Defined

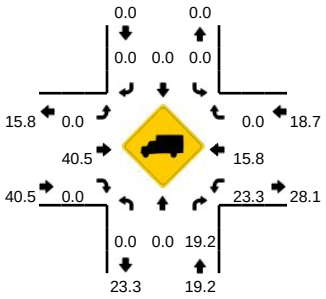
Method for determining peak hour: Total Entering Volume

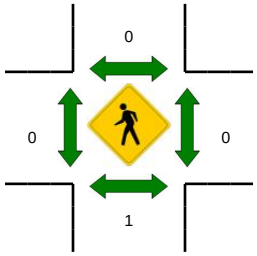
LOCATION: NW Gateway Ave -- SR 501
CITY/STATE: Vancouver, WA

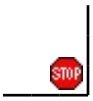
QC JOB #: 10972007
DATE: Thu, May 30 2013

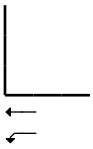
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:10 AM -- 7:25 AM

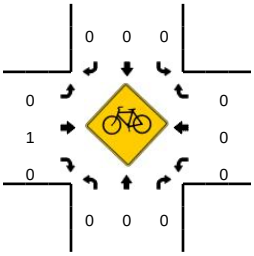


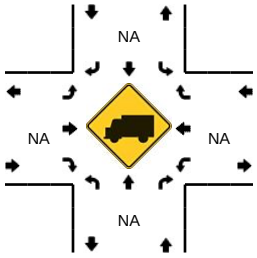


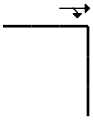


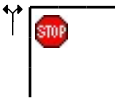


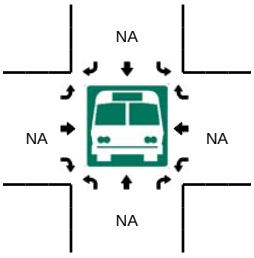












5-Min Count Period Beginning At	NW Gateway Ave (Northbound)				NW Gateway Ave (Southbound)				SR 501 (Eastbound)				SR 501 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	1	0	0	0	0	0	0	3	0	0	13	4	0	0	21	203
6:35 AM	0	0	1	0	0	0	0	0	0	6	0	0	18	8	0	0	33	224
6:40 AM	0	0	2	0	0	0	0	0	0	3	0	0	16	19	0	0	40	254
6:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	12	9	0	0	22	261
6:50 AM	0	0	2	0	0	0	0	0	0	1	0	0	12	5	0	0	20	268
6:55 AM	0	0	3	0	0	0	0	0	0	1	0	0	4	5	0	0	13	270
7:00 AM	0	0	5	0	0	0	0	0	0	7	0	0	3	5	0	0	20	277
7:05 AM	0	0	3	0	0	0	0	0	0	1	0	0	1	5	0	0	10	271
7:10 AM	0	0	13	0	0	0	0	0	0	1	0	0	5	5	0	0	24	281
7:15 AM	0	0	8	0	0	0	0	0	0	3	0	0	5	11	0	0	27	280
7:20 AM	0	0	7	0	0	0	0	0	0	0	0	0	4	8	0	0	19	266
7:25 AM	0	0	2	0	0	0	0	0	0	4	0	0	8	5	0	0	19	268
7:30 AM	0	0	3	0	0	0	0	0	0	2	0	0	5	6	0	0	16	263
7:35 AM	0	0	0	0	0	0	0	0	0	3	0	0	9	8	0	0	20	250
7:40 AM	0	0	4	0	0	0	0	0	0	2	0	0	10	7	0	0	23	233
7:45 AM	0	0	4	0	0	0	0	0	0	4	0	0	3	11	0	0	22	233
7:50 AM	0	0	1	0	0	0	0	0	0	5	0	0	3	14	0	0	23	236
7:55 AM	0	0	2	0	0	0	0	0	0	5	0	0	4	10	0	0	21	244
8:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	5	5	0	0	11	235
8:05 AM	0	0	2	0	0	0	0	0	0	1	0	0	3	8	0	0	14	239
8:10 AM	0	0	2	0	0	0	0	0	0	2	1	0	1	5	0	0	11	226
8:15 AM	0	0	3	0	0	0	0	0	0	2	0	0	2	9	0	0	16	215
8:20 AM	0	0	1	0	0	0	0	0	0	4	0	0	1	7	0	0	13	209
8:25 AM	0	0	1	0	0	0	0	0	0	3	0	0	5	8	0	0	17	207

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	112	0	0	0	0	0	0	16	0	0	56	96	0	0	280
Heavy Trucks	0	0	12		0	0	0		0	8	0		12	16	0		48
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:34 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: W Mill Plain Blvd -- 4th Plain Rd

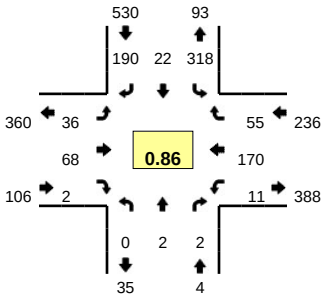
QC JOB #: 10972003

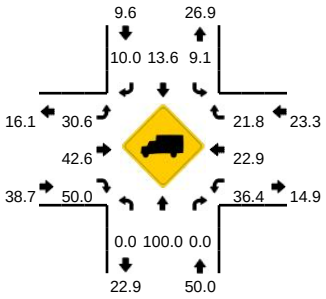
CITY/STATE: Vancouver, WA

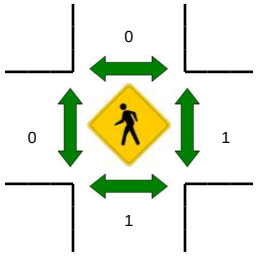
DATE: Thu, May 30 2013

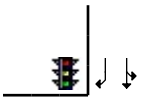
Peak-Hour: 7:00 AM -- 8:00 AM

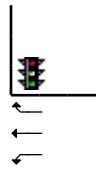
Peak 15-Min: 7:45 AM -- 8:00 AM

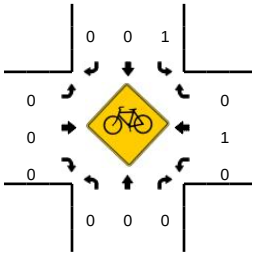


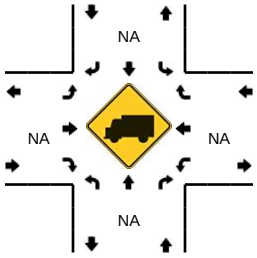


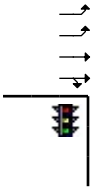


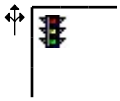


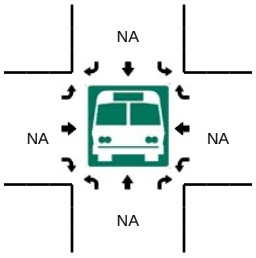












5-Min Count Period Beginning At	W Mill Plain Blvd (Northbound)				W Mill Plain Blvd (Southbound)				4th Plain Rd (Eastbound)				4th Plain Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	17	1	22	0	3	2	0	0	0	14	0	0	59	
6:35 AM	0	0	1	0	16	0	35	0	3	10	0	0	1	11	2	0	79	
6:40 AM	0	0	1	0	14	0	29	0	5	4	0	0	1	7	4	0	65	
6:45 AM	0	0	0	0	24	2	27	0	2	2	0	0	0	7	3	0	67	
6:50 AM	0	0	0	0	21	0	24	0	3	3	0	0	1	9	5	0	66	
6:55 AM	0	0	0	0	14	1	20	0	0	3	0	0	2	7	6	0	53	647
7:00 AM	0	0	0	0	24	0	8	0	2	11	0	0	1	10	2	0	58	671
7:05 AM	0	0	0	0	21	3	13	0	5	2	0	0	2	10	3	0	59	696
7:10 AM	0	0	0	0	22	5	10	0	3	4	0	0	1	5	8	0	58	720
7:15 AM	0	1	0	0	27	6	21	0	4	7	0	0	1	13	2	0	82	746
7:20 AM	0	0	0	0	21	0	18	0	1	3	0	0	2	14	5	0	64	761
7:25 AM	0	0	0	0	23	4	19	0	3	9	0	0	1	12	9	0	80	790
7:30 AM	0	0	1	0	24	2	21	0	3	6	1	0	0	20	3	0	81	812
7:35 AM	0	0	0	0	27	0	11	0	0	3	0	0	0	14	4	0	59	792
7:40 AM	0	0	0	0	18	0	25	0	4	6	1	0	1	19	6	0	80	807
7:45 AM	0	1	0	0	36	0	20	0	3	9	0	0	0	25	4	0	98	838
7:50 AM	0	0	1	0	32	2	16	0	5	2	0	0	2	11	5	0	76	848
7:55 AM	0	0	0	0	43	0	8	0	3	6	0	0	0	17	4	0	81	876
8:00 AM	0	0	0	0	20	0	10	0	4	4	0	0	1	4	3	0	46	864
8:05 AM	0	0	0	0	15	1	9	0	5	3	0	0	0	5	2	0	40	845
8:10 AM	0	0	0	0	8	0	14	0	3	6	0	0	0	6	2	0	39	826
8:15 AM	0	0	1	0	12	0	12	0	3	10	0	0	0	6	1	0	45	789
8:20 AM	0	0	0	0	13	1	12	0	2	6	0	0	0	8	7	0	49	774
8:25 AM	0	0	1	0	10	0	4	0	4	7	0	0	0	13	0	0	39	733

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	4	4	0	444	8	176	0	44	68	0	0	8	212	52	0	1020
Heavy Trucks	0	4	0		32	4	28		24	32	0		4	44	20		192
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:34 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

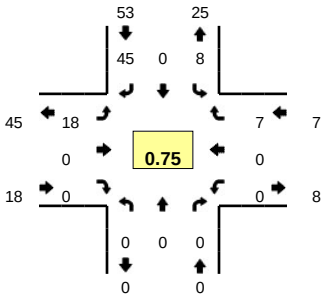
LOCATION: NW Old Lower River Rd -- NW Old Lower River Rd

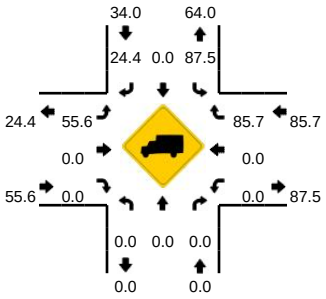
QC JOB #: 10972013

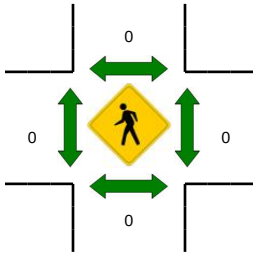
CITY/STATE: Vancouver, WA

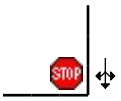
DATE: Thu, Jun 27 2013

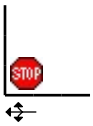
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

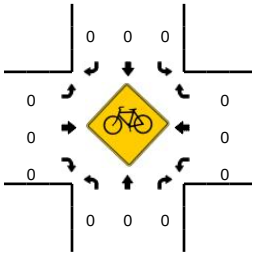


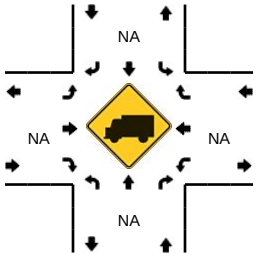


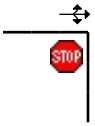


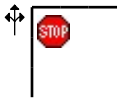


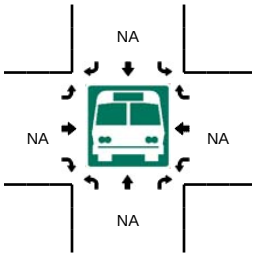












5-Min Count Period Beginning At	NW Old Lower River Rd (Northbound)				NW Old Lower River Rd (Southbound)				NW Old Lower River Rd (Eastbound)				NW Old Lower River Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	1	0	9	0	3	0	0	0	0	0	0	0	13	
6:35 AM	0	0	0	0	0	0	9	0	1	0	0	0	0	0	0	0	10	
6:40 AM	0	0	0	0	0	0	5	0	4	0	0	0	0	0	0	0	9	
6:45 AM	0	0	0	0	0	0	12	0	3	0	0	0	0	0	0	0	15	
6:50 AM	0	0	0	0	1	0	7	0	1	0	0	0	0	0	0	0	9	
6:55 AM	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	84
7:00 AM	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	84
7:05 AM	0	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	5	86
7:10 AM	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	3	87
7:15 AM	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	89
7:20 AM	0	0	0	0	2	0	2	0	1	0	0	0	0	0	0	0	5	87
7:25 AM	0	0	0	0	0	0	7	0	2	0	0	0	0	0	2	0	11	90
7:30 AM	0	0	0	0	0	0	4	0	3	0	0	0	0	0	0	0	7	84
7:35 AM	0	0	0	0	1	0	3	0	2	0	0	0	0	0	0	0	6	80
7:40 AM	0	0	0	0	2	0	1	0	3	0	0	0	0	0	2	0	8	79
7:45 AM	0	0	0	0	0	0	4	0	1	0	0	0	0	0	1	0	6	70
7:50 AM	0	0	0	0	1	0	4	0	2	0	0	0	0	0	0	0	7	68
7:55 AM	0	0	0	0	1	0	8	0	2	0	0	0	0	0	2	0	13	78
8:00 AM	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	78
8:05 AM	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2	75
8:10 AM	0	0	0	0	1	0	1	0	2	0	0	0	0	0	2	0	6	78
8:15 AM	0	0	0	0	1	0	6	0	2	0	0	0	0	0	0	0	9	83
8:20 AM	0	0	0	0	0	0	3	0	3	0	0	0	0	0	1	0	7	85
8:25 AM	0	0	0	0	1	0	3	0	2	0	0	0	0	0	0	0	6	80

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	8	0	64	0	20	0	0	0	0	0	12	0	104
Heavy Trucks	0	0	0		8	0	8		8	0	0		0	0	12		36
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:34 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

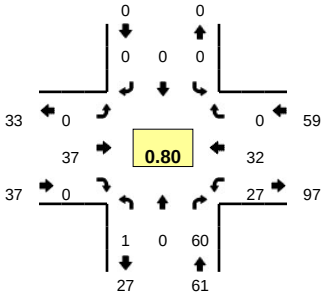
LOCATION: NW Old Lower River Rd (North) -- SR 501

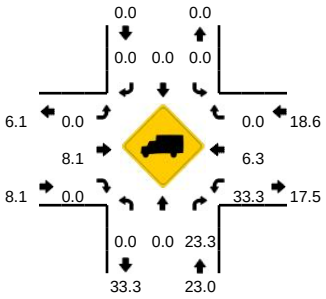
QC JOB #: 10972012

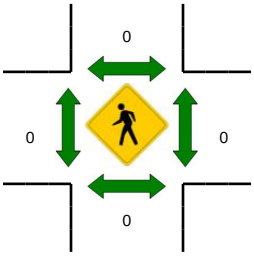
CITY/STATE: Vancouver, WA

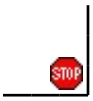
DATE: Thu, May 30 2013

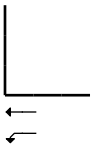
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:10 PM -- 4:25 PM

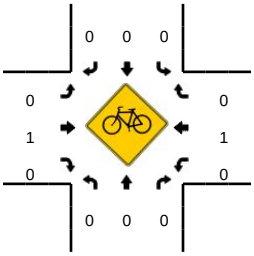


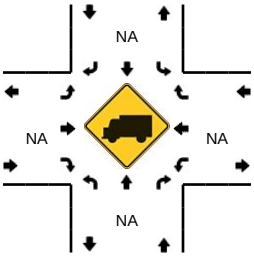


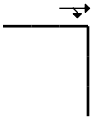


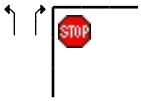


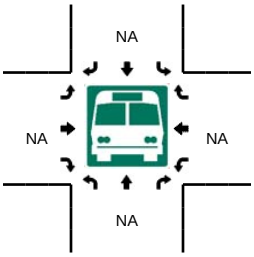












5-Min Count Period Beginning At	NW Old Lower River Rd (North) (Northbound)				NW Old Lower River Rd (North) (Southbound)				SR 501 (Eastbound)				SR 501 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	8	0	0	0	0	0	0	1	0	0	4	1	0	0	14	
4:05 PM	0	0	5	0	0	0	0	0	0	4	0	0	1	4	0	0	14	
4:10 PM	0	0	6	0	0	0	0	0	0	7	0	0	3	3	0	0	19	
4:15 PM	0	0	5	0	0	0	0	0	0	2	0	0	3	3	0	0	13	
4:20 PM	0	0	8	0	0	0	0	0	0	1	0	0	3	5	0	0	17	
4:25 PM	0	0	3	0	0	0	0	0	0	1	0	0	3	4	0	0	11	
4:30 PM	1	0	4	0	0	0	0	0	0	4	0	0	2	2	0	0	13	
4:35 PM	0	0	9	0	0	0	0	0	0	6	0	0	1	2	0	0	18	
4:40 PM	0	0	3	0	0	0	0	0	0	4	0	0	1	0	0	0	8	
4:45 PM	0	0	5	0	0	0	0	0	0	1	0	0	6	3	0	0	15	
4:50 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	
4:55 PM	0	0	4	0	0	0	0	0	0	3	0	0	0	5	0	0	12	157
5:00 PM	0	0	5	0	0	0	0	0	0	8	0	0	1	3	0	0	17	160
5:05 PM	0	0	2	0	0	0	0	0	0	3	0	0	3	4	0	0	12	158
5:10 PM	2	0	9	0	0	0	0	0	0	2	0	0	3	1	0	0	17	156
5:15 PM	0	0	2	0	0	0	0	0	0	4	0	0	0	1	0	0	7	150
5:20 PM	0	0	2	0	0	0	0	0	0	3	0	0	0	2	0	0	7	140
5:25 PM	0	0	2	0	0	0	0	0	0	1	0	0	0	2	0	0	5	134
5:30 PM	0	0	4	0	0	0	0	0	0	1	0	0	1	2	0	0	8	129
5:35 PM	0	0	5	0	0	0	0	0	0	3	0	0	0	2	0	0	10	121
5:40 PM	0	0	1	0	0	0	0	0	0	2	0	0	2	4	0	0	9	122
5:45 PM	0	0	1	0	0	0	0	0	0	5	0	0	0	3	0	0	9	116
5:50 PM	0	0	1	0	0	0	0	0	0	3	0	0	1	5	0	0	10	123
5:55 PM	0	0	4	0	0	0	0	0	0	1	0	0	0	1	0	0	6	117

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	76	0	0	0	0	0	0	40	0	0	36	44	0	0	196
Heavy Trucks	0	0	12		0	0	0		0	4	0		20	4	0		40
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:58 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

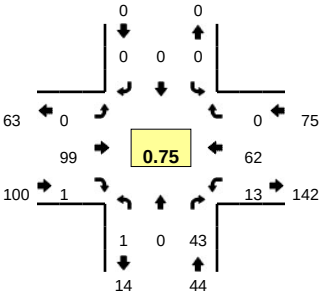
Type of peak hour being reported: User-Defined

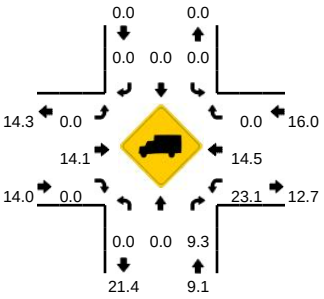
Method for determining peak hour: Total Entering Volume

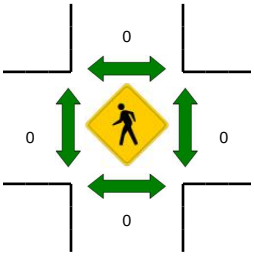
LOCATION: NW Gateway Ave -- SR 501
CITY/STATE: Vancouver, WA

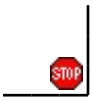
QC JOB #: 10972008
DATE: Thu, May 30 2013

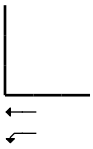
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

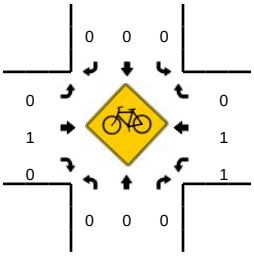


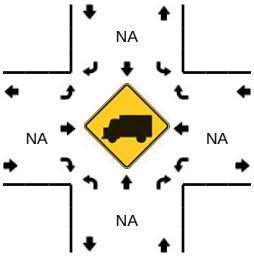


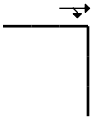


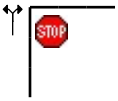


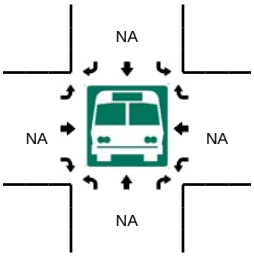












5-Min Count Period Beginning At	NW Gateway Ave (Northbound)				NW Gateway Ave (Southbound)				SR 501 (Eastbound)				SR 501 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	11	0	0	0	0	0	0	8	0	0	0	7	0	0	26	
4:05 PM	0	0	2	0	0	0	0	0	0	9	0	0	3	8	0	0	22	
4:10 PM	0	0	7	0	0	0	0	0	0	12	0	0	3	3	0	0	25	
4:15 PM	0	0	4	0	0	0	0	0	0	7	0	0	0	9	0	0	20	
4:20 PM	0	0	4	0	0	0	0	0	0	10	0	0	2	6	0	0	22	
4:25 PM	0	0	2	0	0	0	0	0	0	5	0	0	0	6	0	0	13	
4:30 PM	1	0	4	0	0	0	0	0	0	8	0	0	2	3	0	0	18	
4:35 PM	0	0	5	0	0	0	0	0	0	14	0	0	1	3	0	0	23	
4:40 PM	0	0	1	0	0	0	0	0	0	9	0	0	1	5	0	0	16	
4:45 PM	0	0	0	0	0	0	0	0	0	7	1	0	0	7	0	0	15	
4:50 PM	0	0	3	0	0	0	0	0	0	4	0	0	0	3	0	0	10	
4:55 PM	0	0	0	0	0	0	0	0	0	6	0	0	1	2	0	0	9	219
5:00 PM	0	0	4	0	0	0	0	0	0	14	0	1	0	4	0	0	23	216
5:05 PM	0	0	5	0	0	0	0	0	0	5	0	0	2	8	0	1	21	215
5:10 PM	0	0	6	0	0	0	0	0	0	8	0	0	0	3	0	0	17	207
5:15 PM	0	0	3	0	0	0	0	0	0	10	0	0	1	1	0	0	15	202
5:20 PM	0	0	4	0	0	0	0	0	0	6	0	0	1	2	0	0	13	193
5:25 PM	0	0	3	0	0	0	0	0	0	3	0	0	4	2	0	0	12	192
5:30 PM	0	0	6	0	0	0	0	0	0	4	0	0	2	3	0	0	15	189
5:35 PM	0	0	3	0	0	0	0	0	0	9	0	0	0	3	0	0	15	181
5:40 PM	0	0	3	0	0	0	0	0	0	3	0	0	1	9	0	0	16	181
5:45 PM	0	0	6	0	0	0	0	0	0	6	0	0	1	3	0	0	16	182
5:50 PM	0	0	1	0	0	0	0	0	0	2	0	0	1	4	0	0	8	180
5:55 PM	0	0	1	0	0	0	0	0	0	7	0	0	0	1	0	1	10	181

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	80	0	0	0	0	0	0	116	0	0	24	72	0	0	292
Heavy Trucks	0	0	12		0	0	0		0	20	0		4	16	0		52
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:58 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: W Mill Plain Blvd -- 4th Plain Rd

