TABLE OF CONTENTS

PART 4 BUILT ENVIRONMENT 4-1

SECTION 4.1 ENVIRONMENTAL HEALTH 4-3
4.1.1 Noise 4-3
4.1.2 Risk of Fire or Explosion 4-18
4.1.3 Releases or Potential Releases to the Environment Affecting Public Health 4-33
4.1.4 Safety Standards Compliance 4-42
4.1.5 Radiation Levels 4-52
4.1.6 Emergency Plans 4-53
SECTION 4.2 LAND AND SHORELINE USE 4-57
4.2.1 Land Use 4-57
4.2.2 Light and Glare 4-78
4.2.3 Aesthetics 4-80
4.2.4 Recreation 4-107
4.2.5 Historic and Cultural Preservation 4-112
4.2.6 Agricultural Crops/Animals 4-125
SECTION 4.3 TRANSPORTATION 4-127
4.3.1 Existing Conditions 4-127
4.3.2 Proposed Transportation Project Elements 4-134
4.3.3 Impacts 4-137
4.3.4 Movement/Circulation of People and Goods 4-146
4.3.5 Mitigation 4-147
SECTION 4.4 SOCIOECONOMIC IMPACT 4-151
4.4.1 Existing Conditions 4-151
4.4.2 Impacts 4-183
4.4.3 Taxes 4-188
4.4.4 Mitigation 4-192

LIST OF TABLES

Table 4.1-1. Common Sound Levels/Sources and Subjective Human Responses 4-4
Table 4.1-2. Washington Maximum Permissible Sound Levels (dBA) 4-6
Table 4.1-3. Range of Measured Sound Levels in Project Vicinity (dBA) 4-7
Table 4.1-4. Typical Construction Equipment Noise 4-10
Table 4.1-5. Summary of Major Facility Noise Sources 4-11
Table 4.1-6. Modeled A-Weighted Model-Calculated Hourly Facility Sound Levels (Hourly Leq, dBA) 4-13
Table 4.1-7. Equipment Octave Band Sound Levels 4-15
Table 4.1-8. Modeled C-Weighted Sound Levels[1] 4-17
Table 4.1-9. NFPA 704 Table 6.2 Degrees of Flammability Hazards 4-22
Table 4.2-1. Status of WVFA Project Elements 4-58
Table 4.2-2. Clark County and Vancouver UGA Land Uses 4-68
Table 4.2-3. Development Standards (VMC Table 20.440.040-1) 4-76

Table 4.2-4. Viewpoints, Sensitive Viewers, Existing Visual Quality 4-84
Table 4.2-5. Estimated Heights of Components 4-93
Table 4.2-6. Summary of Visual Impacts from Representative Viewpoints 4-106
Table 4.2-7. Public Park and Recreation Facilities in the Immediate Vicinity of Project 4-107
Table 4.2-8. Previously Recorded Cultural Resource Studies 4-115
Table 4.3-1. Existing Transportation Facilities and Roadway Designations 4-130
Table 4.3-2. LOS Criteria 4-131
Table 4.3-3. Existing Intersection Traffic Conditions Summary 4-132
Table 4.3-4. Build-Out Year 2020 Baseline Traffic Conditions Summary 4-137
Table 4.3-5. Forecast Year 2025 Baseline Traffic Conditions Summary 4-137
Table 4.3-6. Estimated Trip Generation 4-138
Table 4.3-7. Build-Out Year 2020 Total Traffic Conditions Summary 4-138
Table 4.3-8. Forecast Year 2025 Total Traffic Conditions Summary 4-139
Table 4.3-9. Concurrency Corridor Weekday PM Peak Hour Trip Assignment 4-139
Table 4.3-10. 2000-2012 Summary of Vessel Calls at the Port of Vancouver 4-143
Table 4.3-11. Full Facility Construction Traffic Conditions Summary (Scenario 1) 4-145
Table 4.4-1. Total Population and Forecast Growth by County in Project Vicinity 4-152
Table 4.4-2. Total Population by County and City in Study Area 4-152
Table 4.4-3. Population Age Distribution in Project Vicinity 4-156
Table 4.4-4. Race Composition by County and City in Study Area 4-157
Table 4.4-5. Income and Poverty by City and County 4-161
Table 4.4-6. Poverty Rates (%) in Study Area – All Ages 4-164
Table 4.4-7. Housing Units and Vacancy by County in Study Area 4-164
Table 4.4-8. Housing Values by County in Study Area 4-165
Table 4.4-9. Housing Characteristics by City in Clark County 4-166
Table 4.4-10. Gross Rent by County 4-167
Table 4.4-11. Employment by County in Study Area 4-169
Table 4.4-12. Labor Force by County in Study Area 4-170
Table 4.4-13. Unemployment by County in Project Vicinity 4-171
Table 4.4-14. Unemployment Rate by County in Project Vicinity 4-172
Table 4.4-15. Employment by Sector in 2011 4-174
Table 4.4-16. Average Annual Payroll per Worker by Sector in 2011 4-175
Table 4.4-17. Estimated Employment and Compensation from Operations 4-176
Table 4.4-18. Employment Trends and Forecast in Southwest Washington 4-177
Table 4.4-19. Major Employers in County 4-178
Table 4.4-20. Distribution of Port of Vancouver Direct Jobs by Place of Residence 4-179
Table 4.4-21. Hotel/Motel Rooms in Portland Market 4-179
Table 4.4-22. Hotel/Motel Occupancy & Revenue in Portland Market 4-180
Table 4.4-23. Breakdown of Taxing District Millage Rate 4-181
Table 4.4-24. Fire Departments in Clark County 4-182
Table 4.4-25. Ambulance Service Providers in Project Vicinity 4-182
Table 4.4-26. Enrollment Trends in Project Vicinity 4-183
Table 4.4-27. Economic Impacts of Construction on Study Area 4-184
Table 4.4-28. Direct Employment from Operation at Startup and Full Build-Out Capacity 4-186

Table 4.4-29. Economic Impacts in Study Area from Operations 4-187
Table 4.4-30. Construction and Operation Taxes ($ millions) 4-189
Table 4.4-31. Property Tax 4-190
Table 4.4-32. Estimated Cost of Additional Clark County Services 4-191