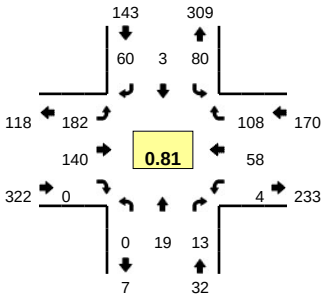
CITY/STATE: Vancouver, WA

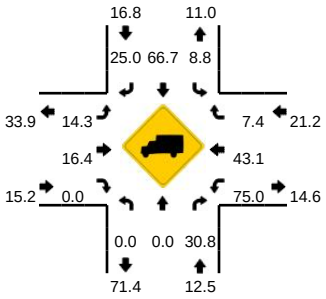
QC JOB #: 10972004

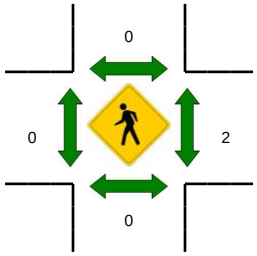
DATE: Thu, May 30 2013

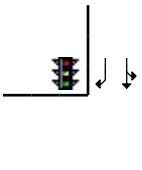
Peak-Hour: 4:00 PM -- 5:00 PM

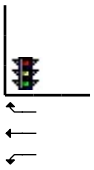
Peak 15-Min: 4:30 PM -- 4:45 PM

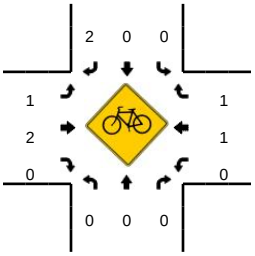


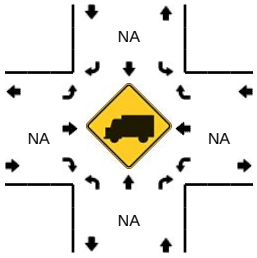


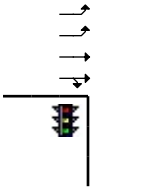


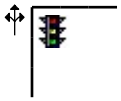


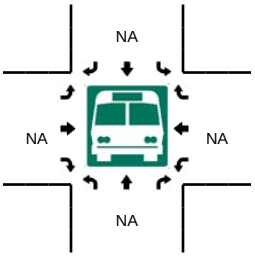












5-Min Count Period Beginning At	W Mill Plain Blvd (Northbound)				W Mill Plain Blvd (Southbound)				4th Plain Rd (Eastbound)				4th Plain Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	4	2	0	2	1	6	0	16	17	0	0	0	7	7	0	62	
4:05 PM	0	9	2	0	7	1	5	0	12	12	0	0	1	7	9	0	65	
4:10 PM	0	1	1	0	8	1	4	0	11	15	0	0	0	5	9	0	55	
4:15 PM	0	1	3	0	3	0	7	0	12	9	0	0	0	6	10	0	51	
4:20 PM	0	0	0	0	7	0	2	0	8	13	0	0	0	7	11	0	48	
4:25 PM	0	0	0	0	6	0	4	0	13	6	0	0	1	5	11	0	46	
4:30 PM	0	2	1	0	4	0	8	0	24	17	0	0	0	2	5	0	63	
4:35 PM	0	0	3	0	8	0	7	0	30	27	0	0	0	5	10	0	90	
4:40 PM	0	0	0	0	7	0	7	0	16	9	0	0	1	2	10	0	52	
4:45 PM	0	0	1	0	9	0	3	0	13	4	0	0	1	5	6	0	42	
4:50 PM	0	0	0	0	4	0	4	0	15	9	0	0	0	4	14	0	50	
4:55 PM	0	2	0	0	15	0	3	0	12	2	0	0	0	3	6	0	43	667
5:00 PM	0	1	2	0	6	0	4	0	20	8	0	0	0	4	9	0	54	659
5:05 PM	0	1	1	0	7	1	10	0	21	16	0	0	0	1	18	0	76	670
5:10 PM	0	1	0	0	4	0	3	0	17	16	0	0	0	0	22	0	63	678
5:15 PM	0	2	0	0	6	0	3	0	15	10	0	0	0	1	18	0	55	682
5:20 PM	0	0	0	0	5	0	4	0	10	6	0	0	0	1	11	0	37	671
5:25 PM	0	0	0	0	10	0	3	0	15	7	0	0	0	3	15	0	53	678
5:30 PM	0	0	0	0	1	0	5	0	5	5	0	0	0	3	8	0	27	642
5:35 PM	0	0	1	0	11	0	4	0	13	8	0	0	0	2	10	0	49	601
5:40 PM	0	0	1	0	2	0	2	0	8	6	0	0	0	5	5	0	29	578
5:45 PM	0	0	3	0	3	0	3	0	9	7	0	0	0	4	7	0	36	572
5:50 PM	0	1	0	0	2	0	1	0	1	4	0	0	0	3	6	0	18	540
5:55 PM	0	0	0	0	2	0	2	0	4	4	0	0	0	5	4	0	21	518

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	8	16	0	76	0	88	0	280	212	0	0	4	36	100	0	820
Heavy Trucks	0	0	8		16	0	20		32	16	0		4	20	16		132
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	1	0		0	1	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:58 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

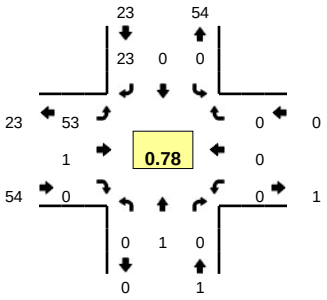
LOCATION: NW Old Lower River Rd -- NW Old Lower River Rd

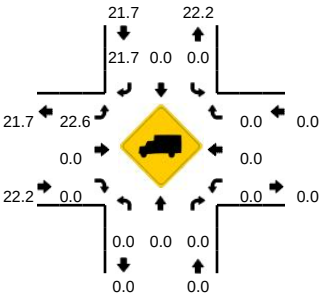
QC JOB #: 10972014

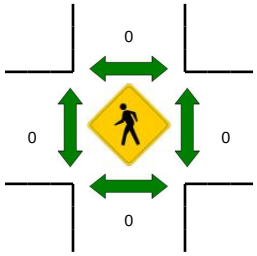
CITY/STATE: Vancouver, WA

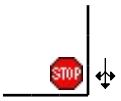
DATE: Thu, Jun 27 2013

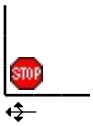
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:20 PM -- 4:35 PM

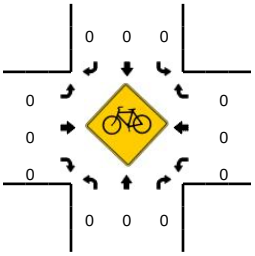


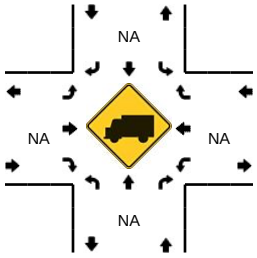


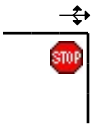


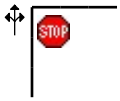


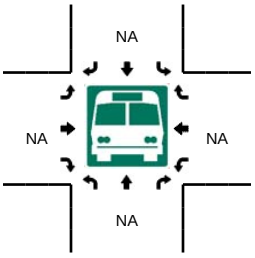












5-Min Count Period Beginning At	NW Old Lower River Rd (Northbound)				NW Old Lower River Rd (Southbound)				NW Old Lower River Rd (Eastbound)				NW Old Lower River Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	0	0	1	0	8	0	0	0	0	0	0	0	9	
4:05 PM	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	
4:10 PM	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	
4:15 PM	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	0	10	
4:20 PM	0	0	0	0	0	0	4	0	3	0	0	0	0	0	0	0	7	
4:25 PM	0	0	0	0	0	0	4	0	3	0	0	0	0	0	0	0	7	
4:30 PM	0	1	0	0	0	0	3	0	7	0	0	0	0	0	0	0	11	
4:35 PM	0	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	6	
4:40 PM	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	5	
4:45 PM	0	0	0	0	0	0	2	0	5	1	0	0	0	0	0	0	8	
4:50 PM	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5	
4:55 PM	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	78
5:00 PM	0	0	0	0	0	0	2	0	4	0	0	0	0	0	0	0	6	75
5:05 PM	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	74
5:10 PM	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	75
5:15 PM	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	68
5:20 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	62
5:25 PM	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	57
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	47
5:35 PM	0	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	6	47
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
5:45 PM	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	36
5:50 PM	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	4	35
5:55 PM	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	35

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	4	0	0	0	0	44	0	52	0	0	0	0	0	0	0	100
Heavy Trucks	0	0	0		0	0	8		4	0	0		0	0	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/2/2013 8:58 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix D 2013 Existing Traffic Conditions Level-of-Service WorksheetsCrash Data

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	14	0	53	36	0	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	19	0	72	49	0	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			19		211	19
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			19		211	19
tC, single (s)			4.3		6.4	6.9
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.9
p0 queue free %			95		100	96
cM capacity (veh/h)			1471		744	899

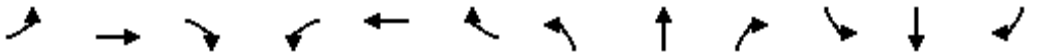
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	19	72	49	34
Volume Left	0	72	0	0
Volume Right	0	0	0	34
cSH	1700	1471	1700	449
Volume to Capacity	0.01	0.05	0.03	0.08
Queue Length 95th (ft)	0	4	0	6
Control Delay (s)	0.0	7.6	0.0	13.7
Lane LOS		A		B
Approach Delay (s)	0.0	4.5		13.7
Approach LOS				B

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	37	0	60	95	0	52
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	43	0	69	109	0	60
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			44		291	44
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			44		291	44
tC, single (s)			4.3		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.5
p0 queue free %			95		100	94
cM capacity (veh/h)			1439		670	980

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	43	69	109	60
Volume Left	0	69	0	0
Volume Right	0	0	0	60
cSH	1700	1439	1700	980
Volume to Capacity	0.03	0.05	0.06	0.06
Queue Length 95th (ft)	0	4	0	5
Control Delay (s)	0.0	7.6	0.0	8.9
Lane LOS		A		A
Approach Delay (s)	0.0	3.0		8.9
Approach LOS				A

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	68	2	11	170	55	0	2	2	318	22	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	2673	2511		1327	1545	1308		1174			1659	1468
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.74	1.00
Satd. Flow (perm)	2673	2511		1327	1545	1308		1174			1281	1468
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	42	79	2	13	198	64	0	2	2	370	26	221
RTOR Reduction (vph)	0	1	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	42	80	0	13	198	64	0	3	0	0	396	221
Confl. Peds. (#/hr)			1	1					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	31%	43%	50%	36%	23%	22%	0%	100%	0%	9%	14%	10%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	5.3	31.4		1.4	27.5	72.1		24.3			24.3	72.1
Effective Green, g (s)	5.3	31.4		1.4	27.5	72.1		24.3			24.3	72.1
Actuated g/C Ratio	0.07	0.44		0.02	0.38	1.00		0.34			0.34	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.5		1.0	1.0			2.0			2.0	
Lane Grp Cap (vph)	196	1094		26	589	1308		396			432	1468
v/s Ratio Prot	0.02	0.03		0.01	c0.13			0.00				
v/s Ratio Perm						0.05					c0.31	c0.15
v/c Ratio	0.21	0.07		0.50	0.34	0.05		0.01			0.92	0.15
Uniform Delay, d1	31.4	11.9		35.0	15.8	0.0		15.9			22.9	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.2	0.1		5.4	1.5	0.1		0.0			23.6	0.2
Delay (s)	31.6	12.0		40.4	17.4	0.1		15.9			46.5	0.2
Level of Service	C	B		D	B	A		B			D	A
Approach Delay (s)		18.7			14.4			15.9			29.9	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: EXAM

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.91	17.8
18X	R	9	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.86	17.8
Approach		11	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.87	17.8
North East: NW Old Lower River Rd											
1X	L	11	88.0	0.066	8.6	LOS A	0.8	24.4	0.36	0.84	18.9
16X	R	60	24.0	0.066	8.6	LOS A	0.8	24.4	0.36	0.63	18.9
Approach		71	33.7	0.066	8.6	LOS A	0.8	24.4	0.36	0.66	18.9
North West: NW Old Lower River Rc											
7X	L	24	56.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.58	22.7
4X	T	1	3.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		25	53.2	0.021	0.0	NA	0.0	0.0	0.00	0.55	22.8
South West: Private Access											
5X	L	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	1.07	18.6
2X	T	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.95	18.6
Approach		4	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.99	18.6
All Vehicles		111	42.1	0.066	7.0	NA	0.8	24.4	0.25	0.67	19.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	37	0	27	32	1	60
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	46	0	34	40	1	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			46		154	46
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			46		154	46
tC, single (s)			4.4		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.5
p0 queue free %			98		100	92
cM capacity (veh/h)			1384		822	967

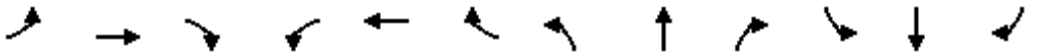
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	46	34	40	76
Volume Left	0	34	0	1
Volume Right	0	0	0	75
cSH	1700	1384	1700	983
Volume to Capacity	0.03	0.02	0.02	0.08
Queue Length 95th (ft)	0	2	0	6
Control Delay (s)	0.0	7.7	0.0	9.0
Lane LOS		A		A
Approach Delay (s)	0.0	3.5		9.0
Approach LOS				A

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	99	1	13	62	1	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	132	1	17	83	1	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			133		250	133
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			133		250	133
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			99		100	94
cM capacity (veh/h)			1332		733	898

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	133	17	83	59
Volume Left	0	17	0	1
Volume Right	1	0	0	57
cSH	1700	1332	1700	894
Volume to Capacity	0.08	0.01	0.05	0.07
Queue Length 95th (ft)	0	1	0	5
Control Delay (s)	0.0	7.7	0.0	9.3
Lane LOS		A		A
Approach Delay (s)	0.0	1.3		9.3
Approach LOS				A

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	182	140	0	4	58	108	0	19	13	80	3	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	3072	3112		1031	1329	1491		1584			1627	1292
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.71	1.00
Satd. Flow (perm)	3072	3112		1031	1329	1491		1584			1204	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	225	173	0	5	72	133	0	23	16	99	4	74
RTOR Reduction (vph)	0	0	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	225	173	0	5	72	133	0	26	0	0	103	74
Confl. Peds. (#/hr)									2	2		
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	14%	16%	0%	75%	43%	7%	0%	0%	31%	9%	67%	25%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	10.8	38.9		1.2	29.3	65.7		10.6			10.6	65.7
Effective Green, g (s)	10.8	38.9		1.2	29.3	65.7		10.6			10.6	65.7
Actuated g/C Ratio	0.16	0.59		0.02	0.45	1.00		0.16			0.16	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.5		1.0	1.0			2.0			2.0	
Lane Grp Cap (vph)	505	1843		19	593	1491		256			194	1292
v/s Ratio Prot	c0.07	0.06		0.00	c0.05			0.02				
v/s Ratio Perm						0.09					c0.09	0.06
v/c Ratio	0.45	0.09		0.26	0.12	0.09		0.10			0.53	0.06
Uniform Delay, d1	24.8	5.8		31.8	10.7	0.0		23.5			25.3	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.2	0.1		2.7	0.4	0.1		0.1			1.4	0.1
Delay (s)	25.0	5.9		34.5	11.1	0.1		23.5			26.7	0.1
Level of Service	C	A		C	B	A		C			C	A
Approach Delay (s)		16.7			4.7			23.5			15.6	
Approach LOS		B			A			C			B	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	65.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: EXPM

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.85	18.7
18X	R	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.83	18.6
Approach		3	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.84	18.6
North East: NW Old Lower River Rd											
1X	L	1	0.0	0.027	7.7	LOS A	0.2	6.1	0.33	0.86	19.2
16X	R	36	22.0	0.027	7.7	LOS A	0.2	6.1	0.33	0.67	19.1
Approach		37	21.2	0.027	7.7	LOS A	0.2	6.1	0.33	0.68	19.1
North West: NW Old Lower River Rd											
7X	L	80	23.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.57	22.7
4X	T	1	0.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		81	22.6	0.054	0.0	NA	0.0	0.0	0.00	0.56	22.7
South West: Private Access											
5X	L	1	3.0	0.005	9.1	LOS A	0.0	0.5	0.01	1.07	18.5
2X	T	1	0.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.95	18.5
Approach		4	2.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.99	18.5
All Vehicles		125	21.1	0.054	2.8	NA	0.2	6.1	0.10	0.61	21.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Appendix E In-Process Development

Table 8. Terminal 5 Project-Related Trips

Category of Trip	Units	Total Trip Ends [b] Daily Trips	AM Peak Trips In	AM Peak Trips Out	AM Peak Trips Total	PM Peak Trips In	PM Peak Trips Out	PM Peak Trips Total
Day Shift Employees and Visitors [a]								
Operations	*12*	*24*	*12*	*0*	*12*	*0*	*0*	*0*
Maintenance	*12*	*24*	*12*	*0*	*12*	*0*	*0*	*0*
Site Administration & Service Providers	*16*	*32*	*0*	*0*	*0*	*0*	*16*	*16*
	40	80	24	0	24	0	16	16
Night Shift [c]								
Operations & Maintenance	12	24	0	0	0	0	0	0
Trucks [d]	1	2	0	0	0	0	0	0
TOTAL TRIP ENDS		**106**	**24**	**0**	**24**	**0**	**16**	**16**

[a] All operations and maintenance workers anticipated to arrive between 7 and 8 AM, while site administration and service providers to arrive between 8 and 9 AM. Maintenance anticipated to leave between 4 and 5 PM, and operations to depart either before 4 PM or after 6 PM.
[b] Assumes a "typical" day when a ship is in port.
[c] Night shift is anticipated to be either a single or double shift with approximately 3 to 12 persons at any given time. Table assumes a maximum of 12.
[d] For site-related deliveries such as fuel. Cargo will arrive by rail and depart by ship. Arrival/departure assumed to occur out of peak hours.

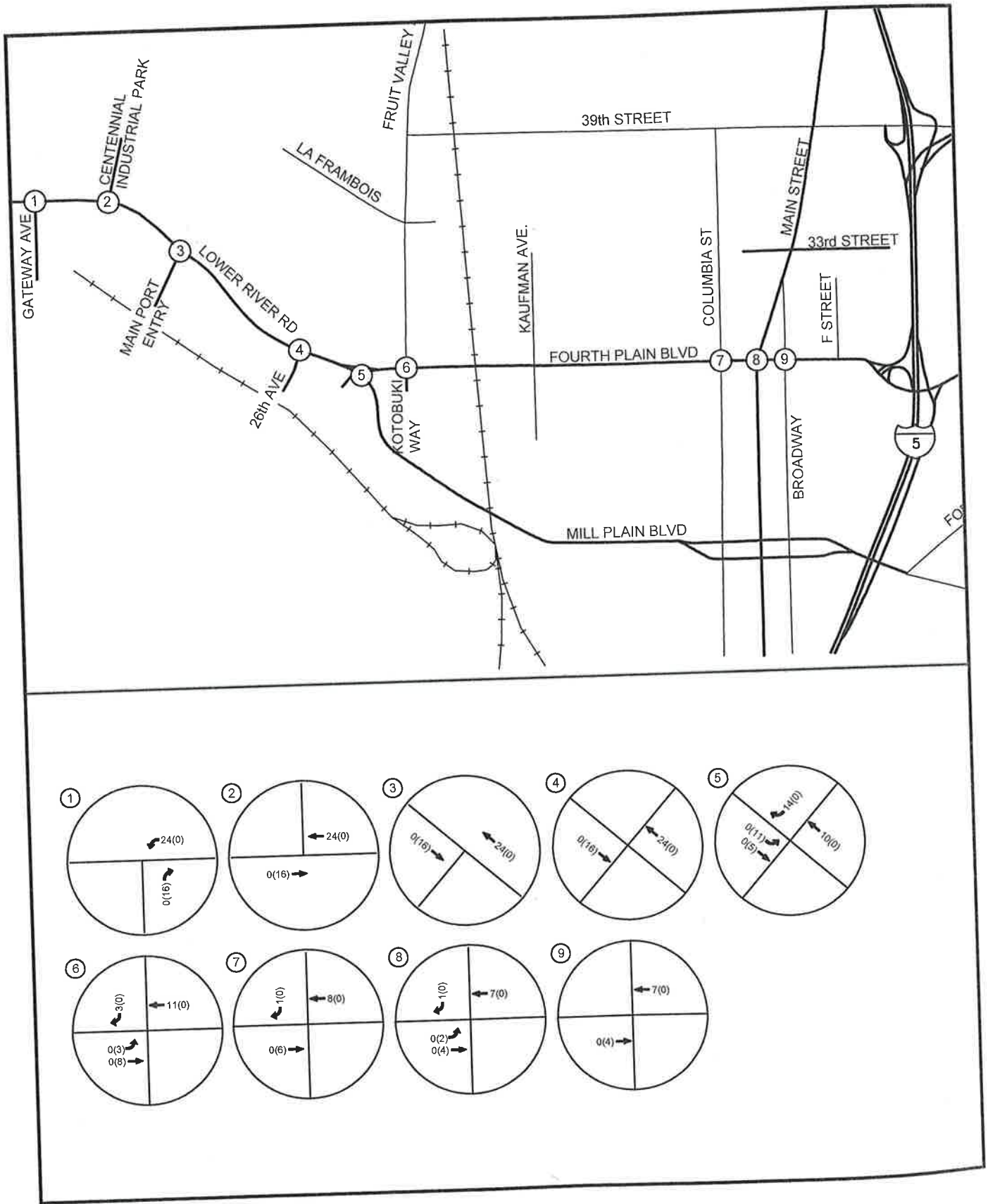
Fourth Plain Boulevard and Mill Plain Boulevard currently serve as the primary routes between Terminal 5 and destinations beyond the study area. The Fruit Valley Road corridor also attracts some project-related traffic, primarily related to employees and visitors accessing the site. For inbound project traffic, an average of 43 percent is expected to use Fourth Plain Boulevard, 42 percent is expected to use Mill Plain Boulevard, and about 14 percent would use Fruit Valley Road. For outbound traffic, about 50 percent is anticipated to use Fourth Plain Boulevard, 32 percent to use Mill Plain Boulevard and 18 percent to use Fruit Valley Road. Much of the inbound and outbound project traffic using Fourth Plain and Mill Plain Boulevards would travel to/from I-5, with some auto traffic diffusing onto other streets in the study area to accommodate multiple home-to-work trips. Trip distribution assumptions for autos used in the analysis of potential Terminal 5 traffic impacts are illustrated in Figure 6.

It is anticipated that inbound and outbound truck trips generated by the Terminal 5 operations will be primarily focused on travel between the project site and I-5. Between these points, truck traffic is expected to primarily use the Mill Plain and Fourth Plain Boulevard corridors. Truck trip distribution percentages were roughly split between the corridors, with 60 percent using Mill Plain Boulevard (the designated state highway and primary access route to the south) and 40 percent using Fourth Plain Boulevard (the primary access route to the north).

4.4 TRAFFIC VOLUMES WITH TERMINAL 5 OPERATIONS

The trip distribution patterns described above were used to assign trips associated with Terminal 5 operations onto the surrounding street network. These trips are illustrated in Figure 7.

Of project-related AM peak hour inbound trips, 11 would be made via Fourth Plain Boulevard, 10 via Mill Plain Boulevard, and 3 via Fruit Valley Road. No AM peak hour outbound trips are expected.



Parametrix DATE: February 10, 2011 FILE: PO2075015F-6

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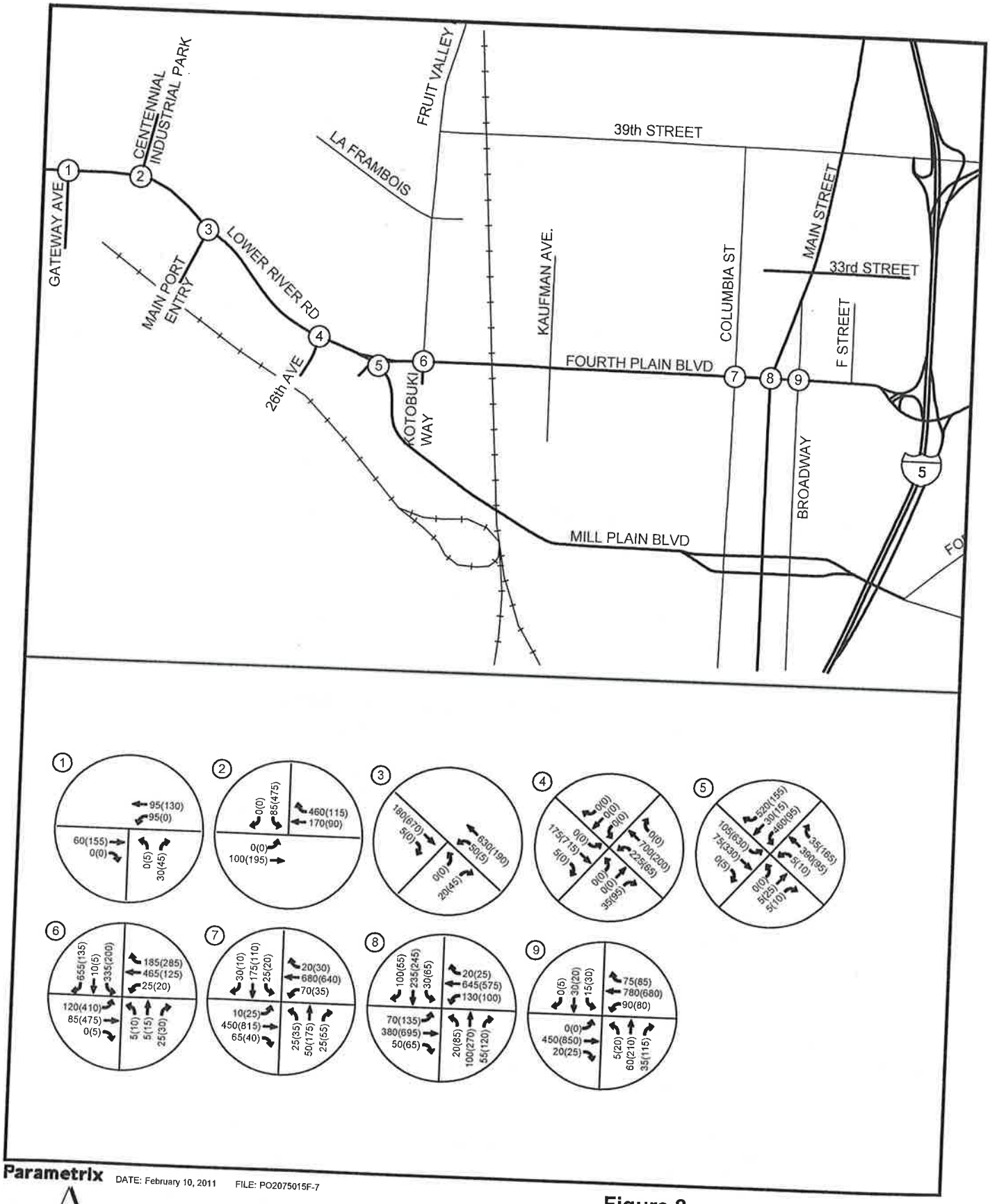
LEGEND

XXX (XXX) TURNING MOVEMENT BY DIRECTION OF TRAFFIC - AM (PM)

Figure 7
Terminal 5 AM (PM) Peak Hour Turning Movements
TERMINAL 5



Parametrix DATE: February 10, 2011 FILE: PO2075015F-7

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LEGEND

XXX (XXX) TURNING MOVEMENT BY DIRECTION OF TRAFFIC - AM (PM)

Figure 8
2020 AM (PM) Peak Hour Turning Movements with Baseline, Parcel 8, and Terminal 5
TERMINAL 5

Appendix F Build-Out Year 2020 Baseline Traffic Conditions Level-of-Service Worksheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	15	0	53	40	0	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	20	0	72	54	0	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			20		218	20
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			20		218	20
tC, single (s)			4.3		6.4	6.9
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.9
p0 queue free %			95		100	96
cM capacity (veh/h)			1470		737	897

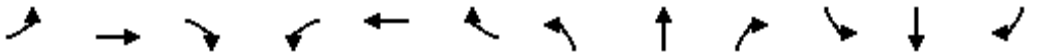
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	20	72	54	34
Volume Left	0	72	0	0
Volume Right	0	0	0	34
cSH	1700	1470	1700	449
Volume to Capacity	0.01	0.05	0.03	0.08
Queue Length 95th (ft)	0	4	0	6
Control Delay (s)	0.0	7.6	0.0	13.7
Lane LOS		A		B
Approach Delay (s)	0.0	4.3		13.7
Approach LOS				B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	41	0	84	105	0	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	47	0	97	121	0	78
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			48		362	48
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			48		362	48
tC, single (s)			4.3		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.5
p0 queue free %			93		100	92
cM capacity (veh/h)			1433		597	974

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	47	97	121	78
Volume Left	0	97	0	0
Volume Right	0	0	0	78
cSH	1700	1433	1700	974
Volume to Capacity	0.03	0.07	0.07	0.08
Queue Length 95th (ft)	0	5	0	7
Control Delay (s)	0.0	7.7	0.0	9.0
Lane LOS		A		A
Approach Delay (s)	0.0	3.4		9.0
Approach LOS				A

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	80	0	12	198	61	0	2	2	351	24	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	2673	2524		1327	1545	1308		1174			1659	1468
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.74	1.00
Satd. Flow (perm)	2673	2524		1327	1545	1308		1174			1280	1468
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	59	93	0	14	230	71	0	2	2	408	28	260
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	59	93	0	14	230	71	0	3	0	0	436	260
Confl. Peds. (#/hr)			1	1					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	31%	43%	50%	36%	23%	22%	0%	100%	0%	9%	14%	10%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	4.2	18.7		1.2	15.7	61.6		26.7			26.7	61.6
Effective Green, g (s)	4.2	18.7		1.2	15.7	61.6		26.7			26.7	61.6
Actuated g/C Ratio	0.07	0.30		0.02	0.25	1.00		0.43			0.43	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	182	766		26	394	1308		509			555	1468
v/s Ratio Prot	c0.02	0.04		0.01	c0.15			0.00				
v/s Ratio Perm						0.05					c0.34	c0.18
v/c Ratio	0.32	0.12		0.54	0.58	0.05		0.01			0.79	0.18
Uniform Delay, d1	27.3	15.5		29.9	20.1	0.0		9.9			15.0	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.4	0.0		10.3	1.4	0.1		0.0			6.7	0.3
Delay (s)	27.7	15.5		40.2	21.5	0.1		9.9			21.7	0.3
Level of Service	C	B		D	C	A		A			C	A
Approach Delay (s)		20.3			17.5			9.9			13.7	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	61.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: BKAM_2020

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.91	17.8
18X	R	9	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.86	17.8
Approach		11	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.87	17.8
North East: NW Old Lower River Rd											
1X	L	11	88.0	0.066	8.6	LOS A	0.8	24.4	0.36	0.84	18.9
16X	R	60	24.0	0.066	8.6	LOS A	0.8	24.4	0.36	0.63	18.9
Approach		71	33.7	0.066	8.6	LOS A	0.8	24.4	0.36	0.66	18.9
North West: NW Old Lower River Rd											
7X	L	24	56.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.58	22.7
4X	T	1	3.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		25	53.2	0.021	0.0	NA	0.0	0.0	0.00	0.55	22.8
South West: Private Access											
5X	L	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	1.07	18.6
2X	T	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.95	18.6
Approach		4	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.99	18.6
All Vehicles		111	42.1	0.066	7.0	NA	0.8	24.4	0.25	0.67	19.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	41	0	27	35	1	60
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	51	0	34	44	1	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			51		162	51
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		162	51
tC, single (s)			4.4		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.5
p0 queue free %			98		100	92
cM capacity (veh/h)			1378		813	960

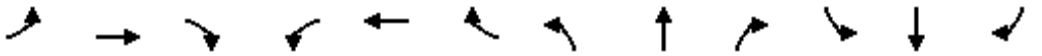
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	51	34	44	76
Volume Left	0	34	0	1
Volume Right	0	0	0	75
cSH	1700	1378	1700	976
Volume to Capacity	0.03	0.02	0.03	0.08
Queue Length 95th (ft)	0	2	0	6
Control Delay (s)	0.0	7.7	0.0	9.1
Lane LOS		A		A
Approach Delay (s)	0.0	3.3		9.1
Approach LOS				A

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	109	1	13	69	1	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	145	1	17	92	1	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			147		273	146
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			147		273	146
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			99		100	94
cM capacity (veh/h)			1316		712	883

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	147	17	92	59
Volume Left	0	17	0	1
Volume Right	1	0	0	57
cSH	1700	1316	1700	878
Volume to Capacity	0.09	0.01	0.05	0.07
Queue Length 95th (ft)	0	1	0	5
Control Delay (s)	0.0	7.8	0.0	9.4
Lane LOS		A		A
Approach Delay (s)	0.0	1.2		9.4
Approach LOS				A

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	201	155	0	4	64	119	0	21	14	88	3	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	3072	3112		1031	1329	1491		1594			1631	1292
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.70	1.00
Satd. Flow (perm)	3072	3112		1031	1329	1491		1594			1200	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	248	191	0	5	79	147	0	26	17	109	4	81
RTOR Reduction (vph)	0	0	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	248	191	0	5	79	147	0	29	0	0	113	81
Confl. Peds. (#/hr)									2	2		
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	14%	16%	0%	75%	43%	7%	0%	0%	31%	9%	67%	25%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	9.3	22.1		1.0	13.8	47.0		8.9			8.9	47.0
Effective Green, g (s)	9.3	22.1		1.0	13.8	47.0		8.9			8.9	47.0
Actuated g/C Ratio	0.20	0.47		0.02	0.29	1.00		0.19			0.19	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	608	1463		22	390	1491		302			227	1292
v/s Ratio Prot	c0.08	0.06		0.00	c0.06			0.02				
v/s Ratio Perm						0.10					c0.09	0.06
v/c Ratio	0.41	0.13		0.23	0.20	0.10		0.10			0.50	0.06
Uniform Delay, d1	16.4	7.0		22.6	12.5	0.0		15.7			17.0	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.2	0.0		1.9	0.1	0.1		0.1			0.6	0.1
Delay (s)	16.6	7.0		24.5	12.6	0.1		15.8			17.7	0.1
Level of Service	B	A		C	B	A		B			B	A
Approach Delay (s)		12.4			4.9			15.8			10.3	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	47.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: BKPM_2020

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.85	18.7
18X	R	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.83	18.6
Approach		3	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.84	18.6
North East: NW Old Lower River Rd											
1X	L	1	0.0	0.027	7.7	LOS A	0.2	6.1	0.33	0.86	19.2
16X	R	36	22.0	0.027	7.7	LOS A	0.2	6.1	0.33	0.67	19.1
Approach		37	21.2	0.027	7.7	LOS A	0.2	6.1	0.33	0.68	19.1
North West: NW Old Lower River Rd											
7X	L	80	23.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.57	22.7
4X	T	1	0.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		81	22.6	0.054	0.0	NA	0.0	0.0	0.00	0.56	22.7
South West: Private Access											
5X	L	1	3.0	0.005	9.1	LOS A	0.0	0.5	0.01	1.07	18.5
2X	T	1	0.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.95	18.5
Approach		4	2.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.99	18.5
All Vehicles		125	21.1	0.054	2.8	NA	0.2	6.1	0.10	0.61	21.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Appendix G Forecast Year 2025 Baseline Traffic Conditions Level-of-Service Worksheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	17	0	53	42	0	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	23	0	72	57	0	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			23		223	23
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			23		223	23
tC, single (s)			4.3		6.4	6.9
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.9
p0 queue free %			95		100	96
cM capacity (veh/h)			1466		732	894

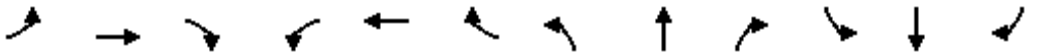
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	23	72	57	34
Volume Left	0	72	0	0
Volume Right	0	0	0	34
cSH	1700	1466	1700	447
Volume to Capacity	0.01	0.05	0.03	0.08
Queue Length 95th (ft)	0	4	0	6
Control Delay (s)	0.0	7.6	0.0	13.7
Lane LOS		A		B
Approach Delay (s)	0.0	4.2		13.7
Approach LOS				B

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	44	0	84	112	0	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	51	0	97	129	0	78
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			52		373	52
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			52		373	52
tC, single (s)			4.3		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.5
p0 queue free %			93		100	92
cM capacity (veh/h)			1429		588	969

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	51	97	129	78
Volume Left	0	97	0	0
Volume Right	0	0	0	78
cSH	1700	1429	1700	969
Volume to Capacity	0.03	0.07	0.08	0.08
Queue Length 95th (ft)	0	5	0	7
Control Delay (s)	0.0	7.7	0.0	9.0
Lane LOS		A		A
Approach Delay (s)	0.0	3.3		9.0
Approach LOS				A

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	85	0	13	211	65	0	2	2	375	26	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	2673	2524		1327	1545	1308		1174			1659	1468
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.74	1.00
Satd. Flow (perm)	2673	2524		1327	1545	1308		1174			1281	1468
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	62	99	0	15	245	76	0	2	2	436	30	277
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	62	99	0	15	245	76	0	3	0	0	466	277
Confl. Peds. (#/hr)			1	1					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	31%	43%	50%	36%	23%	22%	0%	100%	0%	9%	14%	10%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	4.2	19.1		1.2	16.1	62.0		26.7			26.7	62.0
Effective Green, g (s)	4.2	19.1		1.2	16.1	62.0		26.7			26.7	62.0
Actuated g/C Ratio	0.07	0.31		0.02	0.26	1.00		0.43			0.43	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	181	778		26	401	1308		506			552	1468
v/s Ratio Prot	c0.02	0.04		0.01	c0.16			0.00				
v/s Ratio Perm						0.06					c0.36	c0.19
v/c Ratio	0.34	0.13		0.58	0.61	0.06		0.01			0.84	0.19
Uniform Delay, d1	27.6	15.4		30.1	20.2	0.0		10.1			15.8	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.4	0.0		17.8	1.9	0.1		0.0			10.9	0.3
Delay (s)	28.0	15.5		47.9	22.1	0.1		10.1			26.7	0.3
Level of Service	C	B		D	C	A		B			C	A
Approach Delay (s)		20.3			18.3			10.1			16.8	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: BKAM_2025

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.91	17.8
18X	R	9	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.86	17.8
Approach		11	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.87	17.8
North East: NW Old Lower River Rd											
1X	L	11	88.0	0.066	8.6	LOS A	0.8	24.4	0.36	0.84	18.9
16X	R	60	24.0	0.066	8.6	LOS A	0.8	24.4	0.36	0.63	18.9
Approach		71	33.7	0.066	8.6	LOS A	0.8	24.4	0.36	0.66	18.9
North West: NW Old Lower River Rd											
7X	L	24	56.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.58	22.7
4X	T	1	3.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		25	53.2	0.021	0.0	NA	0.0	0.0	0.00	0.55	22.8
South West: Private Access											
5X	L	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	1.07	18.6
2X	T	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.95	18.6
Approach		4	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.99	18.6
All Vehicles		111	42.1	0.066	7.0	NA	0.8	24.4	0.25	0.67	19.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	44	0	27	38	1	60
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	55	0	34	48	1	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			55		170	55
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			55		170	55
tC, single (s)			4.4		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.5
p0 queue free %			98		100	92
cM capacity (veh/h)			1373		805	956

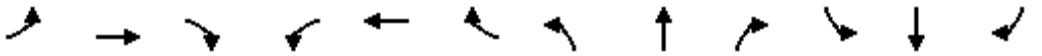
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	55	34	48	76
Volume Left	0	34	0	1
Volume Right	0	0	0	75
cSH	1700	1373	1700	972
Volume to Capacity	0.03	0.02	0.03	0.08
Queue Length 95th (ft)	0	2	0	6
Control Delay (s)	0.0	7.7	0.0	9.1
Lane LOS		A		A
Approach Delay (s)	0.0	3.2		9.1
Approach LOS				A

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	117	1	13	73	1	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	156	1	17	97	1	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			157		289	157
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		289	157
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			99		100	93
cM capacity (veh/h)			1304		697	871

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	157	17	97	59
Volume Left	0	17	0	1
Volume Right	1	0	0	57
cSH	1700	1304	1700	866
Volume to Capacity	0.09	0.01	0.06	0.07
Queue Length 95th (ft)	0	1	0	5
Control Delay (s)	0.0	7.8	0.0	9.5
Lane LOS		A		A
Approach Delay (s)	0.0	1.2		9.5
Approach LOS				A

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	215	165	0	5	68	127	0	22	15	94	4	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	3072	3112		1031	1329	1491		1582			1626	1292
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.70	1.00
Satd. Flow (perm)	3072	3112		1031	1329	1491		1582			1195	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	265	204	0	6	84	157	0	27	19	116	5	88
RTOR Reduction (vph)	0	0	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	265	204	0	6	84	157	0	31	0	0	121	88
Confl. Peds. (#/hr)									2	2		
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	14%	16%	0%	75%	43%	7%	0%	0%	31%	9%	67%	25%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	9.5	22.5		1.0	14.0	47.5		9.0			9.0	47.5
Effective Green, g (s)	9.5	22.5		1.0	14.0	47.5		9.0			9.0	47.5
Actuated g/C Ratio	0.20	0.47		0.02	0.29	1.00		0.19			0.19	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	614	1474		22	392	1491		300			226	1292
v/s Ratio Prot	c0.09	0.07		0.01	c0.06			0.02				
v/s Ratio Perm						0.11					c0.10	0.07
v/c Ratio	0.43	0.14		0.27	0.21	0.11		0.10			0.54	0.07
Uniform Delay, d1	16.6	7.0		22.9	12.6	0.0		15.9			17.4	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.2	0.0		2.4	0.1	0.1		0.1			1.2	0.1
Delay (s)	16.8	7.1		25.3	12.7	0.1		16.0			18.6	0.1
Level of Service	B	A		C	B	A		B			B	A
Approach Delay (s)		12.6			5.0			16.0			10.8	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: BKPM_2025

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.85	18.7
18X	R	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.83	18.6
Approach		3	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.84	18.6
North East: NW Old Lower River Rd											
1X	L	1	0.0	0.027	7.7	LOS A	0.2	6.1	0.33	0.86	19.2
16X	R	36	22.0	0.027	7.7	LOS A	0.2	6.1	0.33	0.67	19.1
Approach		37	21.2	0.027	7.7	LOS A	0.2	6.1	0.33	0.68	19.1
North West: NW Old Lower River Rd											
7X	L	80	23.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.57	22.7
4X	T	1	0.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		81	22.6	0.054	0.0	NA	0.0	0.0	0.00	0.56	22.7
South West: Private Access											
5X	L	1	3.0	0.005	9.1	LOS A	0.0	0.5	0.01	1.07	18.5
2X	T	1	0.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.95	18.5
Approach		4	2.0	0.005	9.1	LOS A	0.0	0.5	0.01	0.99	18.5
All Vehicles		125	21.1	0.054	2.8	NA	0.2	6.1	0.10	0.61	21.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Appendix H Build-Out Year 2020 Total Traffic Conditions Level-of-Service Worksheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	15	0	93	40	0	33
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	20	0	126	54	0	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			20		326	20
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			20		326	20
tC, single (s)			4.3		6.4	6.9
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.9
p0 queue free %			91		100	95
cM capacity (veh/h)			1470		615	897

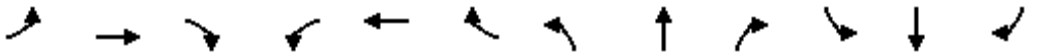
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	20	126	54	45
Volume Left	0	126	0	0
Volume Right	0	0	0	45
cSH	1700	1470	1700	449
Volume to Capacity	0.01	0.09	0.03	0.10
Queue Length 95th (ft)	0	7	0	8
Control Delay (s)	0.0	7.7	0.0	13.9
Lane LOS		A		B
Approach Delay (s)	0.0	5.4		13.9
Approach LOS				B

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	15.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	49	0	84	145	0	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	56	0	97	167	0	78
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			57		417	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			57		417	57
tC, single (s)			4.3		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.5
p0 queue free %			93		100	92
cM capacity (veh/h)			1422		555	962

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	56	97	167	78
Volume Left	0	97	0	0
Volume Right	0	0	0	78
cSH	1700	1422	1700	962
Volume to Capacity	0.03	0.07	0.10	0.08
Queue Length 95th (ft)	0	5	0	7
Control Delay (s)	0.0	7.7	0.0	9.1
Lane LOS		A		A
Approach Delay (s)	0.0	2.8		9.1
Approach LOS				A

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	84	0	12	218	61	0	2	2	351	24	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	2673	2524		1327	1545	1308		1174			1659	1468
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.74	1.00
Satd. Flow (perm)	2673	2524		1327	1545	1308		1174			1280	1468
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	64	98	0	14	253	71	0	2	2	408	28	284
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	64	98	0	14	253	71	0	3	0	0	436	284
Confl. Peds. (#/hr)			1	1					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	31%	43%	50%	36%	23%	22%	0%	100%	0%	9%	14%	10%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	4.2	19.3		1.2	16.3	62.2		26.7			26.7	62.2
Effective Green, g (s)	4.2	19.3		1.2	16.3	62.2		26.7			26.7	62.2
Actuated g/C Ratio	0.07	0.31		0.02	0.26	1.00		0.43			0.43	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	180	783		26	405	1308		504			549	1468
v/s Ratio Prot	c0.02	0.04		0.01	c0.16			0.00				
v/s Ratio Perm						0.05					c0.34	c0.19
v/c Ratio	0.36	0.13		0.54	0.62	0.05		0.01			0.79	0.19
Uniform Delay, d1	27.7	15.4		30.2	20.3	0.0		10.2			15.4	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.4	0.0		10.3	2.2	0.1		0.0			7.3	0.3
Delay (s)	28.1	15.4		40.5	22.4	0.1		10.2			22.6	0.3
Level of Service	C	B		D	C	A		B			C	A
Approach Delay (s)		20.4			18.5			10.2			13.8	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	62.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: TTAM_2020

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	86.0	0.041	12.3	LOS B	0.2	8.2	0.23	0.92	17.8
18X	R	20	86.0	0.041	12.3	LOS B	0.2	8.2	0.23	0.86	17.8
Approach		21	86.0	0.041	12.3	LOS B	0.2	8.2	0.23	0.87	17.8
North East: NW Old Lower River Rd											
1X	L	64	88.0	0.183	11.5	LOS B	1.6	58.6	0.39	0.84	18.1
16X	R	60	24.0	0.183	11.5	LOS B	1.6	58.6	0.39	0.59	18.1
Approach		124	57.0	0.183	11.5	LOS B	1.6	58.6	0.39	0.72	18.1
North West: NW Old Lower River Rd											
7X	L	24	56.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.58	22.7
4X	T	1	3.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		25	53.2	0.021	0.0	NA	0.0	0.0	0.00	0.55	22.8
South West: Private Access											
5X	L	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	1.07	18.6
2X	T	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.95	18.6
Approach		4	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.99	18.6
All Vehicles		175	58.8	0.183	9.9	NA	1.6	58.6	0.31	0.72	18.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	41	0	37	35	1	96
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	51	0	46	44	1	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			51		188	51
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		188	51
tC, single (s)			4.4		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.5
p0 queue free %			97		100	88
cM capacity (veh/h)			1378		779	960

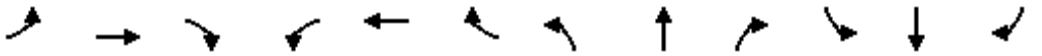
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	51	46	44	121
Volume Left	0	46	0	1
Volume Right	0	0	0	120
cSH	1700	1378	1700	970
Volume to Capacity	0.03	0.03	0.03	0.12
Queue Length 95th (ft)	0	3	0	11
Control Delay (s)	0.0	7.7	0.0	9.3
Lane LOS		A		A
Approach Delay (s)	0.0	4.0		9.3
Approach LOS				A

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	145	1	13	79	1	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	193	1	17	105	1	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			195		334	194
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			195		334	194
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			99		100	93
cM capacity (veh/h)			1262		656	830

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	195	17	105	59
Volume Left	0	17	0	1
Volume Right	1	0	0	57
cSH	1700	1262	1700	825
Volume to Capacity	0.11	0.01	0.06	0.07
Queue Length 95th (ft)	0	1	0	6
Control Delay (s)	0.0	7.9	0.0	9.7
Lane LOS		A		A
Approach Delay (s)	0.0	1.1		9.7
Approach LOS				A

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	221	171	0	4	68	119	0	21	14	88	3	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	3072	3112		1031	1329	1491		1594			1631	1292
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.70	1.00
Satd. Flow (perm)	3072	3112		1031	1329	1491		1594			1200	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	273	211	0	5	84	147	0	26	17	109	4	89
RTOR Reduction (vph)	0	0	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	273	211	0	5	84	147	0	29	0	0	113	89
Confl. Peds. (#/hr)									2	2		
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	14%	16%	0%	75%	43%	7%	0%	0%	31%	9%	67%	25%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	9.6	22.6		1.0	14.0	47.5		8.9			8.9	47.5
Effective Green, g (s)	9.6	22.6		1.0	14.0	47.5		8.9			8.9	47.5
Actuated g/C Ratio	0.20	0.48		0.02	0.29	1.00		0.19			0.19	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	621	1481		22	392	1491		299			225	1292
v/s Ratio Prot	c0.09	0.07		0.00	c0.06			0.02				
v/s Ratio Perm						0.10					c0.09	0.07
v/c Ratio	0.44	0.14		0.23	0.21	0.10		0.10			0.50	0.07
Uniform Delay, d1	16.6	7.0		22.9	12.6	0.0		16.0			17.3	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.2	0.0		1.9	0.1	0.1		0.1			0.6	0.1
Delay (s)	16.8	7.0		24.8	12.7	0.1		16.0			18.0	0.1
Level of Service	B	A		C	B	A		B			B	A
Approach Delay (s)		12.5			5.1			16.0			10.1	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: TTPM_2020