LIST OF FIGURES

Figure 4.1-1. Background Noise Measurement Location and Receptors (Revised)..... 4-9
Figure 4.1-2. Noise Model Receptor Locations (New)..... 4-16
Figure 4.1-3. Ecology Consent Decree (Revised) 4-35
Figure 4.2-1. WVFA Rail Construction Project Elements (Revised)..... 4-61
Figure 4.2-2. BHP Billiton Proposed Site (Revised) 4-64
Figure 4.2-3. City of Vancouver Zoning in Site Vicinity (Revised) 4-66
Figure 4.2-4. General Comprehensive Land Use Designations (Revised) 4-69
Figure 4.2-5. Comprehensive Plan (Revised) 4-70
Figure 4.2-6. Historical Aerial Photo..... 4-85
Figure 4.2-7. Current Aerial Photo (New) 4-86
Figure 4.2-8. Bird's Eye Photo Simulation (Revised) 4-87
Figure 4.2-9. Viewpoints and Vicinity (Revised)..... 4-88
Figure 4.2-10. Viewpoint 1 4-89
Figure 4.2-11. Viewpoint 2 4-90
Figure 4.2-12. Viewpoint 3 4-91
Figure 4.2-13. Viewpoint 4 4-92
Figure 4.2-14. Viewpoint 1 Existing..... 4-94
Figure 4.2-15. Viewpoint 1 Simulation 4-95
Figure 4.2-16. Viewpoint 2a Existing..... 4-98
Figure 4.2-17. Viewpoint 2a Simulation..... 4-99
Figure 4.2-18. Viewpoint 2b Existing..... 4-100
Figure 4.2-19. Viewpoint 2b Simulation 4-101
Figure 4.2-20. Viewpoint 3 Existing..... 4-102
Figure 4.2-21. Viewpoint 3 Simulation 4-103
Figure 4.2-22. Viewpoint 4 Existing..... 4-104
Figure 4.2-23. Viewpoint 4 Simulation 4-105
Figure 4.2-24. Recreational Facilities (Revised) 4-110
Figure 4.2-25. Historical Shoreline Configuration (Revised)..... 4-123
Figure 4.2-26. Previous Cultural Resource Studies (Revised) 4-124
Figure 4.3-1. Existing Roadway Transportation System (Revised) 4-129

~~Tesoro Savage~~
Vancouver Energy ~~Distribution~~ Terminal

PART 4 BUILT ENVIRONMENT

Section 4.1 – Environmental Health

WAC 463-60-352
Built environment – Environmental health.

(1) Noise. The application shall (a) describe and quantify the background noise environment that would be affected by the energy facility; (b) identify and quantify the impact of noise emissions resulting from construction and operation; (c) identify local, state, and federal environmental noise impact guidelines; (d) describe the mitigation measures to be implemented to satisfy WAC 463-62-030; and (e) describe the means the applicant proposes to employ to assure continued compliance with WAC 463-62-030.

(2) Risk of fire or explosion. The application shall describe any potential for fire or explosion during construction, operation, standby or nonuse, dismantling, or restoration of the facility and what measures will be made to mitigate any risk of fire or explosion.

(3) Releases or potential releases to the environment affecting public health, such as toxic or hazardous materials. The application shall describe any potential for release of toxic or hazardous materials to the environment and shall identify plans for complying with the federal Resource Conservation and Recovery Act and the state Dangerous waste regulations (Chapter 173-303 WAC). The application shall describe the treatment or disposition of all solid or semisolid construction and operation wastes including spent fuel, ash, sludge, and bottoms, and show compliance with applicable state and local solid waste regulations.

(4) Safety standards compliance. The application shall identify all federal, state, and local health and safety standards which would normally be applicable to the construction and operation of a project of this nature and shall describe methods of compliance therewith.

(5) Radiation levels. For facilities which propose to release any radioactive materials, the application shall set forth information relating to radioactivity. Such information shall include background radiation levels of appropriate receptor media pertinent to the site. The application shall also describe the proposed radioactive waste treatment process, the anticipated release of radionuclides, their expected distribution and retention in the environment, the pathways which may become sources of radiation exposure, and projected resulting radiation doses to human populations. Other sources of radiation which may be associated with the project shall be described in all applications.

(6) Emergency plans. The application shall describe emergency plans which will be required to assure the public safety and environmental protection on and off the site in the event of a natural disaster or other major incident relating to or affecting the project as well as identifying the specific responsibilities that will be assumed by the applicant.

Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-352, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-352, filed 11/6/92, effective 12/7/92.)

Section 4.1 Environmental Health

4.1.1 Noise

EFSEC rules mandate that the energy facilities it permits must comply with the Washington noise standards and also must assess the potential for impacts from low frequency noise. Washington noise standards identify overall A-weighted sound level limits but do not directly address low frequency noise or potential increases over existing ambient sound levels. Therefore, other noise impact guidelines used in the noise impact analysis include published guidelines regarding low frequency noise.

The noise impact analysis determined that sound levels emitted from the Facility will comply with Washington A-weighted noise limits. In the assessment of impacts from low frequency noise, predicted C-weighted sound levels are within the published ranged of guidelines suggested to protect against low frequency vibrations and rattles.

4.1.1.1 Affected Environment

Introduction to Noise Terminology

The human ear responds to a very wide range of sound intensities. The decibel scale (dB) used to describe sound is a logarithmic rating system which accounts for the large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dB. Therefore, a 70-dB sound level will sound about twice as loud as a 60-dB sound level. People generally cannot detect differences of 1 dB. In ideal laboratory situations, differences of 2 or 3 dB can be detected by people, but such a change probably would not be noticed in a typical outdoor environment. A 5-dB change would probably be clearly perceived by most people under normal listening conditions.

As mentioned above, the decibel scale used to describe noise is logarithmic. On this scale, a doubling of sound-generating activity (i.e., a doubling of the sound energy) causes a 3-dB increase in average sound produced by that source, not a doubling of the loudness of the sound (which requires a 10-dB increase). For example, if traffic along a road is causing a 60-dB sound level at a nearby location, a doubling of the number of vehicles on this same road would cause the sound level at this same location to increase to 63 dB. Such an increase might not be discernible in a complex acoustical environment.

When addressing the effects of noise on people, it is necessary to consider the frequency response of the human ear, or those frequencies that people hear best. Sound measuring instruments are therefore often designed to “weight” sounds based on the way people hear. The frequency weighting most often used to evaluate environmental noise is A weighting because it best reflects how humans perceive sound. Measurements from instruments using this system are reported in “A-weighted decibels,” or dBA. Unless specified otherwise, noise levels are reported in A-weighted decibels.

Low frequency noise is characterized by noise levels at frequencies less than about 100 hertz (Hz). Noise at those frequencies can be annoying to some people even at relatively low levels. Some jurisdictions assess low frequency noise by limiting unweighted sound levels in the octave bands below 100 Hz, typically in the 31.5 and 63 Hz bands. Other jurisdictions assess low frequency noise by an alternative frequency weighting system, C-weighting, which does not

reduce the level of low frequency noise as much as the A-weighting system and is better at describing loud, low frequency sounds. Although low frequency sound is less audible to humans, C-weighting is often used to assess potential annoyance from structural rattling due to low frequency noise. Measurements from instruments using this system are reported in "C weighted decibels" or dBC.

Distance from the source, the frequency of the sound, the absorbency of the intervening ground, obstructions, and duration of the noise-producing event all affect the transmission and perception of noise. The degree of the effect on perception also depends on who is listening (individual physiological and psychological factors) and on existing sound levels (background noise). Typical noise levels of familiar noise sources and activities are presented in Table 4.1-1.

Table 4.1-1~~4.1-1~~. Common Sound Levels/Sources and Subjective Human Responses

Noise Source at a Given Distance	Sound Level (dBA)	Typical Noise Environments	Subjective Impression
Civil defense siren (100 feet)	130		Pain threshold
Jet takeoff (200 feet)	120	Rock music concert	
Loud rock music	110		
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)		Boiler room	
Freight cars (50 feet)	90	Printing press plant	
Freeway (100 feet)	80	Noisy restaurant	
Busy traffic, hair dryer	70		Moderately loud
Vacuum cleaner (10 feet)	60	Data processing center Private business office	
Light traffic (100 feet)	50		
Large transformer (200 feet)	40		Quiet
Soft whisper (5 feet)	30	Quiet bedroom Recording studio	
	20		
Normal breathing	10		
	0		Hearing threshold

Source: Beranek (1988)

~~Thresholds/Noise Sources~~	~~Noise Level (dBA)~~	~~Subjective Evaluations~~	~~Possible Effects on Humans~~
~~Human Threshold of Pain~~ ~~Carrier jet takeoff (50 ft)~~	~~140~~	~~Deafening~~	~~Continuous exposure to levels above 70 can cause hearing loss in~~
~~Siren (100 ft)~~ ~~Loud rock band~~	~~130~~		
~~Jet takeoff (200 ft)~~ ~~Auto horn (3 ft)~~	~~120~~		

~~Chain saw~~ ~~Noisy snowmobile~~	~~110~~		~~majority of population~~
~~Lawn mower (3 ft)~~ ~~Noisy motorcycle (50 feet)~~	~~100~~	~~Very Loud~~	
~~Heavy truck (50 feet)~~	~~90~~		
~~Pneumatic drill (50 feet)~~ ~~Busy urban street, daytime~~	~~80~~		
~~Normal automobile at 50 mph~~ ~~Vacuum cleaner (3 ft)~~	~~70~~	~~Loud~~	
~~Large air conditioning unit (20 feet)~~ ~~Conversation (3 feet)~~	~~60~~	~~Moderate~~	~~Speech Interference~~
~~Quiet residential area~~ ~~Light auto traffic (100 ft)~~	~~50~~		~~Sleep Interference~~
~~Library~~ ~~Quiet home~~	~~40~~	~~Faint~~	
~~Soft whisper~~	~~30~~		
~~Slight rustling of leaves~~	~~20~~		
~~Broadcasting Studio~~	~~10~~	~~Very Faint~~	
~~Threshold of Human Hearing~~	~~0~~		

~~Source: EPA 1974~~

~~Note that both the subjective evaluations and the physiological responses are continuous without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the noise receivers.~~

Environmental noise is usually described in terms of certain "metrics" that allow comparison of sound levels at different locations or in different time periods. Federal regulatory agencies often use the equivalent sound level (L_{eq}) or the day-night sound level (L_{dn}) to characterize sound levels and to evaluate noise impacts. The L_{eq} is the level that if held constant over the same period of time would have the same sound energy as the actual, fluctuating sound. As such, the L_{eq} can be considered an energy-average sound level. Because the L_{eq} considers sound levels over time, this metric accounts for the number and levels of noise events during an interval (e.g., 1 hour), as well as the cumulative duration of these events. The L_{dn} is like a 24-hour L_{eq}, except that the calculation of the L_{dn} adds 10 dBA to the sound levels between 10 p.m. and 7 a.m. to account for possible sleep disturbance. The L_{dn} is used to describe the noise environment in areas where there are both nighttime and daytime uses, such as residences.

Noise Standards

This evaluation includes noise criteria established by EFSEC, the State of Washington, and the City of Vancouver (City).

EFSEC – Energy facilities seeking permits from EFSEC are subject to Section 463-60-352 of the Washington Administrative Code (WAC) (WAC 463-60-352). The code states that applications should:

- Describe and quantify the background noise environment that would be affected by the energy facility
- Identify and quantify the impact of noise emissions resulting from construction and operation of the energy facility, using appropriate state-of-the-art modeling techniques, and including impacts resulting from low frequency noise
- Identify local, state, and federal environmental noise impact guidelines

- Describe the mitigation measures to be implemented to satisfy WAC 463-62-030
- Describe the means the Applicant proposes to employ to assure continued compliance with WAC 463-62-030

WAC 463-62-030 states that energy facilities shall meet the noise standards established in Chapter 70.107 RCW, the Noise Control Act of 1974 as implemented in the requirements in 173-60 WAC. These requirements are described below.

Washington State Standards – EFSEC rules mandate that the Applicant comply with the noise standards established in WAC 173-60, which establishes the maximum noise levels permissible in identified environments pursuant to Chapter 70.107 of the RCW. The state noise limits are based on the environmental designation for noise abatement (EDNA) of the noise source and the receiving properties. EDNAs are designated by class; Class A generally corresponds to residential areas or areas where people sleep, Class B EDNAs to retail and commercial areas, and Class C EDNAs to industrial and agricultural areas. The class of a property is typically determined by its predominant land use. The noise limits for each land use classification are presented in Table 4.1-2.