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	0.0	0.050	9.0	LOS A	0.2	6.0	0.27	0.88	18.8
18X	R	46	0.0	0.050	9.0	LOS A	0.2	6.0	0.27	0.85	18.7
Approach		47	0.0	0.050	9.0	LOS A	0.2	6.0	0.27	0.85	18.7
North East: NW Old Lower River Rd											
1X	L	13	0.0	0.040	8.2	LOS A	0.3	7.8	0.34	0.86	19.0
16X	R	35	22.0	0.040	8.2	LOS A	0.3	7.8	0.34	0.65	19.0
Approach		47	16.1	0.040	8.2	LOS A	0.3	7.8	0.34	0.70	19.0
North West: NW Old Lower River Rd											
7X	L	77	23.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.57	22.7
4X	T	1	0.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		78	22.6	0.052	0.0	NA	0.0	0.0	0.00	0.56	22.7
South West: Private Access											
5X	L	1	3.0	0.004	9.1	LOS A	0.0	0.5	0.01	1.07	18.5
2X	T	1	0.0	0.004	9.1	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.004	9.1	LOS A	0.0	0.5	0.01	0.95	18.5
Approach		4	2.0	0.004	9.1	LOS A	0.0	0.5	0.01	0.99	18.5
All Vehicles		177	14.3	0.052	4.8	NA	0.3	7.8	0.17	0.69	20.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Appendix I Forecast Year 2025 Total Traffic Conditions Level-of-Service Worksheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	17	0	93	42	0	33
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	23	0	126	57	0	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			23		331	23
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			23		331	23
tC, single (s)			4.3		6.4	6.9
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.9
p0 queue free %			91		100	95
cM capacity (veh/h)			1466		611	894

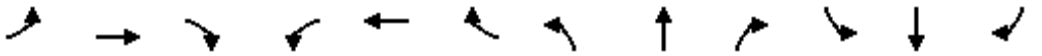
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	23	126	57	45
Volume Left	0	126	0	0
Volume Right	0	0	0	45
cSH	1700	1466	1700	447
Volume to Capacity	0.01	0.09	0.03	0.10
Queue Length 95th (ft)	0	7	0	8
Control Delay (s)	0.0	7.7	0.0	13.9
Lane LOS		A		B
Approach Delay (s)	0.0	5.3		13.9
Approach LOS				B

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	15.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	52	0	84	152	0	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	60	0	97	175	0	78
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			61		429	61
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			61		429	61
tC, single (s)			4.3		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.5
p0 queue free %			93		100	92
cM capacity (veh/h)			1417		547	958

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	60	97	175	78
Volume Left	0	97	0	0
Volume Right	0	0	0	78
cSH	1700	1417	1700	958
Volume to Capacity	0.04	0.07	0.10	0.08
Queue Length 95th (ft)	0	5	0	7
Control Delay (s)	0.0	7.7	0.0	9.1
Lane LOS		A		A
Approach Delay (s)	0.0	2.7		9.1
Approach LOS				A

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	89	0	13	231	65	0	2	2	375	26	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	2673	2524		1327	1545	1308		1174			1659	1468
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.74	1.00
Satd. Flow (perm)	2673	2524		1327	1545	1308		1174			1281	1468
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	66	103	0	15	269	76	0	2	2	436	30	300
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	66	103	0	15	269	76	0	3	0	0	466	300
Confl. Peds. (#/hr)			1	1					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	31%	43%	50%	36%	23%	22%	0%	100%	0%	9%	14%	10%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	4.2	19.8		1.2	16.8	62.7		26.7			26.7	62.7
Effective Green, g (s)	4.2	19.8		1.2	16.8	62.7		26.7			26.7	62.7
Actuated g/C Ratio	0.07	0.32		0.02	0.27	1.00		0.43			0.43	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	179	797		25	414	1308		500			545	1468
v/s Ratio Prot	c0.02	0.04		0.01	c0.17			0.00				
v/s Ratio Perm						0.06					c0.36	c0.20
v/c Ratio	0.37	0.13		0.60	0.65	0.06		0.01			0.86	0.20
Uniform Delay, d1	28.0	15.3		30.5	20.3	0.0		10.4			16.3	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.5	0.0		23.2	2.6	0.1		0.0			12.0	0.3
Delay (s)	28.5	15.3		53.7	23.0	0.1		10.4			28.3	0.3
Level of Service	C	B		D	C	A		B			C	A
Approach Delay (s)		20.5			19.4			10.4			17.3	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: TTAM_2025

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	86.0	0.041	12.3	LOS B	0.2	8.2	0.23	0.92	17.8
18X	R	20	86.0	0.041	12.3	LOS B	0.2	8.2	0.23	0.86	17.8
Approach		21	86.0	0.041	12.3	LOS B	0.2	8.2	0.23	0.87	17.8
North East: NW Old Lower River Rd											
1X	L	64	88.0	0.183	11.5	LOS B	1.6	58.6	0.39	0.84	18.1
16X	R	60	24.0	0.183	11.5	LOS B	1.6	58.6	0.39	0.59	18.1
Approach		124	57.0	0.183	11.5	LOS B	1.6	58.6	0.39	0.72	18.1
North West: NW Old Lower River Rd											
7X	L	24	56.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.58	22.7
4X	T	1	3.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		25	53.2	0.021	0.0	NA	0.0	0.0	0.00	0.55	22.8
South West: Private Access											
5X	L	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	1.07	18.6
2X	T	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.95	18.6
Approach		4	3.0	0.004	8.9	LOS A	0.0	0.5	0.01	0.99	18.6
All Vehicles		175	58.8	0.183	9.9	NA	1.6	58.6	0.31	0.72	18.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	44	0	37	38	1	96
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	55	0	46	48	1	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			55		195	55
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			55		195	55
tC, single (s)			4.4		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.5
p0 queue free %			97		100	87
cM capacity (veh/h)			1373		771	956

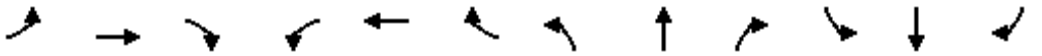
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	55	46	48	121
Volume Left	0	46	0	1
Volume Right	0	0	0	120
cSH	1700	1373	1700	966
Volume to Capacity	0.03	0.03	0.03	0.13
Queue Length 95th (ft)	0	3	0	11
Control Delay (s)	0.0	7.7	0.0	9.3
Lane LOS		A		A
Approach Delay (s)	0.0	3.8		9.3
Approach LOS				A

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	153	1	13	83	1	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	204	1	17	111	1	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			205		350	205
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			205		350	205
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			99		100	93
cM capacity (veh/h)			1250		642	819

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	205	17	111	59
Volume Left	0	17	0	1
Volume Right	1	0	0	57
cSH	1700	1250	1700	813
Volume to Capacity	0.12	0.01	0.07	0.07
Queue Length 95th (ft)	0	1	0	6
Control Delay (s)	0.0	7.9	0.0	9.8
Lane LOS		A		A
Approach Delay (s)	0.0	1.1		9.8
Approach LOS				A

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	235	181	0	5	72	127	0	22	15	94	4	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	3072	3112		1031	1329	1491		1582			1626	1292
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.70	1.00
Satd. Flow (perm)	3072	3112		1031	1329	1491		1582			1195	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	290	223	0	6	89	157	0	27	19	116	5	94
RTOR Reduction (vph)	0	0	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	290	223	0	6	89	157	0	31	0	0	121	94
Confl. Peds. (#/hr)									2	2		
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	14%	16%	0%	75%	43%	7%	0%	0%	31%	9%	67%	25%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	9.8	23.0		1.0	14.2	48.0		9.0			9.0	48.0
Effective Green, g (s)	9.8	23.0		1.0	14.2	48.0		9.0			9.0	48.0
Actuated g/C Ratio	0.20	0.48		0.02	0.30	1.00		0.19			0.19	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	627	1491		21	393	1491		297			224	1292
v/s Ratio Prot	c0.09	0.07		0.01	c0.07			0.02				
v/s Ratio Perm						0.11					c0.10	0.07
v/c Ratio	0.46	0.15		0.29	0.23	0.11		0.10			0.54	0.07
Uniform Delay, d1	16.8	7.0		23.1	12.8	0.0		16.2			17.6	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.2	0.0		2.7	0.1	0.1		0.1			1.4	0.1
Delay (s)	17.0	7.0		25.9	12.9	0.1		16.2			19.1	0.1
Level of Service	B	A		C	B	A		B			B	A
Approach Delay (s)		12.7			5.2			16.2			10.8	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	48.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: TTPM_2025

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	0.0	0.050	9.0	LOS A	0.2	6.0	0.27	0.88	18.8
18X	R	46	0.0	0.050	9.0	LOS A	0.2	6.0	0.27	0.85	18.7
Approach		47	0.0	0.050	9.0	LOS A	0.2	6.0	0.27	0.85	18.7
North East: NW Old Lower River Rd											
1X	L	13	0.0	0.040	8.2	LOS A	0.3	7.8	0.34	0.86	19.0
16X	R	35	22.0	0.040	8.2	LOS A	0.3	7.8	0.34	0.65	19.0
Approach		47	16.1	0.040	8.2	LOS A	0.3	7.8	0.34	0.70	19.0
North West: NW Old Lower River Rd											
7X	L	77	23.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.57	22.7
4X	T	1	0.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		78	22.6	0.052	0.0	NA	0.0	0.0	0.00	0.56	22.7
South West: Private Access											
5X	L	1	3.0	0.004	9.1	LOS A	0.0	0.5	0.01	1.07	18.5
2X	T	1	0.0	0.004	9.1	LOS A	0.0	0.5	0.01	0.96	18.6
12X	R	1	3.0	0.004	9.1	LOS A	0.0	0.5	0.01	0.95	18.5
Approach		4	2.0	0.004	9.1	LOS A	0.0	0.5	0.01	0.99	18.5
All Vehicles		177	14.3	0.052	4.8	NA	0.3	7.8	0.17	0.69	20.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used. Geometric Delay not included.

Appendix J 95th Percentile Queuing Analysis Worksheets

Intersection: 1: SR 501 & NW Old Lower River Rd

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	22	19	75
Average Queue (ft)	1	1	30
95th Queue (ft)	8	14	86
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	39	80
Average Queue (ft)	4	37
95th Queue (ft)	22	69
Link Distance (ft)		657
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	180	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: W 4th Plain Blvd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	23	61	44	76	77	260	29	312	70
Average Queue (ft)	2	17	6	24	12	94	3	163	10
95th Queue (ft)	14	47	25	65	43	202	17	266	48
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)						0			
Queuing Penalty (veh)						0			

Intersection: 1: SR 501 & NW Old Lower River Rd

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	32	103	76
Average Queue (ft)	2	6	25
95th Queue (ft)	13	46	80
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	15	64
Average Queue (ft)	1	27
95th Queue (ft)	8	56
Link Distance (ft)		657
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	180	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: W 4th Plain Blvd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	109	140	48	78	55	131	74	149	24
Average Queue (ft)	17	43	5	22	9	34	22	49	1
95th Queue (ft)	64	95	26	60	40	91	55	105	14
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)	0	0							
Queuing Penalty (veh)	0	0							

Intersection: 1: SR 501 & NW Old Lower River Rd

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	20	69	75
Average Queue (ft)	1	2	27
95th Queue (ft)	8	30	83
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	39	77
Average Queue (ft)	3	36
95th Queue (ft)	21	67
Link Distance (ft)		657
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	180	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: W 4th Plain Blvd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	48	69	44	91	71	308	42	478	182
Average Queue (ft)	3	17	7	26	14	115	5	206	24
95th Queue (ft)	22	46	28	69	48	240	26	371	149
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)						1			
Queuing Penalty (veh)						0			

Intersection: 1: SR 501 & NW Old Lower River Rd

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	30	48	75
Average Queue (ft)	2	3	29
95th Queue (ft)	15	31	85
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	28	66
Average Queue (ft)	1	28
95th Queue (ft)	13	55
Link Distance (ft)		657
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	180	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: W 4th Plain Blvd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	86	100	40	76	66	111	81	171	30
Average Queue (ft)	20	46	6	25	8	37	25	59	1
95th Queue (ft)	59	91	24	62	40	88	59	123	15
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 1: SR 501 & NW Old Lower River Rd

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	31	27	76
Average Queue (ft)	3	1	32
95th Queue (ft)	25	19	89
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	49	79
Average Queue (ft)	7	39
95th Queue (ft)	31	70
Link Distance (ft)		657
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	180	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: W 4th Plain Blvd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	24	70	58	82	69	260	47	295	90
Average Queue (ft)	2	18	7	28	14	105	4	164	15
95th Queue (ft)	12	51	33	68	49	199	23	263	61
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)						0			
Queuing Penalty (veh)						0			

Intersection: 1: SR 501 & NW Old Lower River Rd (North)

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	36	63	76
Average Queue (ft)	3	4	30
95th Queue (ft)	22	37	87
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	31	62
Average Queue (ft)	2	27
95th Queue (ft)	14	57
Link Distance (ft)		657
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	180	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: 4th Plain Rd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	84	100	45	75	62	90	75	140	41
Average Queue (ft)	19	46	6	24	10	33	25	50	2
95th Queue (ft)	56	86	25	61	42	77	59	107	21
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 1: SR 501 & NW Old Lower River Rd

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	44	19	76
Average Queue (ft)	3	1	34
95th Queue (ft)	24	14	91
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			1
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	8	50	82
Average Queue (ft)	0	6	39
95th Queue (ft)	6	27	72
Link Distance (ft)	848		657
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		180	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: W 4th Plain Blvd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	34	92	46	108	62	344	46	358	104
Average Queue (ft)	4	20	7	30	11	129	5	191	16
95th Queue (ft)	22	59	30	74	42	270	26	314	64
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)						3			
Queuing Penalty (veh)						0			

Intersection: 1: SR 501 & NW Old Lower River Rd

Movement	WB	NB	NB
Directions Served	L	L	R
Maximum Queue (ft)	41	71	75
Average Queue (ft)	3	4	27
95th Queue (ft)	21	37	83
Link Distance (ft)		717	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	750		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 2: SR 501 & NW Gateway Ave

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	37	70
Average Queue (ft)	3	29
95th Queue (ft)	19	59
Link Distance (ft)		657
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	180	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: W 4th Plain Blvd & W Mill Plain Blvd

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	L	T	TR	L	T	LTR	LT	R
Maximum Queue (ft)	108	124	40	91	77	118	87	170	65
Average Queue (ft)	23	53	5	29	12	35	29	57	3
95th Queue (ft)	74	103	23	70	52	89	70	119	27
Link Distance (ft)			686	686		689	533	756	756
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	225	225			250				
Storage Blk Time (%)									
Queuing Penalty (veh)									

Appendix K Speed Survey Results for Old Lower River Road

LOCATION: NW Old River Rd west of Old River Rd
QC JOB #: 11091501
SPECIFIC LOCATION: 100 ft from Old River Rd
DIRECTION: WB
CITY/STATE: Vancouver, WA
DATE: Jul 16 2013 - Jul 16 2013

Start Time	Mon	Tue 16-Jul-13	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		1				1			1	
1:00 AM		1				1			1	
2:00 AM		1				1			1	
3:00 AM		19				19			19	
4:00 AM		9				9			9	
5:00 AM		18				18			18	
6:00 AM		**76**				**76**			**76**	
7:00 AM		48				48			48	
8:00 AM		37				37			37	
9:00 AM		44				44			44	
10:00 AM		47				47			47	
11:00 AM		48				48			48	
12:00 PM		52				52			52	
1:00 PM		54				54			54	
2:00 PM		**62**				**62**			**62**	
3:00 PM		44				44			44	
4:00 PM		28				28			28	
5:00 PM		10				10			10	
6:00 PM		7				7			7	
7:00 PM		2				2			2	
8:00 PM		1				1			1	
9:00 PM		9				9			9	
10:00 PM		5				5			5	
11:00 PM		3				3			3	
Day Total		626				626			626	
% Weekday Average		100.0%								
% Week Average		100.0%				100.0%				
AM Peak		6:00 AM				6:00 AM			6:00 AM	
Volume		76				76			76	
PM Peak		2:00 PM				2:00 PM			2:00 PM	
Volume		62				62			62	

Comments: See aerial map for correct location of tubes

LOCATION: NW Old River Rd west of Old River Rd
SPECIFIC LOCATION: 100 ft from Old River Rd
CITY/STATE: Vancouver, WA

QC JOB #: 11091501
DIRECTION: EB
DATE: Jul 16 2013

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	2	2	1	1	0	0	0	0	0	0	0	0	0	0	6	16-25	3
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1-10	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1-10	0
3:00 AM	2	1	2	2	0	0	0	0	0	0	0	0	0	0	7	21-30	4
4:00 AM	2	2	1	0	0	0	0	0	0	0	0	0	0	0	5	16-25	3
5:00 AM	2	0	1	0	0	0	0	0	0	0	0	0	0	0	3	8-17	1
6:00 AM	7	2	8	**4**	0	0	0	0	0	0	0	0	0	0	21	21-30	12
7:00 AM	6	11	16	1	0	0	0	0	0	0	0	0	0	0	34	16-25	27
8:00 AM	1	10	14	2	**1**	0	0	0	0	0	0	0	0	0	28	16-25	23
9:00 AM	7	7	18	3	0	0	0	0	0	0	0	0	0	0	35	16-25	25
10:00 AM	**10**	13	**22**	1	0	0	0	0	0	0	0	0	0	0	46	16-25	35
11:00 AM	9	**23**	22	2	0	0	0	0	0	0	0	0	0	0	**56**	16-25	45
12:00 PM	11	**27**	25	0	**2**	0	0	0	0	0	0	0	0	0	65	16-25	52
1:00 PM	3	19	21	4	0	0	0	0	0	0	0	0	0	0	47	16-25	40
2:00 PM	**12**	19	32	5	1	0	0	0	0	0	0	0	0	0	69	16-25	51
3:00 PM	10	15	**57**	**10**	1	0	0	0	0	0	0	0	0	0	**93**	16-25	72
4:00 PM	10	10	34	8	0	0	0	0	0	0	0	0	0	0	62	18-27	43
5:00 PM	0	5	22	4	1	0	0	0	0	0	0	0	0	0	32	20-29	26
6:00 PM	0	2	8	4	0	0	0	0	0	0	0	0	0	0	14	21-30	12
7:00 PM	1	0	5	0	0	0	0	0	0	0	0	0	0	0	6	16-25	5
8:00 PM	2	1	2	0	0	0	0	0	0	0	0	0	0	0	5	16-25	3
9:00 PM	1	1	0	1	0	0	0	0	0	0	0	0	0	0	3	15-24	1
10:00 PM	2	2	14	2	0	0	0	0	0	0	0	0	0	0	20	16-25	16
11:00 PM	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3	21-30	3
Day Total	100	172	326	56	6	0	0	0	0	0	0	0	0	0	660	16-25	498
Percent	15.2%	26.1%	49.4%	8.5%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
ADT 660																	
AM Peak	10:00 AM	11:00 AM	10:00 AM	6:00 AM	8:00 AM										11:00 AM		
Volume	10	23	22	4	1										56		
PM Peak	2:00 PM	12:00 PM	3:00 PM	3:00 PM	12:00 PM										3:00 PM		
Volume	12	27	57	10	2										93		

Comments: See aerial map for correct location of tubes

SUMMARY - Tube Count - Speed Data

LOCATION: NW Old River Rd west of Old River Rd
SPECIFIC LOCATION: 100 ft from Old River Rd
CITY/STATE: Vancouver, WA

QC JOB #: 11091501
DIRECTION: EB
DATE: Jul 16 2013 - Jul 16 2013

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total	100	172	326	56	6	0	0	0	0	0	0	0	0	0	660	16-25	498
Percent	15.2%	26.1%	49.4%	8.5%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Cumulative Percent	15.2%	41.2%	90.6%	99.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			

ADT 660

85th Percentile 24 MPH

Mean Speed(Average) 19 MPH

Median 20 MPH
Mode: 23 MPH

Comments: See aerial map for correct location of tubes

Report generated on 7/17/2013 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: NW Old River Rd west of Old River Rd
QC JOB #: 11091501
SPECIFIC LOCATION: 100 ft from Old River Rd
DIRECTION: EB
CITY/STATE: Vancouver, WA
DATE: Jul 16 2013 - Jul 16 2013

Start Time	Mon	Tue 16-Jul-13	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		6				6			6	
1:00 AM		0				0			0	
2:00 AM		0				0			0	
3:00 AM		7				7			7	
4:00 AM		5				5			5	
5:00 AM		3				3			3	
6:00 AM		21				21			21	
7:00 AM		34				34			34	
8:00 AM		28				28			28	
9:00 AM		35				35			35	
10:00 AM		46				46			46	
11:00 AM		**56**				**56**			**56**	
12:00 PM		65				65			65	
1:00 PM		47				47			47	
2:00 PM		69				69			69	
3:00 PM		**93**				**93**			**93**	
4:00 PM		62				62			62	
5:00 PM		32				32			32	
6:00 PM		14				14			14	
7:00 PM		6				6			6	
8:00 PM		5				5			5	
9:00 PM		3				3			3	
10:00 PM		20				20			20	
11:00 PM		3				3			3	
Day Total		660				660			660	
% Weekday Average		100.0%								
% Week Average		100.0%				100.0%				
AM Peak		11:00 AM				11:00 AM			11:00 AM	
Volume		56				56			56	
PM Peak		3:00 PM				3:00 PM			3:00 PM	
Volume		93				93			93	

Comments: See aerial map for correct location of tubes

LOCATION: NW Old River Rd west of Old River Rd
SPECIFIC LOCATION: 100 ft from Old River Rd
CITY/STATE: Vancouver, WA

QC JOB #: 11091501
DIRECTION: EB/WB
DATE: Jul 16 2013

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	2	3	1	1	0	0	0	0	0	0	0	0	0	0	7	16-25	4
1:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	11-20	1
2:00 AM	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	1	31-40	1
3:00 AM	3	5	13	5	0	0	0	0	0	0	0	0	0	0	26	16-25	18
4:00 AM	2	4	7	1	0	0	0	0	0	0	0	0	0	0	14	17-26	10
5:00 AM	5	4	12	0	0	0	0	0	0	0	0	0	0	0	21	16-25	16
6:00 AM	12	28	**43**	**12**	**2**	0	0	0	0	0	0	0	0	0	97	16-25	70
7:00 AM	6	26	40	10	0	0	0	0	0	0	0	0	0	0	82	16-25	66
8:00 AM	6	21	34	3	1	0	0	0	0	0	0	0	0	0	65	16-25	54
9:00 AM	15	21	35	7	1	0	0	0	0	0	0	0	0	0	79	16-25	56
10:00 AM	**24**	36	31	2	0	0	0	0	0	0	0	0	0	0	93	16-25	67
11:00 AM	15	**47**	38	4	0	0	0	0	0	0	0	0	0	0	**104**	16-25	84
12:00 PM	16	**52**	45	1	**2**	**1**	0	0	0	0	0	0	0	0	117	16-25	97
1:00 PM	9	41	46	5	0	0	0	0	0	0	0	0	0	0	101	16-25	86
2:00 PM	**22**	51	50	6	2	0	0	0	0	0	0	0	0	0	131	16-25	101
3:00 PM	14	39	**71**	**11**	2	0	0	0	0	0	0	0	0	0	**137**	16-25	109
4:00 PM	14	18	49	9	0	0	0	0	0	0	0	0	0	0	90	16-25	67
5:00 PM	0	10	26	5	1	0	0	0	0	0	0	0	0	0	42	16-25	36
6:00 PM	1	3	13	4	0	0	0	0	0	0	0	0	0	0	21	21-30	17
7:00 PM	2	0	5	1	0	0	0	0	0	0	0	0	0	0	8	21-30	5
8:00 PM	2	1	2	1	0	0	0	0	0	0	0	0	0	0	6	21-30	3
9:00 PM	3	2	5	1	1	0	0	0	0	0	0	0	0	0	12	16-25	7
10:00 PM	2	3	16	4	0	0	0	0	0	0	0	0	0	0	25	21-30	19
11:00 PM	0	1	2	3	0	0	0	0	0	0	0	0	0	0	6	23-32	4
Day Total	175	417	584	96	12	2	0	0	0	0	0	0	0	0	1286	16-25	1000
Percent	13.6%	32.4%	45.4%	7.5%	0.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
ADT 1286																	
AM Peak	10:00 AM	11:00 AM	6:00 AM	6:00 AM	6:00 AM	2:00 AM									11:00 AM		
Volume	24	47	43	12	2	1									104		
PM Peak	2:00 PM	12:00 PM	3:00 PM	3:00 PM	12:00 PM	12:00 PM									3:00 PM		
Volume	22	52	71	11	2	1									137		