Table 4.1-~~24.1-2~~. Washington Maximum Permissible Sound Levels (dBA)

EDNA of Noise Source	EDNA of Receiving Property		
	Class A[1] (Residential)	Class B (Commercial)	Class C (Industrial)
Class A	55/45	57	60
Class B	57/47	60	65
Class C	60/50	65	70

[1]Sound limits shall be reduced by 10 dBA between the hours of 10 p.m. and 7 a.m. at Class A EDNAs
Source: WAC Chapter 173-60

The noise limits presented in Table 4.1-2 can be exceeded for certain periods of time: 5 dBA for no more than 15 minutes in any hour, 10 dBA for no more than 5 minutes of any hour, or 15 dBA for no more than 1.5 minutes of any hour. Sometimes these exceptions are described in terms of the percentage of time a certain level is exceeded. For example, L25 represents a statistical sound level that is exceeded 25 percent of the time, or 15 minutes in an hour. Similarly, L8.33 and L2.5 are the sound levels that are exceeded 8.33 and 2.5 percent of the time, or 5 and 1.5 minutes in an hour, respectively. At no time can the allowable sound level be exceeded by more than 15 dBA, represented by the Lmax.

The Facility would be considered a Class C noise source. In practice, a Class C noise source may not generate a sound level (L_{25}) exceeding 70 dBA at nearby Class C EDNAs (i.e., industrial properties) during daytime and nighttime hours. At the nearest Class A EDNAs, noise generated by the Facility will be limited to 60 dBA during daytime hours (7 AM to 10 PM) and 50 dBA during nighttime hours. Because the proposed Facility could operate 24 hours per day, it must be designed to meet the 50 dBA nighttime limit at any Class A EDNAs.

WAC 173-60-050 identifies several sources of noise that are exempt from the noise limits displayed in Table 4.1-2. These include the following:

- Traffic on public roads
- Sounds from surface carriers engaged in interstate commerce by railroad
- Sounds from temporary construction activities between 7 AM and 10 PM

Because "sounds from surface carriers engaged in interstate commerce by railroad" are identified as exempt from the WAC noise limits, the noise analysis assumes that noise from the train is exempt from the noise limits until delivery of the train to the unloading area.

City of Vancouver Noise Standards – Chapter 20.935 of the Vancouver Municipal Code (VMC 20.935) identifies performance standards for proposed land uses and development activities, including standards for noise. Section 20.935.030(A) applies the noise limits and exemptions established by WAC 173-60, as identified in the previous section. In addition to the WAC noise limits and exemptions, the City restricts construction activities, including construction staging, to between 7 AM and 8 PM, 7 days a week.

Federal Noise Standards – There are no federal regulations that establish noise limits on the sound emanating from the proposed Facility as it affects surrounding properties.

Existing Sound Levels

The existing noise environment in the project vicinity was previously characterized by sound level measurements (SLMs) taken on nearby parcels for another project. These sound levels were taken with Type I sound level meters over a week-long period from March 25-31, 2011. The measured sound levels are summarized in Table 4.1-3 and the locations are briefly described below and displayed in Figure 4.1-1.

- *SLM1* – Sound level measurements were taken in the Fruit Valley residential area northeast of the proposed Facility. Contributing noise sources included local and distant traffic, trains, and occasional aircraft. The measured levels are typical for many urban residential areas.
- *SLM2* – Sound level measurements were taken on the western boundary of the Jail Work Center (JWC). The lowest measured sound levels are not unexpected since the adjacent industrial sites were unoccupied during the measurement period, but the levels are lower than would be expected for a busy industrial area.
- *SLM3* – Sound level measurements were captured on the property boundary of the Tidewater office building site, on the west side of Terminal 5 site. The measured levels are representative of fairly remote locations, far from continuous noise sources, with occasional events due to train passbys or activities. The low measured sound levels are not unexpected since the adjacent industrial site is currently unoccupied, but the levels are lower than would be expected for a busy industrial area, except during those hours with nearby train activity.

Table 4.1-~~34.1-3~~. Range of Measured Sound Levels in Project Vicinity (dBA)

SLM Location	Daytime Leqs	Nighttime Leqs	Ldn
SLM1 – Fruit Valley Residential Area	52-64	46-63	61
SLM2 – Jail Work Center	51-63	47-59	62
SLM3 – West Side of T5	50-73	42-57	60

Source: Wilson Ihrig & Associates, 2011.

4.1.1.2 Environmental Noise Impacts

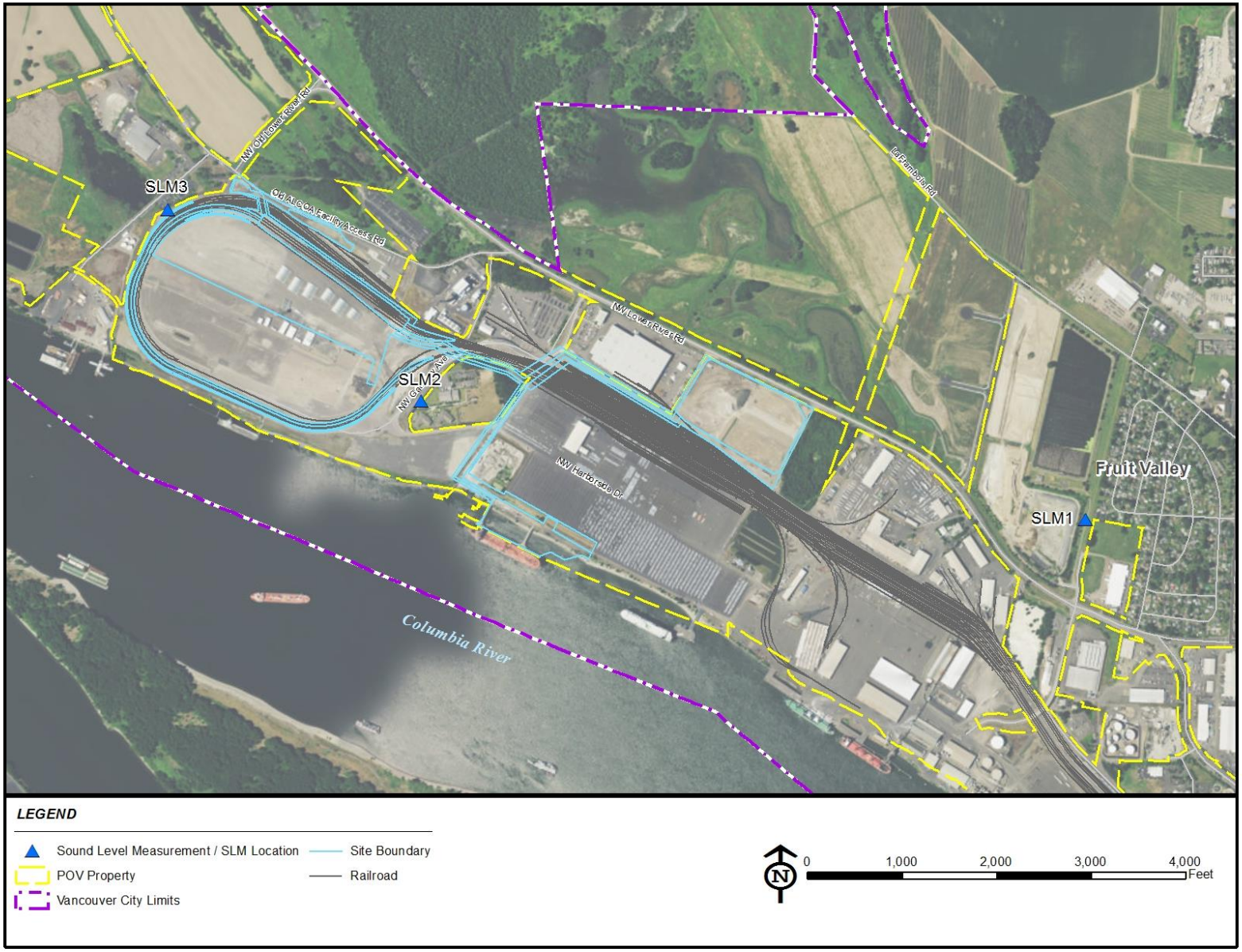
Construction

During the construction phase of the project, noise from construction activities could add to the noise environment in the immediate vicinity of the site. For the purposes of this analysis,

construction activities are separated into “typical” construction activities and impact pile-driving activities.

“Typical” Construction Activities

The noise sensitive use that will be nearest to most construction activities associated with the proposed Facility is the eastern housing unit of the JWC. This facility, which includes dormitories, is just over 400 feet from the proposed pipeline from the storage tank area to the ship loading dock. The nearest residences are approximately 3,000 feet from the proposed tank holding area. The Tidewater office building is just over 100 feet from the nearest proposed rail line associated with the Facility. Although not specifically characterized as a sensitive receiver, tenants of the Tidewater office building could be affected by noise from the proposed project and are included in this analysis. Typical sound levels associated with construction activities at these distances are displayed in Table 4.1-4.



BergerABAM

Figure 4.1-1. Background Noise Measurement Location and Receptors (Revised)

Table 4.1-~~44.1-~~4. Typical Construction Equipment Noise

Activity	Range of Hourly L_{eqs} (dBA)		
	At 100 Feet	At 400 Feet	At 3,000 Feet
Clearing	77	65	47
Grading	70-82	58-70	40-52
Paving	67-82	55-70	37-52
Erecting	67-78	55-66	37-48
Types of Equipment	**Range of Noise Levels (dBA)**		
	At 100 Feet	**At 400 Feet**	**At 3,000 Feet**
Bulldozer	71-90	59-78	41-60
Dump Truck	76-88	64-76	46-58
Scraper	7487	62-75	44-57
Paver	80-82	68-70	50-52
Generator	65-76	53-64	35-46
Compressor	68-75	56-63	38-45

Source: EPA, 1971

As shown in Table 4.1-4, the estimated construction-related hourly L_{eqs} at the nearest residences (more than 3,000 feet away) are below the noise level limit of 60 dBA that would apply to long-term operational noise. The calculated construction sound levels at the housing units of the JWC (the nearest sensitive receivers to the site at approximately 400 feet from the nearest construction area) would be higher than the existing range of measured hourly L_{eqs} shown in Table 4.1-3, but the elevated levels would be temporary and would occur only during daytime hours. Noise emissions at locations farther removed from the Facility construction activities will be even lower than the estimated hourly L_{eqs} presented in Table 4.1-4 due to natural attenuation.

Per WAC 463-62-030, EFSEC requires that energy facilities meet the noise standards established in 173-60 WAC. WAC 173-60-050 exempts construction noise from any limits on noise levels between 7 AM and 10 PM but places no additional constraints on construction activities. Section 20.935.030(4) of the Vancouver Municipal Code restricts outdoor construction activity to between 7 AM and 8 PM, seven days a week. Although the VMC standard is superseded by the State standard for an EFSEC-permitted facility, the Applicant will, to the greatest extent feasible, schedule noisy construction activities to the hours identified in VMC 20.935.030(4). If outdoor construction is required beyond the hours of 7 AM to 8 PM, the Applicant will consult with the City of Vancouver, will notify EFSEC in advance, and will not conduct the work until EFSEC has reviewed and approved the planned activities.

Restriction of construction to daytime hours, the temporary nature of construction noise, the distances between the residential uses and most of the construction areas, and the presence of existing noise at nearby sensitive receivers would serve to minimize potential noise impacts from construction activities.

Impact Pile-Driving Activities

The proposed project is expected to require at least some impact pile driving during construction of upland dock structures, foundations of the rail unloading structure, and potentially at various locations along the pipeline. The nearest portions of these elements of the project are

approximately 450 feet from the nearest occupied structures of the JWC and over 3,000 feet from the nearest residences east and west of the site.

Previous sound level measurement data of impact pile driving activities indicate that the hourly average sound level (L_{eq}) of pile driving is approximately 86 dBA at a distance of 100 feet. Using this sound level information and the CadnaA noise model described later in this section, impact pile driving sound levels were estimated at the JWC and the nearest residences to the site.

Assuming impact pile driving were to occur at the portion of the pipeline that will be nearest the occupied structures of the JWC, the model-calculated hourly L_{eq} is 70 dBA. Although a level of 70 dBA may be considered intrusive to occupants or employees of the JWC, this level is not atypical of sound levels in industrial areas similar to where the JWC is located. Furthermore, the pile driving activities at this location would be short-lived and restricted to daytime hours, which would reduce the potential for impacts.

At the residences east and west of the site, model-calculated impact pile driving L_{eq}s range from 41 to 49 dBA from the pile driving activities nearest the residences. These levels are lower than the existing L_{eq}s at these residences. However, even with fairly low levels of pile driving noise, the unique nature of pile driving impact noise could result in the sounds being audible at and within the residences nearest this activity. This noise could be perceived by some people as intrusive and possibly annoying, but the low overall levels would minimize the potential for impacts.