Comments: See aerial map for correct location of tubes

SUMMARY - Tube Count - Speed Data

LOCATION: NW Old River Rd west of Old River Rd
SPECIFIC LOCATION: 100 ft from Old River Rd
CITY/STATE: Vancouver, WA

QC JOB #: 11091501
DIRECTION: EB/WB
DATE: Jul 16 2013 - Jul 16 2013

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total	175	417	584	96	12	2	0	0	0	0	0	0	0	0	1286	16-25	1000
Percent	13.6%	32.4%	45.4%	7.5%	0.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Cumulative Percent	13.6%	46.0%	91.4%	98.9%	99.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			

ADT 1286

85th Percentile 24 MPH

Mean Speed(Average) 19 MPH

Median 20 MPH
Mode: 23 MPH

Comments: See aerial map for correct location of tubes

Report generated on 7/17/2013 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: NW Old River Rd west of Old River Rd
QC JOB #: 11091501
SPECIFIC LOCATION: 100 ft from Old River Rd
DIRECTION: EB/WB
CITY/STATE: Vancouver, WA
DATE: Jul 16 2013 - Jul 16 2013

Start Time	Mon	Tue 16-Jul-13	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		7				7			7	
1:00 AM		1				1			1	
2:00 AM		1				1			1	
3:00 AM		26				26			26	
4:00 AM		14				14			14	
5:00 AM		21				21			21	
6:00 AM		97				97			97	
7:00 AM		82				82			82	
8:00 AM		65				65			65	
9:00 AM		79				79			79	
10:00 AM		93				93			93	
11:00 AM		**104**				**104**			**104**	
12:00 PM		117				117			117	
1:00 PM		101				101			101	
2:00 PM		131				131			131	
3:00 PM		**137**				**137**			**137**	
4:00 PM		90				90			90	
5:00 PM		42				42			42	
6:00 PM		21				21			21	
7:00 PM		8				8			8	
8:00 PM		6				6			6	
9:00 PM		12				12			12	
10:00 PM		25				25			25	
11:00 PM		6				6			6	
Day Total		1286				1286			1286	
% Weekday Average		100.0%								
% Week Average		100.0%				100.0%				
AM Peak		11:00 AM				11:00 AM			11:00 AM	
Volume		104				104			104	
PM Peak		3:00 PM				3:00 PM			3:00 PM	
Volume		137				137			137	

Comments: See aerial map for correct location of tubes

LOCATION: NW Old River Rd west of Old River Rd
SPECIFIC LOCATION: 100 ft from Old River Rd
CITY/STATE: Vancouver, WA

QC JOB #: 11091501
DIRECTION: WB
DATE: Jul 16 2013

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	11-20	1
1:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	11-20	1
2:00 AM	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	1	31-40	1
3:00 AM	1	4	11	3	0	0	0	0	0	0	0	0	0	0	19	21-30	14
4:00 AM	0	2	6	1	0	0	0	0	0	0	0	0	0	0	9	16-25	8
5:00 AM	3	4	11	0	0	0	0	0	0	0	0	0	0	0	18	17-26	14
6:00 AM	5	**26**	**35**	8	**2**	0	0	0	0	0	0	0	0	0	**76**	16-25	61
7:00 AM	0	15	24	**9**	0	0	0	0	0	0	0	0	0	0	48	16-25	38
8:00 AM	5	11	20	1	0	0	0	0	0	0	0	0	0	0	37	16-25	31
9:00 AM	8	14	17	4	1	0	0	0	0	0	0	0	0	0	44	16-25	30
10:00 AM	**14**	23	9	1	0	0	0	0	0	0	0	0	0	0	47	16-25	31
11:00 AM	6	24	16	2	0	0	0	0	0	0	0	0	0	0	48	16-25	40
12:00 PM	5	25	20	1	0	**1**	0	0	0	0	0	0	0	0	52	16-25	45
1:00 PM	6	22	**25**	1	0	0	0	0	0	0	0	0	0	0	54	16-25	47
2:00 PM	**10**	**32**	18	1	**1**	0	0	0	0	0	0	0	0	0	**62**	16-25	49
3:00 PM	4	24	14	1	1	0	0	0	0	0	0	0	0	0	44	16-25	37
4:00 PM	4	8	15	1	0	0	0	0	0	0	0	0	0	0	28	16-25	23
5:00 PM	0	5	4	1	0	0	0	0	0	0	0	0	0	0	10	16-25	9
6:00 PM	1	1	5	0	0	0	0	0	0	0	0	0	0	0	7	16-25	6
7:00 PM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	21-30	1
8:00 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	21-30	1
9:00 PM	2	1	5	0	1	0	0	0	0	0	0	0	0	0	9	16-25	6
10:00 PM	0	1	2	**2**	0	0	0	0	0	0	0	0	0	0	5	21-30	4
11:00 PM	0	1	1	1	0	0	0	0	0	0	0	0	0	0	3	21-30	2
Day Total	75	245	258	40	6	2	0	0	0	0	0	0	0	0	626	16-25	503
Percent	12.0%	39.1%	41.2%	6.4%	1.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
ADT 626																	
AM Peak	10:00 AM	6:00 AM	6:00 AM	7:00 AM	6:00 AM	2:00 AM									6:00 AM		
Volume	14	26	35	9	2	1									76		
PM Peak	2:00 PM	2:00 PM	1:00 PM	10:00 PM	2:00 PM	12:00 PM									2:00 PM		
Volume	10	32	25	2	1	1									62		

Comments: See aerial map for correct location of tubes

SUMMARY - Tube Count - Speed Data

LOCATION: NW Old River Rd west of Old River Rd
SPECIFIC LOCATION: 100 ft from Old River Rd
CITY/STATE: Vancouver, WA

QC JOB #: 11091501
DIRECTION: WB
DATE: Jul 16 2013 - Jul 16 2013

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total	75	245	258	40	6	2	0	0	0	0	0	0	0	0	626	16-25	503
Percent	12.0%	39.1%	41.2%	6.4%	1.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Cumulative Percent	12.0%	51.1%	92.3%	98.7%	99.7%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			

ADT 626

85th Percentile 24 MPH

Mean Speed(Average) 19 MPH

Median 19 MPH
Mode: 23 MPH

Comments: See aerial map for correct location of tubes

Report generated on 7/17/2013 12:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Appendix L Construction In-Process Development

- Medium level of activity – typically averaging around 177 total employees on the site per work day. Out of the estimated 37 months for completion of site construction, approximately 23 months would see a medium level of activity.

- High level of activity – typically averaging around 265 total employees on the site per work day. Out of the estimated 37 months for completion of site construction, approximately 4 months would see a high level of activity.

Exhibit 4. BHP Billiton Traffic Study Construction Trip Estimates[1]

Table 14. Construction Trip Generation Estimates

		Trip Ends Monday Through Thursday					
		AM Peak (7-8 AM)			PM Peak (5-6 PM)		
Construction Activity	**Daily**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Low Level of Activity [a]							
Auto Trips by Workers	108	108 54	0	108 54	0	108 54	108 54
Truck Trips for Deliveries	18	2	2	4	2	2	4
Total Trip Ends	126	110 56	2	112 58	2	110 56	112 58
Average Level of Activity [b]							
Auto Trips by Workers	354	354 177	0	354 177	0	354 177	354 177
Truck Trips for Deliveries	64	6	6	12	6	6	12
Total Trip Ends	418	360 183	6	366 189	6	360 183	366 189
High Level of Activity [c]							
Auto Trips by Workers	530	530 265	0	530 265	0	530 265	530 265
Truck Trips for Deliveries	88	9	9	18	9	9	18
Total Trip Ends	618	539 274	9	548 283	9	539 274	548 283

[a] 10 out of 37 months of anticipated construction activity, ranges from 30 to 80 workers on site.
[b] 23 out of 37 months of anticipated construction activity, ranges from 90 to 245 workers on site.
[c] 4 out of 37 months of anticipated construction activity, 265 workers on site.

[1] Note: Table 14 in Exhibit 4 updated by Kittelson & Associates, Inc. to reflect peak hour trip generation (assumes all employees enter and leave per the 2010 Terminal 5 traffic study text).

BHP Billiton Traffic Study Mitigation Recommendations

The BHPB study indicated that the Lower River Road/Gateway Avenue intersection will experience long delays during the p.m. peak hour through the period of highest construction traffic activity. The study recommended consideration be given to developing a temporary traffic management strategy at the intersection. This could include, but be limited to, such measures as:

- Staggering employee hours to reduce the impact of arriving and departing traffic during a single hour, or

Installation of a temporary traffic signal at the intersection[3].

[3] Per conversations with Port of Vancouver staff in April 2012, installation of a temporary traffic signal is no longer under consideration.

PHASE 5: TRAFFIC PLAN GATEWAY AVENUE OVERPASS COMPLETE

Duration: March 2013 to March 2015

Figure 8 illustrates the Phase 5 traffic routing plan and Table 7 summarizes the corresponding roads that various properties within the study area will be directed to. All study area tenant traffic except BHP Billiton will be directed to the now complete Gateway Avenue overpass under Phase 5.

Table 7 Phase 5 Construction Roadway Use

Roadway User	Old Lower River Road Perimeter Road	Existing Gateway Avenue	Harborside Drive	Ultimate Gateway Avenue with Overpass
Port Operations			✓	✓
BHP Billiton	✓			
SPL Construction	No Longer On-Site			
Farwest Steel				✓
TriStar				✓
Subaru				✓
Clark County Jail			✓	✓
CalPortland			✓	✓
Emergency Services	✓		✓	✓

Phase 5 will require the following routing patterns:

- Port Operations traffic have the option of entering and exiting the Terminal 5 area via Harborside Drive or by traveling Gateway Avenue to SR 501.
- BHP Billiton traffic will enter and exit SR 501 at Old Lower River Road, pass through the regulated gate area, continue along the Perimeter Road, and then enter the BHP Billiton area via the signalized rail crossing.
- Farwest Street and TriStar traffic will enter and exit SR 501 via Gateway Avenue.
- Subaru traffic will enter and exit SR 501 via Gateway Avenue, crossing the overpass, traveling along Harborside Drive and following Gateway Avenue to the existing site driveway.
- Clark County Jail Work Center traffic will enter and exit SR 501 via Gateway Avenue, crossing the overpass and traveling along Harborside Drive.
- CalPortland traffic will enter and exit SR 501 via Gateway Avenue, crossing the overpass, traveling along Harborside Drive and turning to the existing site driveway.
- Emergency services vehicles will be able to enter the area via both Gateway Avenue or Old Lower River Road and will be routed by CRESA as appropriate for the destination.

LEGEND:
PORT OPERATIONS
BHPB BILLITON
TENANTS
EMERGENCY SERVICES
TRAFFIC BARRICADES

PORT OF VANCOUVER TERMINAL 5 MAIN GATE ACCESS

NW LOWER RIVER RD.
SR 501

NW OLD LOWER RIVER RD.

PORT OF VANCOUVER TERMINAL 5 MAIN GATE ACCESS

PORT OF VANCOUVER GUARD SHACK

STOP 4-WAY

ALL WAY

ONE WAY ENTER

185' QUEUING LENGTH

LOOSE GRAVEL 15 MPH

TIDEWATER

FARWEST STEEL

KEYERA

CPU

TRISTAR

CONTRACTOR TO PLACE ACCESS CONTROL GATE AT THIS LOCATION

EMERGENCY VEHICLES ONLY

NW GATEWAY AVE.

SUBARU

PRIMARY ACCESS POINT

COUNTY JAIL

PORT TRAFFIC ONLY

HARBORSIDE DRIVE

CAL PORTLAND

TERMINAL 5

SECONDARY ACCESS POINT

360' QUEUING LENGTH

EMERGENCY VEHICLES ONLY

T5 ACCESS DRIVEWAY

DRAFT

MARCH 2013 TO MARCH 2015

PLAN
0 62.5 125 250

HDR

WEST VANCOUVER FREIGHT ACCESS PROJECT
T5 EXPANSION/SPL

PROJECT 21–TRAFFIC PLAN GATEWAY OVERPASS COMPLETE

DATE 05/14/12

FIGURE 5

Appendix M Construction Year 2014 Traffic Conditions Level-of-Service Worksheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	14	0	236	37	0	31
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	19	0	319	50	0	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			19		707	19
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			19		707	19
tC, single (s)			4.3		6.4	6.9
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.9
p0 queue free %			78		100	95
cM capacity (veh/h)			1471		317	899

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	19	319	50	42
Volume Left	0	319	0	0
Volume Right	0	0	0	42
cSH	1700	1471	1700	449
Volume to Capacity	0.01	0.22	0.03	0.09
Queue Length 95th (ft)	0	21	0	8
Control Delay (s)	0.0	8.1	0.0	13.8
Lane LOS		A		B
Approach Delay (s)	0.0	7.0		13.8
Approach LOS				B

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	44	0	60	279	0	52
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	51	0	69	321	0	60
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			52		510	52
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			52		510	52
tC, single (s)			4.3		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.5
p0 queue free %			95		100	94
cM capacity (veh/h)			1429		501	969

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	51	69	321	60
Volume Left	0	69	0	0
Volume Right	0	0	0	60
cSH	1700	1429	1700	969
Volume to Capacity	0.03	0.05	0.19	0.06
Queue Length 95th (ft)	0	4	0	5
Control Delay (s)	0.0	7.6	0.0	9.0
Lane LOS		A		A
Approach Delay (s)	0.0	1.4		9.0
Approach LOS				A

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	72	0	11	264	56	0	2	2	323	22	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	2673	2524		1327	1545	1308		1174			1659	1468
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.74	1.00
Satd. Flow (perm)	2673	2524		1327	1545	1308		1174			1281	1468
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	47	84	0	13	307	65	0	2	2	376	26	330
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	47	84	0	13	307	65	0	3	0	0	402	330
Confl. Peds. (#/hr)			1	1					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	31%	43%	50%	36%	23%	22%	0%	100%	0%	9%	14%	10%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	4.1	20.4		1.2	17.5	63.4		26.8			26.8	63.4
Effective Green, g (s)	4.1	20.4		1.2	17.5	63.4		26.8			26.8	63.4
Actuated g/C Ratio	0.06	0.32		0.02	0.28	1.00		0.42			0.42	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	173	812		25	426	1308		496			541	1468
v/s Ratio Prot	0.02	0.03		0.01	c0.20			0.00				
v/s Ratio Perm						0.05					c0.31	c0.22
v/c Ratio	0.27	0.10		0.52	0.72	0.05		0.01			0.74	0.22
Uniform Delay, d1	28.2	15.1		30.8	20.7	0.0		10.6			15.4	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.3	0.0		8.7	5.0	0.1		0.0			4.8	0.4
Delay (s)	28.5	15.1		39.5	25.8	0.1		10.6			20.2	0.4
Level of Service	C	B		D	C	A		B			C	A
Approach Delay (s)		19.9			21.9			10.6			11.3	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: BKAM - 2014

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.91	17.8
18X	R	9	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.86	17.8
Approach		11	86.0	0.021	12.3	LOS B	0.1	4.1	0.22	0.87	17.8
North East: NW Old Lower River Rd											
1X	L	255	88.0	0.580	20.4	LOS C	8.4	336.9	0.64	0.75	16.0
16X	R	60	24.0	0.580	20.4	LOS C	8.4	336.9	0.64	0.35	16.0
Approach		315	75.8	0.580	20.4	LOS C	8.4	336.9	0.64	0.67	16.0
North West: NW Old Lower River Rc											
7X	L	24	56.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.58	22.7
4X	T	1	3.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		25	53.2	0.021	0.0	NA	0.0	0.0	0.00	0.55	22.8
South West: Private Access											
5X	L	1	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	1.08	18.5
2X	T	8	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	0.97	18.6
12X	R	1	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	0.95	18.5
Approach		11	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	0.98	18.5
All Vehicles		361	72.4	0.580	18.4	NA	8.4	336.9	0.56	0.68	16.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	38	0	33	32	1	243
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	48	0	41	40	1	304
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			48		170	48
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			48		170	48
tC, single (s)			4.4		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.5
p0 queue free %			97		100	69
cM capacity (veh/h)			1382		800	965

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	48	41	40	305
Volume Left	0	41	0	1
Volume Right	0	0	0	304
cSH	1700	1382	1700	969
Volume to Capacity	0.03	0.03	0.02	0.31
Queue Length 95th (ft)	0	2	0	34
Control Delay (s)	0.0	7.7	0.0	10.4
Lane LOS		A		B
Approach Delay (s)	0.0	3.9		10.4
Approach LOS				B

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	283	1	13	69	1	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	377	1	17	92	1	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			379		505	378
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			379		505	378
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			98		100	91
cM capacity (veh/h)			1074		522	653

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	379	17	92	59
Volume Left	0	17	0	1
Volume Right	1	0	0	57
cSH	1700	1074	1700	650
Volume to Capacity	0.22	0.02	0.05	0.09
Queue Length 95th (ft)	0	1	0	7
Control Delay (s)	0.0	8.4	0.0	11.1
Lane LOS		A		B
Approach Delay (s)	0.0	1.3		11.1
Approach LOS				B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	285	224	0	4	62	110	0	19	13	81	3	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	3072	3112		1031	1329	1491		1584			1628	1292
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.71	1.00
Satd. Flow (perm)	3072	3112		1031	1329	1491		1584			1204	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	352	277	0	5	77	136	0	23	16	100	4	79
RTOR Reduction (vph)	0	0	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	352	277	0	5	77	136	0	26	0	0	104	79
Confl. Peds. (#/hr)									2	2		
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	14%	16%	0%	75%	43%	7%	0%	0%	31%	9%	67%	25%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	11.4	39.5		1.2	29.3	66.3		10.6			10.6	66.3
Effective Green, g (s)	11.4	39.5		1.2	29.3	66.3		10.6			10.6	66.3
Actuated g/C Ratio	0.17	0.60		0.02	0.44	1.00		0.16			0.16	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.5		1.0	1.0			2.0			2.0	
Lane Grp Cap (vph)	528	1854		19	587	1491		253			192	1292
v/s Ratio Prot	c0.11	c0.09		0.00	0.06			0.02				
v/s Ratio Perm						0.09					c0.09	0.06
v/c Ratio	0.67	0.15		0.26	0.13	0.09		0.10			0.54	0.06
Uniform Delay, d1	25.7	5.9		32.1	11.0	0.0		23.8			25.6	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	2.5	0.2		2.7	0.5	0.1		0.1			1.7	0.1
Delay (s)	28.1	6.1		34.8	11.4	0.1		23.8			27.3	0.1
Level of Service	C	A		C	B	A		C			C	A
Approach Delay (s)		18.4			4.9			23.8			15.5	
Approach LOS		B			A			C			B	

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	66.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: BKPM_2014

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.85	18.7
18X	R	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.83	18.6
Approach		3	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.84	18.7
North East: NW Old Lower River Rd											
1X	L	8	0.0	0.034	8.0	LOS A	0.2	6.8	0.31	0.86	19.1
16X	R	35	22.0	0.034	8.0	LOS A	0.2	6.8	0.31	0.68	19.0
Approach		42	18.0	0.034	8.0	LOS A	0.2	6.8	0.31	0.71	19.0
North West: NW Old Lower River Rd											
7X	L	77	23.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.57	22.7
4X	T	1	0.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		78	22.6	0.052	0.0	NA	0.0	0.0	0.00	0.56	22.7
South West: Private Access											
5X	L	1	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	1.01	17.9
2X	T	236	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	0.91	18.0
12X	R	1	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	0.79	17.9
Approach		238	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	0.91	18.0
All Vehicles		362	9.0	0.308	8.7	NA	1.4	36.4	0.19	0.81	19.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	14	0	237	37	0	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	19	0	320	50	0	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			19		709	19
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			19		709	19
tC, single (s)			4.3		6.4	6.9
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.9
p0 queue free %			78		100	95
cM capacity (veh/h)			1471		316	899

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	19	320	50	43
Volume Left	0	320	0	0
Volume Right	0	0	0	43
cSH	1700	1471	1700	449
Volume to Capacity	0.01	0.22	0.03	0.10
Queue Length 95th (ft)	0	21	0	8
Control Delay (s)	0.0	8.1	0.0	13.9
Lane LOS		A		B
Approach Delay (s)	0.0	7.0		13.9
Approach LOS				B

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	45	0	185	280	0	52
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	52	0	213	322	0	60
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			53		800	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			53		800	53
tC, single (s)			4.3		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.5
p0 queue free %			85		100	94
cM capacity (veh/h)			1427		304	968

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	52	213	322	60
Volume Left	0	213	0	0
Volume Right	0	0	0	60
cSH	1700	1427	1700	968
Volume to Capacity	0.03	0.15	0.19	0.06
Queue Length 95th (ft)	0	13	0	5
Control Delay (s)	0.0	8.0	0.0	9.0
Lane LOS		A		A
Approach Delay (s)	0.0	3.2		9.0
Approach LOS				A

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	26.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	76	0	11	331	56	0	2	2	323	22	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	2673	2524		1327	1545	1308		1174			1659	1468
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.74	1.00
Satd. Flow (perm)	2673	2524		1327	1545	1308		1174			1281	1468
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	51	88	0	13	385	65	0	2	2	376	26	408
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	51	88	0	13	385	65	0	3	0	0	402	408
Confl. Peds. (#/hr)			1	1					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	31%	43%	50%	36%	23%	22%	0%	100%	0%	9%	14%	10%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	4.2	24.7		1.2	21.7	67.5		26.6			26.6	67.5
Effective Green, g (s)	4.2	24.7		1.2	21.7	67.5		26.6			26.6	67.5
Actuated g/C Ratio	0.06	0.37		0.02	0.32	1.00		0.39			0.39	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.0		1.5	1.0			1.5			1.0	
Lane Grp Cap (vph)	166	924		24	497	1308		463			505	1468
v/s Ratio Prot	0.02	0.03		0.01	c0.25			0.00				
v/s Ratio Perm						0.05					c0.31	c0.28
v/c Ratio	0.31	0.10		0.54	0.77	0.05		0.01			0.80	0.28
Uniform Delay, d1	30.3	14.1		32.9	20.7	0.0		12.4			18.1	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.4	0.0		12.7	6.8	0.1		0.0			7.9	0.5
Delay (s)	30.6	14.1		45.6	27.5	0.1		12.4			26.0	0.5
Level of Service	C	B		D	C	A		B			C	A
Approach Delay (s)		20.2			24.1			12.4			13.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: TTAM_2014

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	86.0	0.024	12.3	LOS B	0.1	4.6	0.22	0.92	17.8
18X	R	11	86.0	0.024	12.3	LOS B	0.1	4.6	0.22	0.86	17.8
Approach		12	86.0	0.024	12.3	LOS B	0.1	4.6	0.22	0.87	17.8
North East: NW Old Lower River Rd											
1X	L	256	88.0	0.585	20.6	LOS C	8.8	355.3	0.65	0.75	16.0
16X	R	60	24.0	0.585	20.6	LOS C	8.8	355.3	0.65	0.33	16.0
Approach		316	75.8	0.585	20.6	LOS C	8.8	355.3	0.65	0.67	16.0
North West: NW Old Lower River Rc											
7X	L	24	56.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.58	22.7
4X	T	1	3.0	0.021	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		25	53.2	0.021	0.0	NA	0.0	0.0	0.00	0.55	22.8
South West: Private Access											
5X	L	1	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	1.08	18.5
2X	T	8	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	0.97	18.6
12X	R	1	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	0.95	18.5
Approach		11	3.0	0.012	9.2	LOS A	0.0	1.2	0.03	0.98	18.5
All Vehicles		364	72.5	0.585	18.6	NA	8.8	355.3	0.57	0.68	16.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	38	0	34	32	1	244
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	48	0	42	40	1	305
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			48		172	48
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			48		172	48
tC, single (s)			4.4		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.5
p0 queue free %			97		100	68
cM capacity (veh/h)			1382		797	965