Operation

Noise Sources – The Facility will generate noise from a number of sources associated with petroleum product rail unloading, storage, ship loading, and transport. Some of these sources are relatively quiet, and these quieter sources would not be audible when the louder equipment is operating. Therefore, this evaluation focused on the loudest noise sources associated with the Facility, including pumps, compressors, blowers, and the Marine Vapor Combustion Unit (MVCU). Equipment that will be located inside buildings (i.e., the boilers and the rail unloading pumps) is not expected to substantially contribute to the overall Facility noise and was not included in the analysis (see Table 4.1-5).

Table 4.1-~~6~~ 5 summarizes the A-weighted sound pressure levels associated with the dominant noise sources examined in this assessment. The Sound Power Level (SWL) and octave band data are provided in Table 4.1-7.

Table 4.1-5~~4.1-5~~. Summary of Major Facility Noise Sources

Source	Data Source	No. of Units	Approximate Sound Pressure Level at 100 ft (dBA)
Rail Unloading (Area 200)			
Compressor	1	1	40
Transformer	2	3	54
Storage (Area 300)			
Pumps	~~3~~2	~~1~~5	~~64~~66
Transformer	2	1	54

Source	Data Source	No. of Units	Approximate Sound Pressure Level at 100 ft (dBA)
Marine Terminal (Area 400)			
Marine Vapor Combustion Unit			
MVCU Blower	1	8	49
MVCU Exhaust Stack	1	8	36
Vapor Blower Staging Unit Blowers	2	2	60
Train Sources			
Locomotives (10 mph)	~~4~~3	3	54 (Hourly Leq)
Rail Cars (10 mph)	~~4~~3	~~7000 feet~~100-120 cars per train	52 (Hourly Leq)
Idling Locomotives	~~5~~4	3	65
Switch Engine	2	1[a]	66
Locomotive Horn	3	1	81 (Hourly Leq)

Sources:

(1) Based on vendor-provided equipment sound levels

(2) Based on equipment sound levels from previous ENVIRON noise analyses

~~(3) Based on a measured sound level of similar petroleum product off-loading pumps~~

(~~4~~3)CadnaA v4.1. DataKustik GmbH. FRA/FTA module.

(~~5~~4)Assessment of Railway Activity and Train Noise Exposure: A Teaneck, New Jersey, Case Study. Craig B. Anderson. October 2009

Note: Please note that engineering and equipment selection has not been finalized and that the above equipment sound levels are speculative. They are used in this analysis to represent a reasonable estimate of overall future sound levels from the proposed Facility.

[a] Although two switch engines may be on the site, only one switch engine will operate in the northern area of the site at any one time.

CadnaA Noise Model – Noise anticipated to be generated by operation of the Facility was evaluated at nearby receivers using the CadnaA noise model. CadnaA is a computer program that calculates sound levels after considering the noise reductions or enhancements caused by distance, topography, ground surfaces (including water), atmospheric absorption, and meteorological conditions in compliance with ISO-9613-2:1996. The modeling includes the following steps: (1) characterizing the noise sources, (2) creating three-dimensional (3-D) maps of the site and vicinity to enable the model to evaluate effects of distance and topography on noise attenuation, and (3) assigning the equipment sound levels to appropriate locations on the site. CadnaA then constructs topographic cross sections to calculate sound levels in the vicinity of a project site.

In addition to using the ISO 9613 procedures in CadnaA for on-site equipment, ENVIRON used the Federal Railroad Administration (FRA)/Federal Transit Administration (FTA) module available in CadnaA for modeling noise due to moving trains. This module computes train noise using the source levels and methods outlined by the FRA. The trains were specified to consist of three locomotives and be approximately 7,80~~0~~0 feet in length. The train was specified to travel 10 mph while on the site, although it is expected that trains would generally travel slower than 10 mph, and the resulting rail-related noise would be lower than modeled.

For the modeling effort, ENVIRON used numerous modeling "receptor" locations representing the off-site uses nearest the project site. The modeling receptors considered in the noise modeling are depicted in Figure 4.1-~~1~~2 and described in more detail below.

- R1 – The southwest corner of the ~~Jail Work Center~~ JWC representing the western housing unit, which is nearest the rail line. The housing units of the ~~Work Center~~ JWC are considered Class A EDNAs when applying the WAC noise limits.
- R2 – The southeast corner of the ~~Jail Work Center~~ JWC representing the eastern housing unit, which is nearest the pipeline and marine terminal. The housing unit is considered a Class A EDNA.
- R3 – The Tidewater Office Building near the northwest corner of the site. The office building is considered a Class B receiving property (e.g., commercial).
- R4 – The CPU River Road generating facility north of the site. This is a Class C (Industrial) receiving property.
- R5 – The nearest residential structure northwest of the site, a Class A receiving property.
- R6 and R7 – Residences in the Fruit Valley residential community northeast of the site, both considered Class A receiving properties.
- R8 – The nearest residence to the rail line in the southeast portion of the Port, near the intersection of West 20th Street and Thompson Avenue. It is a Class A receiving property.
- R9 – The Subaru facility parking area, adjacent to the MVCU. This is a Class C (Industrial) receiving property.

Predicted A-weighted Sound Levels at Nearby Receiving Properties – Modeled-calculated A-weighted sound levels with the equipment above are presented in Table 4.1-6. The modeled levels include locomotives idling during train unloading, a single train movement during the unloading process, and noise from a switch engine, but do not include noise from off-site trains arriving or departing (i.e., while trains are exempt from WAC noise limits).

As Table 4.1-6 shows, the model-calculated sound levels comply with the most restrictive nighttime noise limits at all off-site receivers nearest the Facility. Furthermore, the modeled sound levels at the nearest residences to the site are well below even the nighttime noise limit. Operation-related noise levels at locations further removed from the Facility will be even lower than the estimated hourly L_{eqs} presented in Table 4.1-6 due to natural attenuation.

Table 4.1-6~~4.1-6~~. Modeled A-~~Weighted~~Weighted Model-Calculated Hourly Facility Sound Levels (Hourly L_{eq}, dBA)

~~Receptor~~	~~Without Train Arrival[1]~~	~~With Train Arrival~~	~~EDNA~~	~~WAC Noise Limit[1, 2, 3]~~
~~R1 – SW Jail Work Center~~	~~45~~	~~50~~	~~Class A~~	~~60/50~~
~~R2 – SE Jail Work Center~~	~~38~~	~~46~~	~~Class A~~	~~60/50~~
~~R3 – Tidewater~~	~~52~~	~~54~~	~~Class B~~	~~65~~
~~R4 – CPU~~	~~61~~	~~62~~	~~Class C~~	~~70~~
~~R5 – NW Residence~~	~~27~~	~~33~~	~~Class A~~	~~60/50~~
~~R6 – Fruit Valley Residence~~	~~26~~	~~44~~	~~Class A~~	~~60/50~~
~~R7 – Fruit Valley Residence~~	~~25~~	~~47~~	~~Class A~~	~~60/50~~

~~[1] The noise limits do not apply to off-site rail noise or on-site train delivery noise because surface carriers engaged in interstate commerce by railroad are exempt from the WAC noise limits (WAC 173-60-050). However, the "Without Train Arrival" scenario does include idling locomotives during train unloading and a switch engine, which are not exempt from the noise limits.~~

~~[2] The noise limits for Class A receivers (e.g., residences and housing facilities) are displayed as Day/Night where Day refers to the hours between 7 AM and 10 PM and Night refers to the hours between 10 PM and 7 AM. Because the Facility could operate 24-hours a day, the more restrictive nighttime noise limit would apply.~~

~~[3] The WAC noise limit shown in the table uses the hourly L25 noise descriptor. The primary noise sources from the site would emit fairly continuous noise, and the modeled hourly Leq would essentially be the same as the hourly L25. Because it is not a continuous noise source, the modeled hourly Leq of railroad-related noise may differ from the hourly L25. However, railroad noise is exempt from the WAC noise limits, so comparisons of the "With Train" scenario sound levels to the WAC noise limits are unnecessary.~~

Receptor	Project Level [a]	EDNA	WAC Noise Limit [b, c]	Comply?
R1 – SW Jail Work Center	45	Class A	50	Y
R2 – SE Jail Work Center	38	Class A	50	Y
R3 – Tidewater	52	Class B	65	Y
R4 – CPU	61	Class C	70	Y
R5 – NW Residence	27	Class A	50	Y
R6 – Fruit Valley Residence	26	Class A	50	Y
R7 – Fruit Valley Residence	25	Class A	50	Y
R8 – SE Residence	23	Class A	50	Y
R9 – Subaru Parking Area	70	Class C	70	Y

[a] The model-calculated sound levels are hourly Leqs. Although the actual noise limits are based on the hourly L25s, the on-site noise sources were assumed to operate continuously over an hour period, so the hourly Leq and L25 would be expected to be very similar. Therefore, the Leq can be used to estimate the potential L25 from on-site sources.

[b] The noise limits do not apply to off-site rail noise or on-site train delivery noise because surface carriers engaged in interstate commerce by railroad are exempt from the WAC noise limits (WAC 173-60-050).

[c] The limit shown for Class A EDNAs is for nighttime hours (i.e., 10:00 p.m. to 7:00 a.m.). The daytime noise limit at Class A EDNAs is 10 dBA higher. However, because peak hourly operations could occur anytime day or night, the more limiting 50 dBA was used for considering potential compliance.

Table 4.1-7~~4.1-7~~. Equipment Octave Band Sound Levels

Equipment	Sound Power Levels (Octave Bands (Hz))									Total Sound Power Level		
	31.5	63	125	250	500	1000	2000	4000	8000	Linear	A-Wght	C-Wght
Rail Unloading (Area 200)												
Compressor	72	72	71	69	69	71	75	74	70	81	80	81
Transformer	95	95	95	97	95	87	80	73	66	103	95	102
Locomotive	117	121	109	101	102	97	96	96	97	123	105	122
Switch Engine	125	116	110	104	108	99	91	81	71	125	106	123
Storage (Area 300)												
Pumps	51	65	81	89	95	100	100	96	83	104	105	104
Transformer	95	95	95	97	95	87	80	73	66	103	95	102
Marine Terminal (Area 400)												
MVCU	96	95	94	96	85	81	74	70	68	101	90	101
MVCU stack	91	93	82	72	72	71	74	71	66	95	79	94
Vapor Blower Staging Unit Blowers	106	106	105	106	96	91	84	80	79	112	100	111