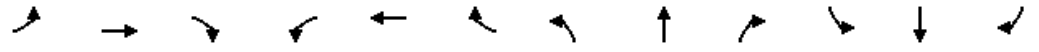
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	48	42	40	306
Volume Left	0	42	0	1
Volume Right	0	0	0	305
cSH	1700	1382	1700	969
Volume to Capacity	0.03	0.03	0.02	0.32
Queue Length 95th (ft)	0	2	0	34
Control Delay (s)	0.0	7.7	0.0	10.4
Lane LOS		A		B
Approach Delay (s)	0.0	4.0		10.4
Approach LOS				B

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	284	1	13	70	1	168
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	379	1	17	93	1	224
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			380		507	379
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			380		507	379
tC, single (s)			4.3		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.4
p0 queue free %			98		100	66
cM capacity (veh/h)			1072		520	652

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	380	17	93	225
Volume Left	0	17	0	1
Volume Right	1	0	0	224
cSH	1700	1072	1700	651
Volume to Capacity	0.22	0.02	0.05	0.35
Queue Length 95th (ft)	0	1	0	39
Control Delay (s)	0.0	8.4	0.0	13.4
Lane LOS		A		B
Approach Delay (s)	0.0	1.3		13.4
Approach LOS				B

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	359	284	0	4	65	110	0	19	13	81	3	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0		5.0			5.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		0.99			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	3072	3112		1031	1329	1491		1584			1628	1292
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.71	1.00
Satd. Flow (perm)	3072	3112		1031	1329	1491		1584			1204	1292
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	443	351	0	5	80	136	0	23	16	100	4	85
RTOR Reduction (vph)	0	0	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	443	351	0	5	80	136	0	26	0	0	104	85
Confl. Peds. (#/hr)									2	2		
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	14%	16%	0%	75%	43%	7%	0%	0%	31%	9%	67%	25%
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			4			8	
Permitted Phases						Free	4			8		Free
Actuated Green, G (s)	12.5	40.6		1.2	29.3	67.4		10.6			10.6	67.4
Effective Green, g (s)	12.5	40.6		1.2	29.3	67.4		10.6			10.6	67.4
Actuated g/C Ratio	0.19	0.60		0.02	0.43	1.00		0.16			0.16	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	1.5	1.5		1.0	1.0			2.0			2.0	
Lane Grp Cap (vph)	570	1875		18	578	1491		249			189	1292
v/s Ratio Prot	c0.14	c0.11		0.00	0.06			0.02				
v/s Ratio Perm						0.09					c0.09	0.07
v/c Ratio	0.78	0.19		0.28	0.14	0.09		0.10			0.55	0.07
Uniform Delay, d1	26.1	6.0		32.7	11.5	0.0		24.3			26.2	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	6.0	0.2		3.0	0.5	0.1		0.1			2.0	0.1
Delay (s)	32.2	6.2		35.7	12.0	0.1		24.4			28.2	0.1
Level of Service	C	A		D	B	A		C			C	A
Approach Delay (s)		20.7			5.2			24.4			15.5	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	67.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

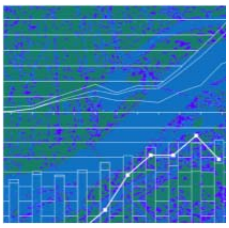
Site: TTPM_2014

NW Old Lower River Rd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South East: NW Old Lower River Rd											
8X	T	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.85	18.7
18X	R	1	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.83	18.6
Approach		3	0.0	0.003	9.3	LOS A	0.0	0.3	0.26	0.84	18.7
North East: NW Old Lower River Rd											
1X	L	9	0.0	0.035	8.0	LOS A	0.2	7.0	0.31	0.86	19.0
16X	R	35	22.0	0.035	8.0	LOS A	0.2	7.0	0.31	0.68	19.0
Approach		44	17.5	0.035	8.0	LOS A	0.2	7.0	0.31	0.72	19.0
North West: NW Old Lower River Rd											
7X	L	77	23.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.57	22.7
4X	T	1	0.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		78	22.6	0.052	0.0	NA	0.0	0.0	0.00	0.56	22.7
South West: Private Access											
5X	L	1	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	1.01	17.9
2X	T	236	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	0.91	18.0
12X	R	1	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	0.79	17.9
Approach		238	3.0	0.308	11.7	LOS B	1.4	36.4	0.22	0.91	18.0
All Vehicles		363	8.9	0.308	8.7	NA	1.4	36.4	0.19	0.81	19.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.



Tesoro Savage
Vancouver Energy Disribution Terminal
Socio-Economic Analysis
EFSEC Application No. 2013-01

PREPARED BY

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August 22, 2013

BST Associates

Market Research & Strategic Planning

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LIST OF TABLES

LIST OF ACRONYMS & ABBREVIATIONS

B & O – Washington State Business and Occupation tax

EFSEC – Energy Facility Site Evaluation Council

IMPLAN – Impact Analysis for Planning input-output model from MIG, Inc.

MSA – Metropolitan Statistical Area

OEA - and Oregon Office of Economic Analysis

OFM - Washington Office of Financial Management

WAC - Washington Administrative Code

1.0 SOCIOECONOMIC IMPACT

1.1 Existing Conditions

The proposed Tesoro Savage Vancouver Energy Distribution Terminal (Project) is located at the Port of Vancouver, adjacent to the Columbia River in Vancouver, Washington. Vancouver is the largest city in Clark County, and Clark County is part of the larger Portland, Oregon metropolitan area. The majority of services, such as police, fire, and ambulance, will be supplied by Vancouver or Clark County providers, but the larger metropolitan area and other surrounding counties are likely to supply a portion of workers and construction material. The Project is proposed by Tesoro Savage Petroleum Terminal LLC (Appplicant).

For this socio-economic analysis, the study area is defined as those counties within a one-hour commute of the project site, in accordance with Washington Administrative Code (WAC) 463-60-535. These include Clark, Skamania, and Cowlitz County in Washington, and Multnomah, Clackamas, Marion, Yamhill, and Washington County in Oregon. Small portions three other counties may fall within a one hour commute of the project site (depending on traffic conditions), but these small areas are sparsely populated and workers associated with the project are not likely to live there. These three counties include Wahkiakum County in Washington and Clatsop County and Tillamook County in Oregon.

The following analysis provides county-level detail for each of the counties in the study area, and city-level detail for municipalities in Clark County.

1.1.1 Population Trends

According to data from the Washington Office of Financial Management (OFM)[1] and Oregon Office of Economic Analysis (OEA)[2], the population of the study area grew by nearly 800,000 between 1992 and 2012, to approximately 2.8 million. This represents an increase of 38.8% over the period. Growth was faster between 1992 and 2002 (i.e. 450,000 new residents, or 22.4%) than it was between 2002 and 2012 (i.e. 330,000 new residents, or 13.4%).

During the same periods Clark County experienced faster growth than the study area as a whole. Between 1992 and 2012 the population of Clark County grew from approximately 257,000 to 431,000, or 68.1%. Between 1992 and 2002 the population grew by 98,000, or 38.2%, and between 2002 and 2012 it grew by nearly 77,000, or 21.6%.

Neighboring counties within the study area experienced varying levels of growth between 1992 and 2012. The two counties in Washington (i.e. Cowlitz and Skamania) are mostly rural and saw relatively limited population growth. Combined, these two counties account for approximately one-quarter of the population of Clark County.

In contrast, the Oregon counties in the study area are in a fast-growing urban area, and experienced strong population growth between 1992 and 2012. Nearly 75% of the study area population growth over that period occurred in Oregon.

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[1] *Historical and Projected Population for Growth Management and Other Purposes, Medium Series: History 1960 to 2010, Projections 2015 To 2040*, Forecasting Division of the Office of Financial Management (OFM), May 2012.
[2] *Forecasts of Oregon's County Populations and Components of Change, 2010 – 2050*, Prepared by Office of Economic Analysis, Department of Administrative Services, State of Oregon, Release date: March 28, 2013

Construction of the project is anticipated to be completed during 2016. Based on population projections from OFM and OEA, the population of the study area is projected to grow by 6.3% between 2012 and 2016, or by more than 176,000. Growth in Clark County is anticipated to be slightly faster, with the population rising by 28,000, or 6.5%.

The long term forecast projects total study area population to grow by 789,000 between 2016 and 2036, or a total of 26.6%. In Clark County, the population is projected to grow by a total of nearly 113,500, or 24.7%.

Table 1.1-1 – Total Population and Forecast Growth by County in the Project Vicinity

	(Thousands)					Growth Rate			
						Actual		Forecast	
County Name	1992	2002	2012	2016	2036	1992-2002	2002-2012	2012-2016	2016-2036
Washington State	5,072.1	6,022.9	6,817.8	7,175.6	8,619.1	1.7%	1.2%	1.3%	0.9%
Clark	256.5	354.5	431.3	459.2	572.7	3.3%	2.0%	1.6%	1.1%
Cowlitz	84.1	94.2	103.1	106.5	116.5	1.1%	0.9%	0.8%	0.4%
Skamania	8.6	10.0	11.3	11.4	13.0	1.5%	1.2%	0.2%	0.7%
Oregon State	2,985.8	3,515.5	3,883.7	4,100.0	5,089.1	1.6%	1.0%	1.4%	1.1%
Clackamas	294.0	349.2	381.7	404.7	524.2	1.7%	0.9%	1.5%	1.3%
Columbia	38.9	44.8	49.7	52.6	65.3	1.4%	1.0%	1.4%	1.1%
Hood River	17.7	21.1	22.9	24.4	32.7	1.8%	0.8%	1.7%	1.5%
Marion	241.8	293.5	320.5	340.9	440.7	2.0%	0.9%	1.6%	1.3%
Multnomah	603.5	675.4	748.4	783.8	922.2	1.1%	1.0%	1.2%	0.8%
Polk	52.6	65.1	76.6	83.3	116.7	2.2%	1.6%	2.1%	1.7%
Washington	341.4	463.1	542.8	590.8	803.8	3.1%	1.6%	2.1%	1.6%
Yamhill	69.9	88.2	100.6	108.1	147.0	2.4%	1.3%	1.8%	1.5%
Study Area	2,008.9	2,459.0	2,788.8	2,965.7	3,754.8	2.0%	1.3%	1.5%	1.2%

Source: Washington Office of Financial Management, Oregon Office of Economic Analysis

According to data from OFM[3], most Clark County residents live in incorporated areas of the county, but a large minority lives in unincorporated areas. Even as the total county population grew between 2002 and 2012 the share living in incorporated area remained near 48%.

Vancouver is the largest incorporated municipality in Clark County, and was home to 37.9% of all county residents in 2012. However, even though Vancouver added 13,000 new residents between 2002 and 2012, its population did not increase as fast as other parts of the county, such as Battle Ground, Camas, and Washougal, and its share of county population declined from 40.9%.

Table 1.1-2 – Total Population and Forecast Growth by City in Clark County

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change 2002-2011
Clark County	364.9	374.1	385.4	394.6	404.7	412.7	419.1	423.8	425.4	425.4	428.0	66.4
Uninc.	176.0	181.7	186.9	192.5	197.8	199.5	202.3	203.4	203.3	203.3	204.6	29.8
Incorp	188.8	192.4	198.5	202.2	206.9	213.2	216.8	220.4	222.0	222.0	223.4	36.6
Battle Ground	11.2	12.4	14.0	14.7	15.6	16.0	16.7	17.2	17.6	17.6	17.8	6.7
Camas	13.9	14.7	16.1	16.4	17.0	17.7	18.4	18.8	19.4	19.4	19.6	6.1
La Center	1.8	1.9	2.0	2.2	2.4	2.6	2.7	2.7	2.8	2.8	2.8	1.1
Ridgefield	2.2	2.2	2.3	2.7	3.4	3.8	4.2	4.6	4.8	4.8	5.0	3.0
Vancouver	149.3	150.1	152.1	153.5	154.9	158.6	159.8	161.6	161.8	161.8	162.3	13.9
Washougal	9.1	9.7	10.7	11.3	12.2	12.9	13.5	13.9	14.1	14.1	14.2	5.2
Woodland	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Yacolt	1.1	1.1	1.1	1.2	1.2	1.4	1.5	1.5	1.6	1.6	1.6	0.5

Source: Washington Office of Financial Management

[3] *April 1, 2013 Population of Cities, Towns and Counties Used for Allocation of Selected State Revenues State of Washington*, Office of Financial Management (OFM), April 2013

Nearly one-quarter of the study area population is under 18 years of age, and 15% is 62 years old or older. The remaining 61% is working age adults, a total of 1.66 million people. The population of Clark County is somewhat younger than that of the study area, with nearly 27% under 18 years of age and less than 15% aged 62 years or more. The working-age adult population in Clark County is approximately 248,000.[4]

Females outnumber males in the study area, with 0.978 males for each female. This male-female ratio in Clark County is nearly identical, with 0.976 males for each female.

Table 1.1-3 – Population Age Distribution in the Project Vicinity

	Total		Under 18 Years		18 Years to 61 Years		62 Years and Older	
County Name	Pop.	M/F Ratio	Pop.	% of Total	Pop.	% of Total	Pop.	% of Total
Washington State	6,652,845	0.993	1,563,419	23.5%	4,071,541	61.2%	1,017,885	15.3%
Clark	421,154	0.976	112,448	26.7%	248,060	58.9%	60,646	14.4%
Cowlitz	101,901	0.980	24,966	24.5%	57,676	56.6%	19,259	18.9%
Skamania	10,979	0.996	2,459	22.4%	6,609	60.2%	1,910	17.4%
Oregon State	3,801,991	0.980	866,854	22.8%	2,284,997	60.1%	650,140	17.1%
Clackamas	373,832	0.969	89,346	23.9%	220,935	59.1%	63,551	17.0%
Columbia	49,247	1.002	11,918	24.2%	28,711	58.3%	8,618	17.5%
Hood River	21,962	0.991	5,710	26.0%	12,980	59.1%	3,272	14.9%
Marion	313,020	0.996	82,950	26.5%	180,613	57.7%	49,457	15.8%
Multnomah	724,803	0.977	149,309	20.6%	479,820	66.2%	95,674	13.2%
Polk	74,734	0.940	18,086	24.2%	42,897	57.4%	13,751	18.4%
Washington	524,275	0.970	134,739	25.7%	323,478	61.7%	66,059	12.6%
Yamhill	98,293	1.009	24,770	25.2%	57,796	58.8%	15,727	16.0%
Study Area	2,714,200	0.978	656,701	24.2%	1,659,574	61.1%	397,926	14.7%

Source: U.S. Census Bureau, 2007-2011 American Community Survey

According to 2012 estimates from the U.S. Census Bureau, the ethnic mix of the study area population is primarily white, with white residents accounting for 86.3 % of the total. Residents of Asian ethnicity accounted for 5.3% of the population, African-American accounted for 2.7% American Indian and Alaska Natives accounted for 1.5%, Hawaiian and other Pacific Islanders accounted for 0.5%, and two or more races accounted for 3.7% of the population. Residents of Hispanic origin (of all races) accounted for 12.9% of the study area population.[5]

In Clark County non-white residents account for a smaller share of the population, although the share of Native Hawaiian/Pacific Islander and two or more races is slightly higher than in the study area as a whole. Hispanic residents (of all races) account for 8.1% of the Clark County population.

[4] *2007-2011 American Community Survey*, U.S. Census Bureau, accessed June 17, 2013
[5] *Annual County Resident Population Estimates by Age, Sex, Race, and Hispanic Origin: April 1, 2010 to July 1, 2012*, U.S. Census Bureau, Population Division, June 2013

Table 1.1-4 – Race Composition by County in the Project Vicinity

	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Two or More Races	Total	Hispanic (all races)
Washington State	5,625.34	268.66	126.53	531.40	46.14	298.95	6,897.01	807.6
Clark	385.13	9.24	4.58	19.42	3.20	16.72	438.29	35.4
Cowlitz	93.92	0.83	1.94	1.69	0.29	3.33	102.00	8.2
Skamania	10.46	0.06	0.20	0.11	0.01	0.34	11.19	0.6
Oregon State	3,444.77	77.56	68.96	156.08	15.85	136.14	3,899.35	474.2
Clackamas	348.69	3.78	4.10	14.89	1.03	11.38	383.86	31.0
Columbia	46.08	0.25	0.72	0.48	0.11	1.66	49.29	2.2
Hood River	21.24	0.16	0.25	0.34	0.05	0.54	22.58	6.8
Marion	287.97	4.33	7.97	6.90	2.61	10.21	319.99	80.3
Multnomah	614.11	43.75	11.40	52.23	4.73	33.05	759.26	84.3
Polk	69.53	0.55	1.86	1.54	0.27	2.60	76.35	9.7
Washington	454.77	11.49	6.44	50.85	2.90	21.23	547.67	87.8
Yamhill	92.41	1.03	2.02	1.65	0.23	2.92	100.26	15.4
	2,424.31	75.45	41.47	150.09	15.44	103.97	2,810.72	361.44
Share of Total								
Washington State	81.6%	3.9%	1.8%	7.7%	0.7%	4.3%	100.0%	11.7%
Clark	87.9%	2.1%	1.0%	4.4%	0.7%	3.8%	100.0%	8.1%
Cowlitz	92.1%	0.8%	1.9%	1.7%	0.3%	3.3%	100.0%	8.0%
Skamania	93.5%	0.5%	1.8%	1.0%	0.1%	3.0%	100.0%	5.5%
Oregon State	88.3%	2.0%	1.8%	4.0%	0.4%	3.5%	100.0%	12.2%
Clackamas	90.8%	1.0%	1.1%	3.9%	0.3%	3.0%	100.0%	8.1%
Columbia	93.5%	0.5%	1.5%	1.0%	0.2%	3.4%	100.0%	4.4%
Hood River	94.1%	0.7%	1.1%	1.5%	0.2%	2.4%	100.0%	30.2%
Marion	90.0%	1.4%	2.5%	2.2%	0.8%	3.2%	100.0%	25.1%
Multnomah	80.9%	5.8%	1.5%	6.9%	0.6%	4.4%	100.0%	11.1%
Polk	91.1%	0.7%	2.4%	2.0%	0.4%	3.4%	100.0%	12.6%
Washington	83.0%	2.1%	1.2%	9.3%	0.5%	3.9%	100.0%	16.0%
Yamhill	92.2%	1.0%	2.0%	1.6%	0.2%	2.9%	100.0%	15.3%
Study Area	86.3%	2.7%	1.5%	5.3%	0.5%	3.7%	100.0%	12.9%

Note: Population figures are Census estimates for 2012
Source: U.S. Census Bureau

1.1.2 Poverty

The number of people living in poverty in the study area climbed 70.0% between 2002 and 2001, according to the U.S. Census Bureau. During that period the number of residents living in poverty increased in all but two years, and grew from approximately 252,000 in 2002 to 428,000 in 2011.[6]

In Clark County the growth in poverty was slightly lower than in the larger study area, but the share of residents living in poverty still grew by 61.2%, climbing from approximately 36,000 in 2002 to nearly 59,000 in 2011. Only one county in the study area, Skamania, saw poverty levels grow by less than 50%, and in several counties the growth was greater than 80%.

Table 1.1-5 – Population Living Below the Poverty Level – All Ages

	Thousands											
County	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Change 2002-2011**	**% Change**
Washington	623.0	671.2	715.3	732.0	736.9	722.6	727.2	803.3	890.3	931.6	308.6	49.5%
Clark	36.4	41.0	44.8	45.9	41.6	39.2	41.6	50.6	53.7	58.7	22.3	61.2%
Cowlitz	11.8	13.0	13.8	14.3	15.4	15.2	14.7	16.0	20.8	19.6	7.8	66.5%
Skamania	1.2	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.5	1.6	0.5	38.7%
Oregon	396.2	423.3	462.2	497.3	487.4	476.6	501.5	536.8	596.6	655.2	259.1	65.4%
Clackamas	27.3	30.4	33.1	32.5	29.7	34.2	34.7	35.9	38.8	41.5	14.2	52.1%
Columbia	3.7	4.0	4.5	5.0	4.3	4.3	5.5	5.8	6.6	6.0	2.3	62.4%
Hood River	2.4	2.6	2.7	3.1	3.1	2.6	2.8	2.7	2.9	3.3	0.9	36.8%
Marion	38.3	41.1	44.5	44.7	44.0	45.8	48.0	50.5	55.0	63.4	25.2	65.8%
Multnomah	78.7	85.3	93.9	112.8	103.7	103.2	99.0	107.6	130.6	142.3	63.6	80.8%
Polk	6.3	6.8	7.7	10.4	9.4	7.9	9.0	10.0	11.6	10.5	4.2	67.0%
Washington	36.9	42.2	46.5	48.0	49.1	44.7	50.1	53.3	50.9	67.5	30.7	83.2%
Yamhill	8.9	9.3	9.8	11.2	11.9	10.7	11.7	11.5	13.8	13.4	4.5	50.2%
StudyArea	251.7	276.8	302.6	329.1	313.6	309.1	318.4	345.3	386.2	427.7	176.1	70.0%

Source: U.S. Census Bureau

The share of the population living below the poverty level grew from 10.1% to 15.6% in the study area, between 2002 and 2011. Clark County residents fared somewhat better during this time, but the share of residents living below the poverty level grew from 9.6% in 2002 to 13.7% in 2011. Directly north of Clark County the poverty rate in Cowlitz County grew from 12.5% to 19.5%, and directly to the south the poverty rate in Multnomah County grew from 11.8% to 19.4%.[7]

[6] *Small Area Income and Poverty Estimates*, U.S. Census Bureau, December 2012
[7] *ibid*

Table 1.1-6 – Poverty Rates in Study Area – All Ages

County	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Change 2002-2011
Washington	10.3%	11.0%	11.6%	12.0%	11.8%	11.4%	11.3%	12.3%	13.5%	13.9%	3.6%
Clark	9.6%	10.5%	11.2%	11.5%	10.2%	9.5%	9.9%	11.8%	12.7%	13.7%	4.1%
Cowlitz	12.5%	13.6%	14.3%	15.0%	15.7%	15.4%	14.8%	16.0%	20.6%	19.5%	7.0%
Skamania	11.6%	10.9%	11.5%	11.1%	12.5%	11.9%	12.2%	12.4%	13.8%	14.9%	3.3%
Oregon	11.3%	12.0%	12.9%	14.1%	13.4%	13.0%	13.5%	14.3%	15.8%	17.3%	6.0%
Clackamas	7.6%	8.4%	9.0%	8.9%	8.0%	9.2%	9.2%	9.4%	10.4%	11.0%	3.4%
Columbia	8.0%	8.6%	9.5%	10.5%	8.8%	8.8%	11.3%	11.9%	13.4%	12.3%	4.3%
Hood River	11.7%	12.5%	13.0%	15.3%	14.7%	12.7%	13.2%	12.9%	13.0%	14.7%	3.0%
Marion	13.2%	14.1%	15.1%	15.4%	14.7%	15.2%	15.8%	16.4%	17.9%	20.5%	7.3%
Multnomah	11.8%	12.9%	14.2%	17.3%	15.5%	15.0%	14.1%	15.1%	18.0%	19.4%	7.6%
Polk	9.7%	10.3%	11.3%	15.4%	13.2%	10.8%	11.9%	13.2%	15.7%	14.1%	4.4%
Washington	7.7%	8.7%	9.3%	9.7%	9.6%	8.6%	9.5%	10.0%	9.7%	12.6%	4.9%
Yamhill	10.5%	10.8%	11.2%	13.0%	13.3%	11.7%	12.5%	12.3%	14.7%	14.1%	3.6%
StudyArea	10.1%	11.0%	11.8%	13.0%	12.1%	11.7%	11.9%	12.7%	14.3%	15.6%	5.5%

Source: U.S. Census Bureau

1.1.3 Housing

According to data from the U.S. Census Bureau, the study area has more than 1.1 million housing units, with more than 166,000 in Clark County[8]. Results from the most recent American Community Survey indicate that there are more than 9,000 vacant housing units in Clark County, and that the vacancy rate for rental housing in Clark County is 5.2%. Within the larger study area, there are an estimated 73,000 vacant housing units. Vacancy rates for rental housing range between 4.1% and 8.1%.

Table 1.1-7 – Housing Units and Vacancy by County in Study Area

	Housing Units			Vacancy	
County	**Total**	**Occupied**	**Vacant**	**Homeowner**	**Rental**
Clark	166,270	157,179	9,091	1.9%	5.2%
Cowlitz	43,227	39,793	3,434	1.9%	5.3%
Skamania	5,577	4,435	1,142	3.3%	5.1%
Clackamas	156,150	144,588	11,562	1.6%	6.3%
Columbia	20,600	19,173	1,427	1.7%	4.3%
Hood River	9,193	8,204	989	1.9%	5.8%
Marion	120,482	112,841	7,641	1.9%	5.5%
Multnomah	322,567	302,224	20,343	2.5%	4.1%
Polk	30,044	28,111	1,933	2.6%	4.2%
Washington	211,045	198,593	12,452	2.2%	5.3%
Yamhill	36,831	33,804	3,027	2.2%	8.1%
Study Area	1,121,986	1,048,945	73,041		

Source: U.S. Census Bureau, 2007-2011 American Community Survey

County-wide median house values in the study area range between $193,800 and $326,300, according to data from the U.S. Census Bureau, 2007-2011 American Community Survey. In Clark County the median house value is $254,200. The largest number of housing units in both the study area and in Clark County is valued between $200,000 and $299,999, but there is also a large number of housing units valued at less than $200,000. In the study, area one out of four housing units is valued at less than $200,000, and in Clark County nearly one-third of housing units are valued at less than $200,000.[9]

[8] *Housing Unit Estimates for Counties in Washington: April 1, 2010 to July 1, 2011*, Source: U.S. Census Bureau, Population Division, June 2012

[9] *ibid*

Table 1.1-8 – Housing Values by County in Study Area

County	Less than $50,000	$50,000 to $99,999	$100,000 to $149,999	$150,000 to $199,999	$200,000 to $299,999	$300,000 to $499,999	$500,000 to $999,999	$1,000,000 or more	Median (dollars)
Clark	4,124	2,157	5,739	16,597	39,112	27,929	8,730	1,132	$254,200
Cowlitz	1,638	1,955	3,996	6,451	6,951	4,534	999	258	$193,800
Skamania	151	179	291	416	1,053	910	200	123	$257,600
Clackamas	5,848	1,471	2,542	7,227	27,631	36,422	16,622	3,893	$326,300
Columbia	1,072	668	1,604	2,831	4,702	2,854	873	117	$221,200
Hood River	197	257	298	414	1,333	1,789	1,045	212	$326,900
Marion	5,053	2,632	8,270	16,710	19,766	11,801	3,971	586	$206,700
Multnomah	5,415	2,201	6,915	19,664	58,394	51,365	20,105	2,857	$281,900
Polk	877	605	1,742	4,038	6,055	4,344	1,070	163	$231,900
Washington	4,247	1,449	3,638	10,253	42,238	44,612	15,393	1,944	$300,200
Yamhill	1,909	991	1,888	3,911	6,951	5,238	2,363	384	$237,700
Study Area	30,531	14,565	36,923	88,512	214,186	191,798	71,371	11,669	

Source: U.S. Census Bureau, 2007-2011 American Community Survey

A second source of housing information is the Washington Office of Financial Management, which provides detail at the municipality level. As illustrated in Table 1.1-9 on the following two pages, approximately 55% of the housing in Clark County is located in incorporated parts of the county and 45% is in unincorporated areas. Vancouver accounts for most of the housing in the incorporated areas, with an estimated 70,249 out of 93,319 housing units in 2012, or 75.7%. Battle Ground, Camas, and Washougal account for most the other housing in incorporated areas.[10]

Between 2002 and 2012 the number of housing units in Clark County grew by more than 27,600. Vancouver accounted for more than 28.4% of this total, adding more than 7,800 new housing units. Battle Ground, Camas, and Washougal each added more than 2,000 new housings units, while unincorporated parts of the county added nearly 11,800 new units.

Housing vacancy rates have remained steady over the past 10 years in Clark County, ranging between 5.2% and 5.8%. In Vancouver the vacancy rate has generally ranged between 6.2% and 6.7%, and in 2012 it was estimated that there were 4,5316 unoccupied housing units in Vancouver.

[10] *Historical Estimates of April 1 Population and Housing for the State, Counties, and Cities*, Washington Office of Financial Management, http://www.ofm.wa.gov/pop/april1/hseries/default.asp, accessed July 3, 2013

Table 1.1-9 – Housing Characteristics by City in Clark County

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011*	2012*
Housing Units											
Clark County	142,050	146,196	150,712	154,819	158,999	162,191	164,926	166,721	167,413	168,416	169,667
Unincorporated	64,562	66,722	68,725	70,868	72,951	73,672	74,784	75,302	75,498	75,908	76,348
Incorporated	77,488	79,474	81,987	83,951	86,048	88,519	90,142	91,419	91,915	92,508	93,319
Battle Ground	3,857	4,311	4,809	5,119	5,375	5,465	5,706	5,857	5,952	6,042	6,084
Camas	5,251	5,533	6,026	6,122	6,382	6,574	6,796	6,925	7,072	7,182	7,341
La Center	652	671	723	765	884	903	941	965	981	996	1,061
Ridgefield	797	815	827	1,022	1,273	1,431	1,544	1,641	1,695	1,779	1,857
Vancouver	62,816	63,785	64,845	65,865	66,655	68,375	69,159	69,875	70,005	70,249	70,663
Washougal	3,695	3,942	4,337	4,627	5,021	5,276	5,468	5,628	5,673	5,717	5,764
Woodland	57	55	53	56	59	47	52	53	53	53	53
Yacolt	363	362	367	375	399	448	476	475	484	490	496
Occupied Housing Units											
Clark County	134,671	138,146	142,394	145,885	149,723	152,780	155,350	157,242	158,099	158,841	160,021
Unincorporated	61,600	63,640	65,529	67,551	69,512	70,176	71,212	71,680	71,843	72,257	72,676
Incorporated	73,071	74,506	76,865	78,334	80,211	82,604	84,138	85,562	86,256	86,580	87,339
Battle Ground	3,687	4,086	4,596	4,807	5,071	5,207	5,402	5,554	5,652	5,729	5,769
Camas	4,938	5,200	5,650	5,731	5,935	6,125	6,333	6,472	6,619	6,709	6,857
La Center	614	635	685	726	809	859	894	920	942	951	1,013
Ridgefield	753	770	781	935	1,156	1,302	1,429	1,529	1,591	1,658	1,731
Vancouver	59,207	59,730	60,698	61,462	62,210	63,795	64,542	65,404	65,691	65,744	66,132
Washougal	3,483	3,705	4,070	4,275	4,610	4,864	5,046	5,191	5,256	5,282	5,325
Woodland	54	45	45	51	55	43	49	49	51	50	50
Yacolt	335	335	340	347	365	409	443	443	454	458	463

Source: Washington Office of Financial Management

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011*	2012*
Occupancy Rate											
Clark County	94.8%	94.5%	94.5%	94.2%	94.2%	94.2%	94.2%	94.3%	94.4%	94.3%	94.3%
Unincorporated	95.4%	95.4%	95.3%	95.3%	95.3%	95.3%	95.2%	95.2%	95.2%	95.2%	95.2%
Incorporated	94.3%	93.7%	93.8%	93.3%	93.2%	93.3%	93.3%	93.6%	93.8%	93.6%	93.6%
Battle Ground	95.6%	94.8%	95.6%	93.9%	94.3%	95.3%	94.7%	94.8%	95.0%	94.8%	94.8%
Camas	94.0%	94.0%	93.8%	93.6%	93.0%	93.2%	93.2%	93.5%	93.6%	93.4%	93.4%
La Center	94.2%	94.6%	94.7%	94.9%	91.5%	95.1%	95.0%	95.3%	96.0%	95.5%	95.5%
Ridgefield	94.5%	94.5%	94.4%	91.5%	90.8%	91.0%	92.6%	93.2%	93.9%	93.2%	93.2%
Vancouver	94.3%	93.6%	93.6%	93.3%	93.3%	93.3%	93.3%	93.6%	93.8%	93.6%	93.6%
Washougal	94.3%	94.0%	93.8%	92.4%	91.8%	92.2%	92.3%	92.2%	92.6%	92.4%	92.4%
Woodland	94.7%	81.8%	84.9%	91.1%	93.2%	91.5%	94.2%	92.5%	96.2%	94.3%	94.3%
Yacolt	92.3%	92.5%	92.6%	92.5%	91.5%	91.3%	93.1%	93.3%	93.8%	93.4%	93.4%
Unoccupied Housing Units											
Clark County	7,379	8,050	8,318	8,934	9,276	9,411	9,576	9,479	9,314	9,575	9,646
Unincorporated	2,962	3,082	3,196	3,317	3,439	3,496	3,572	3,622	3,655	3,651	3,672
Incorporated	4,417	4,968	5,122	5,617	5,837	5,915	6,004	5,857	5,659	5,928	5,980
Battle Ground	170	225	213	312	304	258	304	303	300	313	315
Camas	313	333`	376	391	447	449	463	453	453	473	484
La Center	38	36	38	39	75	44	47	45	39	45	48
Ridgefield	44	45	46	87	117	129	115	112	104	121	126
Vancouver	3,609	4,055	4,147	4,403	4,445	4,580	4,617	4,471	4,314	4,505	4,531
Washougal	212	237	267	352	411	412	422	437	417	435	439
Woodland	3	10	8	5	4	4	3	4	2	3	3
Yacolt	28	27	27	28	34	39	33	32	30	32	33

*For 2011 and 2012, the number of occupied housing units, occupancy rate, and unoccupied housing units were estimated on based on occupancy rates for 2008 through 2010.
Source: Washington Office of Financial Management

1.1.4 Workforce

According to data from the Bureau of Labor Statistics, between 2002 and 2012 the workforce in the study area grew from 1.33 million to 1.43 million, an increase of more than 108,000 workers or 8.1%. In Clark County, the number of workers increased from approximately 187,000 to 211,000, an increase of approximately 24,000 workers or 12.9%.[11]

During the same period the number of workers who were employed grew by 7.4% in the study area. The number of workers employed grew from 1.22 million to 1.32 million, an increase of more than 91,000. In Clark County, the number of workers with jobs grew by more than 19,000 (from approximately 170,000 to 189,000), an increase of 11.4%.

Because the size of the workforce grew faster than the number workers employed, the number of unemployed workers in the study area grew by nearly 17,000 between 2002 and 2012. However, the 2012 unemployment number represents a significant improvement over the situation of the prior three years, which saw the number of unemployed jump to nearly 155,000 before slowly declining.

[11] *Local Area Unemployment Statistics Not Seasonally Adjusted*, Bureau of Labor Statistics, data extracted on: July 1, 2013

In Clark County, the number of unemployed workers was 4,800 higher in 2012 than in 2002, with approximately 22,000 workers not employed. The number of unemployed workers in Clark County had dropped to less than 12,000 in 2006 and 2007, but grew to nearly 29,000 in 2009 and to more than 30,000 in 2010.

The unemployment rate in the study area declined from 7.8% in 2002 to 5.0% in 2007, but the impact of the recent recession was a doubling of that rate, to 10.8% in 2009 and 10.6% in 2010. By 2012 the unemployment rate had dropped to 8.4%, an improvement over the situation during the height of the recession but substantially higher than in 2007.

In Clark County the unemployment rate fell from 9.2% in 2002 to a low of 5.6% in 2007, before the recession. During the recession the Clark County unemployment rate grew for three consecutive years, to a high of 14.0% in 2010. The rate dropped in each of the most recent two years, but was still 10.2% in 2012.

Table 1.1-10 – Size of Workforce by County in the Project Vicinity

County Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change 2002-2012	% Change
Washington State	3,481,463	2,913,230	2,999,526	3,075,972	3,155,384	3,232,652	3,284,836	3,194,251	3,166,880	3,161,818	3,197,293	376,765	12.1%
Clark	211,442	170,968	180,700	188,730	192,679	196,119	198,829	188,747	186,527	187,179	189,421	24,123	12.9%
Cowlitz	43,067	38,553	39,051	39,637	39,843	40,581	40,493	38,659	38,590	37,912	38,380	284	0.7%
Skamania	5,060	4,295	4,510	4,624	4,688	4,666	4,687	4,415	4,501	4,461	4,515	292	6.1%
Oregon State	1,962,908	1,699,679	1,714,447	1,740,990	1,792,039	1,821,827	1,827,032	1,753,853	1,761,867	1,785,400	1,791,730	119,168	6.5%
Clackamas	199,576	175,118	177,506	180,656	185,938	187,337	188,717	181,268	178,777	181,905	183,824	9,838	5.2%
Columbia	24,221	20,823	21,102	21,619	22,409	22,380	22,476	21,357	21,526	21,683	21,912	1,143	5.0%
Hood River	14,497	11,155	11,441	11,538	11,922	12,296	12,632	12,815	13,196	13,304	13,487	2,406	19.9%
Marion	154,899	136,976	137,804	138,962	142,018	143,510	145,044	140,510	141,020	140,720	140,106	7,600	5.2%
Multnomah	404,357	342,767	338,901	340,275	349,215	360,495	365,458	351,922	360,613	369,121	373,015	24,841	6.5%
Polk	38,442	31,996	32,680	33,733	35,249	36,560	37,458	36,391	35,548	35,352	35,198	4,660	13.8%
Washington	293,472	245,736	249,121	255,825	266,761	271,610	273,971	263,334	262,950	269,929	272,777	28,109	10.6%
Yamhill	48,611	40,330	40,790	41,581	43,273	44,232	44,778	42,767	43,386	44,010	44,475	4,866	11.1%
Study Area	1,437,644	1,218,717	1,233,606	1,257,180	1,293,995	1,319,786	1,334,543	1,282,185	1,286,634	1,305,576	1,317,110	108,162	8.1%

Source: *Local Area Unemployment Statistics Not Seasonally Adjusted* (Bureau of Labor Statistics)

Table 1.1-11 – Employment by County in the Project Vicinity

County Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change 2002-2012	% Change
Washington State	2,877,022	3,146,154	3,199,234	3,255,527	3,319,252	3,386,775	3,473,010	3,523,739	3,516,008	3,482,239	3,481,463	320,271	11.1%
Clark	170,096	189,109	195,202	201,564	204,406	207,853	214,101	217,536	216,991	213,635	211,442	19,325	11.4%
Cowlitz	38,218	42,820	42,663	42,724	42,607	43,327	44,119	44,627	44,376	43,072	43,067	162	0.4%
Skamania	4,293	4,779	4,928	5,002	5,042	5,001	5,126	5,075	5,188	5,103	5,060	222	5.2%
Oregon State	1,704,131	1,850,024	1,849,720	1,856,062	1,893,267	1,921,081	1,954,125	1,972,962	1,973,793	1,975,393	1,962,908	87,599	5.1%
Clackamas	176,583	189,349	190,199	191,232	195,283	196,328	200,108	201,930	198,863	199,654	199,576	7,241	4.1%
Columbia	20,899	23,233	23,207	23,340	23,771	23,737	24,188	24,586	24,484	24,265	24,221	1,013	4.8%
Hood River	11,095	12,200	12,353	12,321	12,612	12,878	13,346	13,936	14,384	14,438	14,497	2,392	21.6%
Marion	136,577	148,851	149,066	148,651	150,558	151,714	155,295	157,808	158,598	156,976	154,899	3,529	2.6%
Multnomah	348,945	374,435	366,118	362,362	368,171	379,016	388,198	392,741	400,065	404,114	404,357	24,070	6.9%
Polk	31,647	34,348	34,993	35,752	37,090	38,455	39,688	40,136	39,198	38,834	38,442	3,551	11.2%
Washington	247,008	265,300	265,583	269,807	279,060	283,871	289,259	290,455	288,873	292,843	293,472	25,769	10.4%
Yamhill	40,511	43,915	43,969	44,285	45,617	46,566	47,868	48,294	48,538	48,604	48,611	3,964	9.8%
Study Area	1,225,872	1,328,339	1,328,281	1,337,040	1,364,217	1,388,746	1,421,296	1,437,124	1,439,558	1,441,538	1,437,644	91,238	7.4%

Source: *Local Area Unemployment Statistics Not Seasonally Adjusted* (Bureau of Labor Statistics)

Table 1.1-12 – Unemployment by County in the Project Vicinity

County Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change 2002-2012	% Change
Washington State	227,676	232,924	199,708	179,555	163,868	154,123	188,174	329,488	349,128	320,421	284,170	56,494	24.8%
Clark	17,223	18,141	14,502	12,834	11,727	11,734	15,272	28,789	30,464	26,456	22,021	4,798	27.9%
Cowlitz	4,565	4,267	3,612	3,087	2,764	2,746	3,626	5,968	5,786	5,160	4,687	122	2.7%
Skamania	475	484	418	378	354	335	439	660	687	642	545	70	14.7%
Oregon State	139,609	150,345	135,273	115,072	101,228	99,254	127,093	219,109	211,926	189,993	171,178	31,569	22.6%
Clackamas	13,155	14,231	12,693	10,576	9,345	8,991	11,391	20,662	20,086	17,749	15,752	2,597	19.7%
Columbia	2,179	2,410	2,105	1,721	1,362	1,357	1,712	3,229	2,958	2,582	2,309	130	6.0%
Hood River	996	1,045	912	783	690	582	714	1,121	1,188	1,134	1,010	14	1.4%
Marion	10,722	11,875	11,262	9,689	8,540	8,204	10,251	17,298	17,578	16,256	14,793	4,071	38.0%
Multnomah	30,571	31,668	27,217	22,087	18,956	18,521	22,740	40,819	39,452	34,993	31,342	771	2.5%
Polk	2,135	2,352	2,313	2,019	1,841	1,895	2,230	3,745	3,650	3,482	3,244	1,109	51.9%
Washington	18,355	19,564	16,462	13,982	12,299	12,261	15,288	27,121	25,923	22,914	20,695	2,340	12.7%
Yamhill	3,234	3,585	3,179	2,704	2,344	2,334	3,090	5,527	5,152	4,594	4,136	902	27.9%
Study Area	103,610	109,622	94,675	79,860	70,222	68,960	86,753	154,939	152,924	135,962	120,534	16,924	16.3%

Source: *Local Area Unemployment Statistics Not Seasonally Adjusted* (Bureau of Labor Statistics)

Table 1.1-13 – Unemployment Rate by County in the Project Vicinity

County Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Washington State	7.3%	7.4%	6.2%	5.5%	4.9%	4.6%	5.4%	9.4%	9.9%	9.2%	8.2%
Clark	9.2%	9.6%	7.4%	6.4%	5.7%	5.6%	7.1%	13.2%	14.0%	12.4%	10.4%
Cowlitz	10.7%	10.0%	8.5%	7.2%	6.5%	6.3%	8.2%	13.4%	13.0%	12.0%	10.9%
Skamania	10.0%	10.1%	8.5%	7.6%	7.0%	6.7%	8.6%	13.0%	13.2%	12.6%	10.8%
Oregon State	7.6%	8.1%	7.3%	6.2%	5.3%	5.2%	6.5%	11.1%	10.7%	9.6%	8.7%
Clackamas	6.9%	7.5%	6.7%	5.5%	4.8%	4.6%	5.7%	10.2%	10.1%	8.9%	7.9%
Columbia	9.4%	10.4%	9.1%	7.4%	5.7%	5.7%	7.1%	13.1%	12.1%	10.6%	9.5%
Hood River	8.2%	8.6%	7.4%	6.4%	5.5%	4.5%	5.3%	8.0%	8.3%	7.9%	7.0%
Marion	7.3%	8.0%	7.6%	6.5%	5.7%	5.4%	6.6%	11.0%	11.1%	10.4%	9.6%
Multnomah	8.1%	8.5%	7.4%	6.1%	5.1%	4.9%	5.9%	10.4%	9.9%	8.7%	7.8%
Polk	6.3%	6.8%	6.6%	5.6%	5.0%	4.9%	5.6%	9.3%	9.3%	9.0%	8.4%
Washington	6.9%	7.4%	6.2%	5.2%	4.4%	4.3%	5.3%	9.3%	9.0%	7.8%	7.1%
Yamhill	7.4%	8.2%	7.2%	6.1%	5.1%	5.0%	6.5%	11.4%	10.6%	9.5%	8.5%
Study Area	7.8%	8.3%	7.1%	6.0%	5.1%	5.0%	6.1%	10.8%	10.6%	9.4%	8.4%

Source: *Local Area Unemployment Statistics Not Seasonally Adjusted* (Bureau of Labor Statistics)

According to data from the *2011 County Business Patterns* (U.S. Census Bureau), health care and social assistance is the largest source of jobs in the study area, accounting for approximately 150,000 of the 1 million jobs. Retail trade is the second largest source of employment, accounting for 126,000 jobs, followed by manufacturing (110,000 jobs), accommodation and food services (99,000 jobs), and wholesale trade (69,000 jobs).[12]

The Project falls into the transportation and warehousing sector, which accounted for nearly 37,000 jobs in the study area in 2011.

Average wages vary significantly by sector and county. According to the County Business Pattern data, the average annual wage for the region, across all sectors, was $45,700. In the transportation and warehousing sector the average annual wage is slightly lower, at $44,300, and in Clark County it is $39,200. (See tables on following two pages.)

[12] *2011 County Business Patterns*, U.S. Census Bureau, http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml, accessed July 8, 2013

Table 1.1-14 – Employment by Sector in 2011

NAICS	Description	Clark County, Washington	Cowlitz County, Washington	Skamania County, Washington	Clackamas County, Oregon	Columbia County, Oregon	Hood River County, Oregon	Marion County, Oregon	Multnomah County, Oregon	Polk County, Oregon	Washington County, Oregon	Yamhill County, Oregon	Study Area Total
0	Total for all sectors	107,452	30,312	1,185	121,901	6,948	8,501	93,122	375,965	10,795	223,496	26,599	1,006,276
11	Agriculture, forestry, fishing and hunting	110	737	2	243	245	150	1,152	700	410	258	232	4,089
21	Mining, quarrying, and oil and gas extraction	277	89		50	54		286	50	10	66	50	872
22	Utilities	50	50		300	150	50	251	4,272	50	700	50	4,523
23	Construction	8,710	2,872	101	8,347	357	378	5,005	15,509	807	10,936	1,089	54,111
31-33	Manufacturing	11,195	5,974	150	15,779	1,177	1,095	8,247	31,389	1,564	26,982	5,547	109,099
42	Wholesale trade	5,601	1,109	14	9,180	56	300	3,735	22,714	289	26,003	300	69,001
44-45	Retail trade	15,238	4,678	142	17,281	1,347	1,269	15,420	37,000	1,606	28,400	3,312	125,693
48-49	Transportation and warehousing	2,986	983	10	4,087	296	106	3,551	20,718	244	3,088	560	36,629
51	Information	3,751	369	14	1,909	55	192	1,827	10,789	50	9,146	188	28,290
52	Finance and insurance	4,633	877	50	5,053	292	142	3,540	20,119	245	9,911	800	45,662
53	Real estate and rental and leasing	2,067	344	10	2,450	89	50	2,034	8,631	181	4,713	257	20,826
54	Professional, scientific, and technical services	6,535	838	50	8,294	251	385	3,891	29,224	333	16,581	614	66,996
55	Management of companies and enterprises	1,872	700		2,751	10	50	1,347	14,282	10	11,640	199	32,801
56	Administrative and support and waste management and remediation services	6,693	741	10	6,304	165	139	6,029	25,117	270	18,065	833	64,366
61	Educational services	1,369	294		2,051	47	50	3,000	14,799	187	5,739	2,778	30,264
62	Health care and social assistance	18,946	5,634	85	17,213	999	1,790	18,616	56,182	2,455	24,088	4,357	150,365
71	Arts, entertainment, and recreation	1,817	349	10	1,773	69	653	1,132	6,390	161	3,291	216	15,851
72	Accommodation and food services	10,477	2,572	504	12,284	914	1,241	9,498	40,086	1,247	16,415	3,976	99,214
81	Other services (except public administration)	5,065	1,176	27	6,549	300	356	4,731	18,026	653	7,402	1,079	45,364

Source: *2011 County Business Patterns* (US Census Bureau)

Table 1.1-15 – Average Wage by Sector in 2011

NAICS	Description	Clark County, Washington	Cowlitz County, Washington	Skamania County, Washington	Clackamas County, Oregon	Columbia County, Oregon	Hood River County, Oregon	Marion County, Oregon	Multnomah County, Oregon	Polk County, Oregon	Washington County, Oregon	Yamhill County, Oregon	Study Area Total
0	Total for all sectors	$43,100	$42,000	$30,000	$42,800	$30,200	$28,900	$33,300	$47,300	$29,100	$54,600	$35,100	$45,700
11	Agriculture, forestry, fishing and hunting	$60,700	$47,200	$55,500	$27,800	$40,400	n/a	$22,600	$34,100	$37,700	$36,400	$36,200	$34,600
21	Mining, quarrying, and oil and gas extraction	$72,100	$73,000	n/a	n/a	$54,300	n/a	$72,400	n/a	n/a	$53,400	$42,900	$64,000
22	Utilities	n/a	n/a	n/a	n/a	n/a	n/a	$75,300	$97,300	n/a	n/a	n/a	$96,100
23	Construction	$53,100	$53,700	$47,100	$49,400	$34,900	$31,400	$46,400	$61,200	$49,000	$54,400	$39,800	$53,900
31-33	Manufacturing	$53,500	$64,100	n/a	$57,300	$46,300	$35,800	$38,800	$51,700	$36,500	$59,300	$50,700	$53,700
42	Wholesale trade	$74,200	$51,500	$56,200	$56,900	$52,000	n/a	$46,800	$55,200	$42,200	$117,700	$76,300	$80,000
44-45	Retail trade	$27,200	$24,100	$20,000	$26,500	$23,700	$24,400	$24,000	$26,900	$23,700	$26,900	$25,600	$26,300
48-49	Transportation and warehousing	$43,200	$39,200	$24,400	$38,600	$32,800	$29,500	$44,100	$45,100	$34,000	$44,600	$83,300	$44,300
51	Information	$77,300	$42,900	$37,200	$55,200	$31,900	$47,300	$38,200	$67,100	$33,300	$64,600	$44,200	$64,200
52	Finance and insurance	$55,200	$42,500	$14,600	$57,900	$36,700	$50,900	$47,400	$78,600	$34,000	$58,200	$45,700	$65,200
53	Real estate and rental and leasing	$34,700	$21,600	$19,300	$35,000	$25,700	$34,200	$28,200	$38,000	$16,800	$36,600	$23,100	$35,400
54	Professional, scientific, and technical services	$50,600	$39,900	$40,100	$69,100	$31,100	$47,600	$43,600	$70,600	$32,400	$57,800	$40,900	$62,600
55	Management of companies and enterprises	$99,700	$77,800	n/a	$73,700	n/a	n/a	$61,900	$92,900	$45,200	$114,600	$78,700	$97,700
56	Administrative and support and waste management and remediation services	$27,100	$25,000	$15,900	$30,600	$24,500	$21,600	$23,900	$28,400	$27,700	$29,900	$25,400	$28,400
61	Educational services	$19,700	$17,300	n/a	$22,400	$14,600	n/a	$21,700	$26,600	$20,000	$22,800	$20,700	$24,100
62	Health care and social assistance	$48,300	$42,200	$30,400	$49,300	$27,100	$30,600	$40,700	$53,000	$28,400	$46,000	$36,600	$47,600
71	Arts, entertainment, and recreation	$19,500	$16,200	n/a	$20,300	$13,000	$15,100	$18,400	$33,400	$10,900	$27,600	$20,900	$26,500
72	Accommodation and food services	$15,900	$14,700	$20,600	$16,200	$12,800	$16,100	$14,600	$17,900	$13,700	$16,500	$22,200	$16,900
81	Other services (except public administration)	$23,800	$21,900	$18,600	$23,500	$20,800	$22,600	$23,700	$29,900	$21,900	$29,600	$19,000	$26,900

Source: *2011 County Business Patterns* (US Census Bureau)

Projections from the Washington Employment Security Department indicate that job growth in Southwest Washington (i.e. Clark, Cowlitz, and Wahkiakum County) is expected to be strongest in the service industries, including professional and business services, and education and health services. For professional and business services the estimated annual employment growth rate between 2009 and 2014 is 3.2%, and between 2014 and 2019 it is 3.3%. Between 2009 and 2019 the rate is 3.3, compared to a statewide average of 2.9%.[13]

The Project falls into the transportation, warehousing, and utilities sector, which is also projected to have strong job growth in the Southwest Region. Estimated annual job growth for this sector is 2.6% between 2009 and 2014, and 2.3% between 2014 and 2019. Between 2009 and 2019 this sector is projected to add 1,600 jobs in the Southwest Region; projected employment at the Project operation would account for approximately 5% to 7% of this growth.

Table 1.1-16 – Employment Trends and Forecast in Southwest Washington

Industry	Est. Emp. 2009	Est. Emp. 2014	Est. Emp. 2019	Avg. Annual Growth Rate 2009-2014	Avg. Annual Growth Rate 2014-2019	Avg. Annual Growth Rate 2009-2019	State Rate
Natural Resources And Mining	1,000	1,100	1,100	1.9%	0.0%	1.0%	1.4%
Construction	11,500	12,000	13,300	0.9%	2.1%	1.5%	1.1%
Manufacturing	17,800	20,200	21,500	2.6%	1.3%	1.9%	1.1%
Wholesale Trade	6,900	7,700	8,500	2.2%	2.0%	2.1%	1.4%
Retail Trade	19,300	21,000	22,200	1.7%	1.1%	1.4%	1.0%
Transportation, Warehousing And Utilities	5,800	6,600	7,400	2.6%	2.3%	2.5%	1.6%
Information	3,300	3,800	4,100	2.9%	1.5%	2.2%	2.3%
Financial Activities	7,400	7,800	7,900	1.1%	0.3%	0.7%	0.3%
Professional And Business Services	16,200	19,000	22,400	3.2%	3.3%	3.3%	2.9%
Education And Health Services	24,100	27,100	31,100	2.4%	2.8%	2.6%	2.0%
Leisure And Hospitality	15,800	16,800	18,100	1.2%	1.5%	1.4%	1.3%
Other Services	5,800	6,100	6,200	1.0%	0.3%	0.7%	0.4%
Government	30,200	31,500	33,700	0.8%	1.4%	1.1%	0.9%
Total Nonfarm	165,100	180,700	197,500	1.8%	1.8%	1.8%	1.4%

Note: Southwest Washington is Clark, Cowlitz, and Wahkiakum County
Washington Employment Security Department

1.1.5 Major Employers in County

Most of the largest employers in Clark County fall into one of four sectors: medical services, education, manufacturing, and government. The medical sector includes the largest employer in 2012, the Southwest Washington Medical Center; other medical providers in the top 28 employers include the Vancouver Clinic, Legacy Salmon Creek Medical Center, VA Medical

[13] *Occupational Employment Projections*, Washington Employment Security Department/LMEA, May 2013

Center, and Kaiser Permanente Northwest. These five medical providers account for more than 22% of the jobs generated by the top employers.[14]

Education accounts for nearly one-third of the jobs generated by the top 28 employers. Major agencies include the Evergreen, Vancouver, Battle Ground School Districts, as well as Clark College and WSU Vancouver.

Manufacturing accounts for nearly 15% of the jobs provided by the top 28 employers in Clark College. Top manufacturers in the county include WaferTech, Northwest Natural Products, SEH America, Georgia-Pacific, Frito-Lay, and Columbia Machine.

Government agencies represent two of the top 28 employers, and account for more than 9% of the jobs.

Table 1.1-17 – Major Employers in County

2012 Rank	Employer	2012 FTE
1	Southwest Washington Medical Center	2,841
2	Evergreen Public Schools	2,455
3	Vancouver Public Schools	2,203
4	Clark County, Washington	1,561
5	Fred Meyer Stores, Inc.	1,500
6	Battle Ground Public Schools	1,213
7	Bonneville Power Administration	1,181
8	WaferTech, LLC	1,040
9	Clark College	985
10	City of Vancouver	932
11	The Vancouver Clinic	912
12	Legacy Salmon Creek Medical Center	860
13	VA Medical Clinic	809
14	BNSF Railway Railroad	800
15	Northwest Natural Products, Inc.	790
16	Camas School District No. 117	750
17	Kaiser Permanente Northwest	724
18	SEH America	711
19	Wells Fargo	654
20	Dick Hannah Dealerships	650
21	Charter Communications	605
22	Educational Service District No. 112	600
23	Georgia-Pacific LLC	508
24	Frito-Lay, Inc.	475
25	Columbia Machine, Inc.	400
26	Clark Co. Public Transportation Benefit Area	384
27	Washington State University, Vancouver	352
28	Clark Public Utilities	340

Source: Columbia River Economic Development Council

A recent study completed for the Port of Vancouver included an analysis of where workers live. Excluding rail crew and rail headquarters employment, more than 75% of the workers with jobs

[14] *Clark County's Largest Employers, 2013*, Columbia River Economic Development Council, http://www.credc.org/wp-content/uploads/2012/11/2013-CC-Top-Employers.pdf., accessed July 2, 2013

directly related to the Port of Vancouver (and its tenants) are residents of Clark County. This includes 45.8% who are residents of Vancouver, and 29.9% who live elsewhere in Clark County. Nearly 20% of port-related workers commute from Oregon, including 12.1% from Multnomah County.[15]

Table 1.1-18 – Distribution of Port of Vancouver Direct Jobs by Place of Residence

County	Percent	Direct Jobs
Vancouver	45.8%	579
Other Clark	29.9%	378
Skamania	0.5%	7
Other WA	3.5%	45
Multnomah	12.1%	152
Washington	1.1%	14
Clackamas	3.2%	40
Other OR	3.2%	41
Other U.S.	0.7%	8
Total	100.0%	1,265

Source: Martin & Associates

1.1.6 Lodging

Clark County is one of seven counties in the Portland, Oregon lodging market, as defined by STR Lodging. According to STR Lodging, the Portland market currently has total of 25,903 hotel rooms, of which approximately 10% are in Clark County.[16]

The majority of the hotel rooms in Clark County are at hotels rated as upper "Economy", "Midscale", or "Upper Midscale", these hotel types account for approximately two-thirds of the rooms in Clark County. The two least-expensive hotel types, Economy and Midscale, each account for approximately 20% to 23% of the available rooms in Clark County, and there are a total of approximately 1,100 such rooms.

In the Portland market these three least expensive tiers of hotels account for 56% of the total rooms available. Nearly 11,000 available rooms in the Portland market are in Economy or Midscale hotels.

[15] *The Local and Regional Economic Impacts of the Port of Vancouver Marine Terminals and Non-Maritime Real Estate Tenants*, Martin Associates, August 10, 2011.
[16] Portland hotel market data, obtained from STR Lodging on July 2, 2012

Table 1.1-19 – Hotel/Motel Rooms in Portland Market

County	Economy	Midscale	Upper Midscale	Upscale	Upper Upscale	Luxury	Total
Clark County, WA	521	587	571	642	226	-	2,547
Clackamas County, OR	517	525	464	685	230	-	2,421
Columbia County, OR	90	112	40	-	-	-	242
Multnomah County, OR	2,750	2,328	2,417	3,358	3,971	581	15,405
Washington County, OR	1,207	588	1,314	1,013	366	124	4,612
Yamhill County, OR	276	221	66	20	-	93	676
Portland market total	5,361	4,361	4,872	5,718	4,793	798	25,903

Source: STR Lodging

Another source of data for the hotel market is PKF Hospitality Research, LLC. PKF Hospitality provides data for sub-markets of the Portland region, as well historical occupancy data. According to PKF, occupancy at hotels in the Airport / Vancouver sub-market averaged 59.8% between 2008 and 2012. The revenue per available room (Revenue PAR) averaged approximately $50.00 during that period, and the estimated revenue per occupied room was approximately $82.50.[17]

The Airport / Vancouver sub-market is the least expensive of the four tracked by PKF. Average occupancy is also relatively low.

Table 1.1-20 – Hotel/Motel Occupancy & Revenue in Portland Market

	Downtown		Airport / Vancouver		Beaverton / Sunset Hwy West		Lake Oswego / I-5 South	
Year	Occupancy	Revenue PAR	Occupancy	Revenue PAR	Occupancy	Revenue PAR	Occupancy	Revenue PAR
2008	72.3%	$93.94	63.2%	$56.20	63.3%	$57.36	60.2%	$53.36
2009	66.8%	$78.01	54.2%	$44.13	57.4%	$45.84	54.2%	$43.81
2010	71.3%	$84.02	57.3%	$44.83	66.0%	$50.25	57.7%	$47.48
2011	74.0%	$91.45	59.8%	$48.19	69.6%	$58.73	59.4%	$50.43
2012	75.9%	$100.45	64.6%	$53.90	72.3%	$66.55	62.2%	$55.77
2013 ytd	66.0%	$77.72	57.2%	$46.97	65.3%	$63.72	54.7%	$46.77

Source: PKF Hospitality Research, LLC

Construction of the project is projected to last approximately nine months to require a total of 250 workers during the project, and peak employment is projected to not exceed 125 per day. The impact on available lodging is likely to be minor.

1.1.7 Fire Protection

The Vancouver Fire Department provides services to 246,441 people in the combined City of Vancouver and Clark County Fire District 5 service area, which is comprised of 90.9 square miles. It serves a population equating to the second largest city in Washington State with the highest call volume per firefighter and the fewest firefighters per thousand in population of

[17] *Hotel Horizons*, PKF Hospitality Research, LLC, June to August 2013

comparable cities in the state. Vancouver Fire Department is a full service fire department, providing: fire suppression, prevention, emergency medical services, hazardous materials, trench and confined space rescue, water rescue, high angle rescue, and citywide emergency management. These services are provided from ten fire stations.[18]

Vancouver Fire Department maintains a Class 4 rating from the Washington Surveying and Rating Bureau. Class 1 is the best rating, classified as the ideal fire department, and Class 10 is one with the most deficiency points or no department at all. The Fire Department was downgraded from a class in October 2002 due to staffing, fire prevention, and marine response deficiencies. This resulted in an increase in insurance premiums paid by most businesses in the fire service area.

Table 1.1-21 – Fire Departments in Clark County

Department	City	Personnel
City of Vancouver	Vancouver	198
Clark County	Camas	
City of Camas	Camas	
City Of Washougal	Washougal	
Town Of Yacolt	Yacolt	
Cowlitz County Fire District 1	Woodland	

Source: Dun & Bradstreet

1.1.8 Emergency Medical Care

The closest hospital to the Facility is the Peace Health Southwest Washington Medical Center which is approximately 7.5 miles east of the Facility on Mill Plain Boulevard. Soutwest Washington Medical Center is designated as a Level II Trauma Center by the Washington State Department of Health. There are five levels of trauma centers designated by the state with Level I providing the highest level of care and Level V providing the lowest level. Harborview Medical Center in Seattle is the only Level 1 Trauma Center in Washington State. In Oregon, Legacy Emanuel and Oregon Health Sciences University in Portland are both Level I Hospitals designated by the State of Oregon. The State of Oregon has a 4 level designation with Level I providing the highest level of definitive, comprehensive care for severely injured patients. Legacy Emanuel and Oregon Health Sciences University are approximately 10 and 14 miles south of the project site, respectively.

Table 1.1-22 – Ambulance Service Providers in Project Vicinity

Department	City
City Of Vancouver	Vancouver
Clark County	Camas
City of Camas	Camas
City Of Washougal	Washougal
Town Of Yacolt	Yacolt
Cowlitz County Fire District 1	Woodland

Source: Dun & Bradstreet

[18] Dun & Bradstreet master file data accessed from Mailinglistsxpress.com, accessed June 26, 2013

1.1.9 School Enrollment

School enrollment in the study area has grown slowly over the past six school years. Total enrollment grew from 423,542 during the 2007-2008 school year to 425,891 during the 2012-2013 school year. The increase in enrollment of 2,349 students represents average annual growth of just 0.11%.

Within the study area, enrollment in Clark County grew at one of the fastest rates. Clark County schools saw an increase of nearly 2,000 students between the 2007-2008 and 2012-2013 school years, with growth of 0.51%.

Table 1.1-23 – Enrollment Trends in Project Vicinity

County	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	Avg. Annual Growth
Washington State							
Clark	76,106	76,782	76,720	76,644	77,134	78,054	0.51%
Cowlitz	17,930	17,715	17,382	17,161	17,013	16,931	-1.14%
Skamania	1,213	1,294	1,617	1,538	1,307	1,198	-0.25%
Oregon State							
Clackamas	58,590	58,847	58,394	57,996	57,702	57,870	-0.25%
Columbia	8,639	8,584	8,281	8,241	8,139	7,835	-1.93%
Hood River	3,968	3,973	4,026	3,989	4,076	4,086	0.59%
Marion	60,051	60,268	60,068	60,474	60,324	60,691	0.21%
Multnomah	90,278	89,814	90,080	90,474	91,010	90,405	0.03%
Polk	6,749	6,749	6,710	6,666	6,569	6,514	-0.71%
Washington	83,404	83,699	84,165	85,155	85,471	85,863	0.58%
Yamhill	16,614	16,612	16,763	16,506	16,438	16,444	-0.21%
Study Area	423,542	424,337	424,206	424,844	425,183	425,891	0.11%

Source: Washington Superintendent of Public Instruction[19], Oregon Department of Education[20]

1.2 Impacts

1.2.1 Construction

The Applicant has developed estimates of the manpower needed for the construction of the Vancouver facility. Over the nine month construction period, a total of 250 construction workers will be employed, with a maximum of 125 workers on site per day. The trades represented by these workers will vary over the course of the project, depending on the project phase. The total number of each category of worker is presented in the Table 1.2-1.

[19] *October Federal & State Ethnicity/Race Enrollment Reports by Aggregate Level - County Level,* Washington Superintendent of Public Instruction, October 2013.
[20] *October 1 Enrollment Summary,* Oregon Department of Education, October 2013.

The project is located in a major metropolitan area (i.e. Portland-Vancouver MSA) that is capable of supplying most of the needed construction workforce. As demonstrated in Table 1.2-1, for most of the trades required, peak construction employment will account less than 3.0% of the available local workforce. The exceptions are ironworkers (10.7% of local workforce) and boilermakers (5.9%); a portion of these workers in these trades may need to travel from outside of the Portland-Vancouver region.

Table 1.2-1 – Impact on Local Workforce

Trade	Regional Employment	Project Maximum	% Increase
Mechanical	2,285	50	2.2%
Electricians	4,872	35	0.7%
Operating Engineers	1,689	25	1.5%
Laborers	5,637	53	0.9%
Ironworkers	300	32	10.7%
Carpenters	5,306	20	0.4%
Concrete	876	15	1.7%
Boilermakers	339	20	5.9%
Total	21,304	250	1.2%

Source: Washington Employment Security Department[21], Tesoro Savage Petroleum Terminal LLC

Over the nine months of the project the direct employment is projected to be 250 workers, with a maximum of 125 on site per day. For this analysis it is assumed that these workers earn the prevailing wage for Clark County. The total capital cost of the project is estimated to be $110 million, of which an estimated $10 million will be supplies purchased from out of state.

The estimated direct labor income associated with the project is estimated to $20.6 million. Labor income includes both employee compensation (wages, benefits, and taxes) and proprietor's income. While the annual wage in the study area averages $45,700 across all sectors (see Table 1.1-15), the construction jobs associated with the project are likely to generate direct income (including wages and all benefits) that is substantially higher than the study area average wage.

Total economic impacts were estimated using the IMPLAN input-output model. Including both indirect and induced benefits, the construction project is projected to support a total of 677 jobs in Washington, with associated total income of $43.6 million.

Table 1.2-2 – Economic Impact of Construction

Trade	Jobs	Labor Income
Direct	250	$20.6
Indirect & Induced	427	$23.0
Total	677	$43.6

Source: Tesoro Savage Petroleum Terminal LLC, BST Associates using IMPLAN

[21] *2013 Occupational Employment and Wage Estimates*, Washington State Employment Security Department/LMEA, June 2013

1.2.2 Operations

The proposed terminal will directly employ an estimated 120 workers at full operation. In addition, the terminal will generate work for longshore labor, vessel assist crews, ships pilots, and railroad employees. The number of additional workers in Washington State is presented in Table 1.2-3. In addition to the 120 workers estimated to be employed at the terminal, the largest impact is on line-haul rail, where the additional rail traffic is projected to support an additional 151 rail workers in Washington.

The Applicant is expected to bring a small number of management employees from out of the area, but the remaining terminal jobs are anticipated to be filled by the local workforce.

In addition to the terminal workers, the projected direct employment impacts include:

- Longshore workers will be used for mooring each vessel that calls at the terminal.
- Ship pilots are required for vessels entering and leaving the Columbia River.
  - Columbia River Bar Pilots guide ships through the mouth of the Columbia River, between Astoria and the open ocean.
  - Columbia River Pilots guide ships between Astoria and the ports and anchorages upriver as far as Portland and Vancouver.
- Each vessel is expected to use the services of two ship-assist tugboats for arrival and departure at the terminal.
- Railroad crews will operate trains from point of origin to the terminal, with approximately one-third of the rail trip occurring in Washington.

Table 1.2-3 – Direct Employment from Operation at Full Build-Out

Type of Worker	Jobs
Terminal workers	120
Longshore	2
Pilots – Bar	4
Pilots – River	11
Tug ship assist	15
Line-Haul Rail	151
Total	303

Source: BST Associates, Tesoro Savage Petroluem Terminal LLC

The direct labor income associated with the full operation is estimated to be $33.0 million (in 2013 dollars). Labor income includes both employee compensation (wages, benefits, and taxes) and proprietor's income.

Total economic impacts were estimated using the IMPLAN input-output model. Including both indirect and induced benefits, the operation of the terminal is projected to support a total of 890 jobs in Washington, with associated total income of $64.1 million.

As illustrated in Table 1.1-15, the average wage in the study area is $45,700 per year across all sectors, and $44,300 in the transportation and warehousing sector. Including wages and benefits,

the jobs directly associated with operation of the project are likely to generate employee income that is substantially higher than the study area average wage.

Table 1.2-4 – Economic Impact of Full Operation

Trade	Jobs	Labor Income
Direct	303	$33.0
Indirect & Induced	587	$31.1
Total	890	$64.1

Source: Tesoro Savage Petroleum LLC, BST Associates using IMPLAN

1.2.3 Taxes

The project will be subject to a variety of state and local taxes. Taxes on the construction will be assessed on a one-time basis, while taxes on operations will be on-going.

Construction-related taxes evaluated for this analysis include Business and Occupation tax (B & O) and retail sales taxes.

For operations, the annual property tax impact was evaluated.

1.2.3.1 Construction Related Taxes

Businesses in Washington are subject to the B & O tax, which is levied on gross sales.. Construction of the terminal would be subject to the state B & O tax rate of 0.00471. With a construction value of $110 million, the total state B & O tax associated with construction would be $518,100.

In addition to the state B & O tax, a number of cities levy a local B & O tax. However, there is no local B & O tax in the City of Vancouver.

Retail sales tax is assessed against the value of the construction project. In Vancouver total sales tax rate is 8.4%, of which 6.5% goes to the State and 1.9% to local government. The $110 million in construction is projected to generate a total of $9.24 million, of which the State would receive $7.15 million and local government $2.09 million.

In total, construction of the terminal is expected to generate $9.76 million in non-recurring taxes, of which Washington State can be expected to receive $7.67 million and local government $2.09 miillion.

Table 1.2-5 – Summary of Construction Related Tax ($ millions)

Trade	State	Local	Total
Business & Occupation	$0.52	$0.00	$0.52
Retail Sales	$7.15	$2.09	$9.24
Total	$7.67	$2.09	$9.76

Source: BST Associates

1.2.3.2 Operations Related Tax

The project is located on land owned by the Port of Vancouver. Port land is not subject to property taxes, but privately owned improvements located on land leased from the Port are subject to property tax. In this case, all of the equipment associated with the Project would be subject to property taxes.

Based on the taxing millage rate of an adjacent parcel, the property tax rate at the project location is $14.11773 per thousand dollars of assessed value. The distribution of these taxes is presented in the following table. Schools are the primary recipient of property taxes, with $5.609446 going to Vancouver schools and $2.489687 going to the state school fund.

The value of the project is estimated to be $110,000,000. Based on this value, the annual property tax generated is estimated to be $1,552,951 in current (2013) dollars.

Table 1.2-6 – Property Tax

Taxing District	Tax Rate	Estimated Property Tax
Port Vancouver General Adref	0.000449	$49
County General Adref	0.003626	$399
Veterans Asst	0.009925	$1,092
City Vancouver General Adref	0.010346	$1,138
Dev Disability	0.012500	$1,375
Mental Health	0.012500	$1,375
Vanc Library Capital Facilities	0.256084	$28,169
SD37 Vancouver M&O Adref	0.016503	$1,815
Conservation Futures	0.062500	$6,875
Port Vancouver Bonds	0.223412	$24,575
Port Vancouver General	0.211683	$23,285
County General	1.537209	$169,093
SD37 Vancouver Debt Svc	1.851094	$203,620
SD37 Vancouver M&O	3.758351	$413,419
State Schools	2.489687	$273,866
City Vancouver General	3.161863	$347,805
Ft Vancouver Reg Library	0.500000	$55,000
Totals	14.11773	$1,552,951

Source: Clark County Assessor, BST Associates