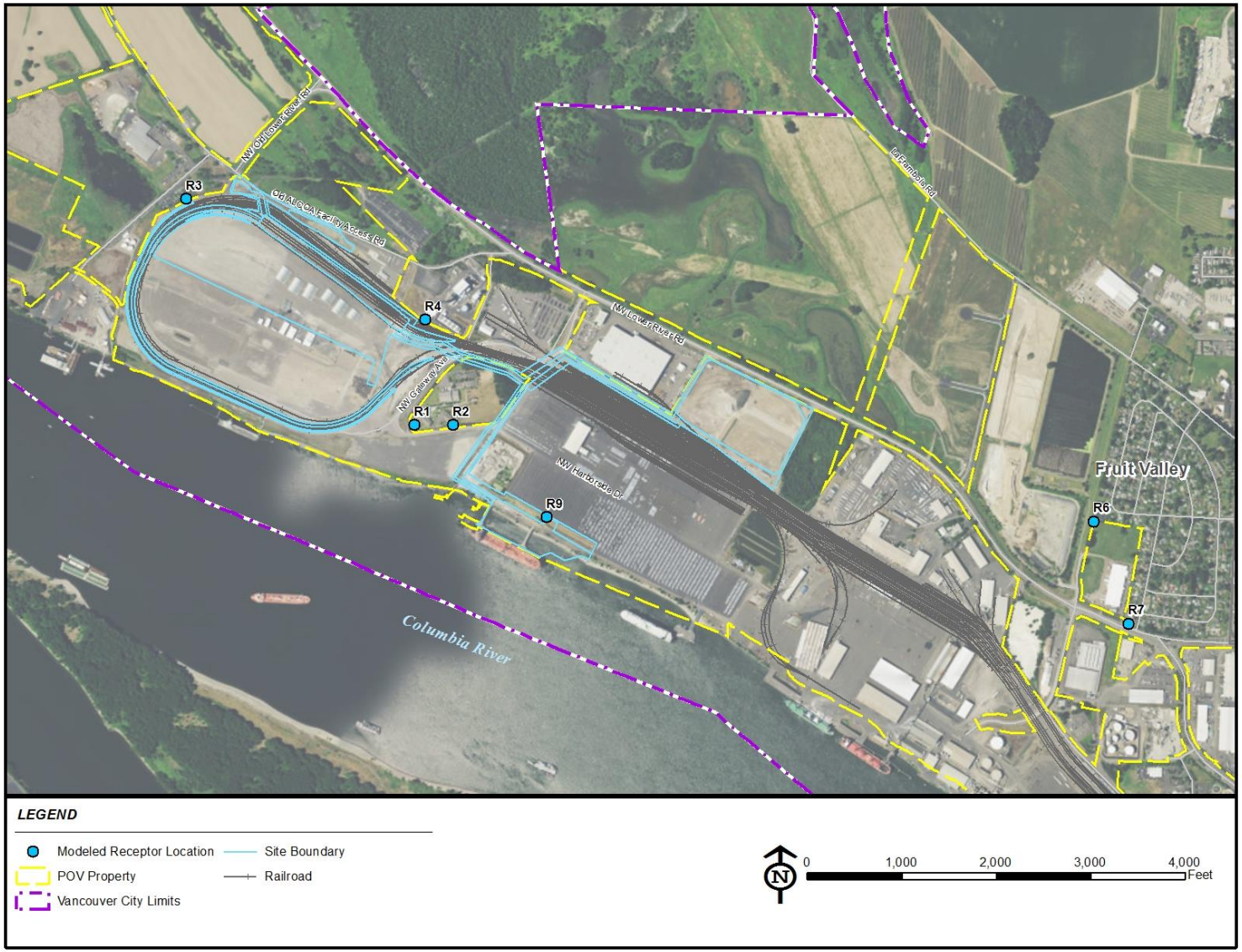


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Figure 4.1-2. Noise Model Receptor Locations (New)

As shown the modeled sound levels would comply with the most restrictive nighttime noise limits at all off-site receivers nearest the Facility. Furthermore, the modeled sound levels at the nearest residences to the site are well below even the nighttime noise limit.

Predicted C-weighted Sound Levels at Nearby Receiving Properties – Energy facilities seeking permits from EFSEC are required to identify potential low frequency noise impacts in their permit applications (WAC 463-60-352). Washington does not apply specific regulatory limits on low frequency noise nor provide any basis for assessing impacts from such noise. Therefore, to provide a means for considering potential noise impacts from low frequency noise, several sources were reviewed to identify appropriate guidelines for characterizing the potential effects of low frequency noise. ANSI Standard B133.8 Gas Turbine Installation Sound Emissions indicates that a 75 to 80 C-weighted decibels or dBC (C-weighting as defined in this section) sound level should be used as an upper limit to prevent structural vibrations and rattling. Several other documents and studies have indicated that 70 dBC is a more appropriate minimum threshold to prevent rattles and vibrations from low frequency noise (Colorado Oil and Gas Conservation Commission 2013; Hessler Associates, Inc. 2006; and Hodgdon, K. et al. 2007).

The Facility is still in preliminary design, and final equipment has yet to be determined. Therefore, accurate estimates of low frequency noise associated with the major on-site equipment are not yet available. However, frequency data of similar sources were used to estimate potential low frequency sound levels and overall C-weighted sound levels in order to assess the potential impacts from low frequency noise. The primary source of low frequency noise is anticipated to be the on-site switch engine and idling locomotives, when present.

The predicted C-weighted sound levels using our presumed frequency data are presented in Table 4.1-8.

Table 4.1-8~~4.1-8~~. Modeled C-Weighted Sound Levels[1]

Receptor	Modeled Level	Guideline/Limit
R1 – SW Jail Work Center	63	70-80
R2 – SE Jail Work Center	58	70-80
R3 – Tidewater	54	70-80
R4 – CPU	75	70-80
R5 – NW Residence	45	70-80
R6 – Fruit Valley Residence	44	70-80
R7 - Fruit Valley Residence	44	70-80

[1] The modeled C-weighted sound levels do not include train noise. The FRA noise prediction method used by CadnaA does not include frequency data for the train sources.

As seen in Table 4.1-8, the estimated C-weighted sound levels at most locations are much lower than 70 dBC from the Facility, which would protect against undue impacts from low frequency noise. At the CPU River Road generating plant, the estimated C-weighted level of 75 dBC is above 70 dBC but falls below the limit of 80 dBC identified in the ANSI standard as protective against structural vibrations and rattling. Because this location represents an industrial use with no sensitive receivers, the likelihood of impact from low frequency noise is minimal.

4.1.1.3 Mitigation Measures

Construction

Construction will occur only during daytime hours to reduce the potential for noise impacts from this activity. Construction noise is exempt from the Washington noise limits during daytime hours.

The Applicant will, to the greatest extent feasible, schedule noisy construction activities to the hours identified in VMC 20.935.030(4), i.e., between 7 AM and 8 PM. If outdoor construction is required outside of these hours, the Applicant will consult with the City, will notify EFSEC in advance, and will not conduct the work until EFSEC has reviewed and approved the planned activities.

The Applicant will also conduct noise monitoring in accordance with the construction wildlife monitoring plan (Appendix H.4).

Operation

The model-calculated sound levels indicate that the Facility would comply with the WAC noise limits at all nearby receiving properties. Therefore, no noise mitigation is proposed. However, in association with the final design of the Facility, the procurement process for equipment contributing to noise emissions will take into consideration the estimates used in the analyses presented above so as to ensure the overall noise emissions from the Facility do not exceed Washington State noise thresholds.

4.1.2 Risk of Fire or Explosion

This section addresses ~~for~~ the risk of fire or explosion during the construction, operation, standby and/or nonuse, dismantling and/or restoration of the Facility and what measures will be implemented to mitigate risk of fire or explosion.

4.1.2.1 Construction

The risk of fire or explosion during the construction of the Facility is generally related to the storage and use of flammable materials, including petroleum products such as vehicle fuel, solvents, cleaners, and welding gases. The proposed Facility is located in a developed industrial zone; the majority of the areas proposed for the project are devoid of vegetation thereby limiting the potential for fire propagation due to combustible vegetation. During the first phases of construction, patches of existing vegetation where project facilities are proposed will be graded and the vegetation removed, thereby reducing fire risk. With proper storage of these materials on site and proper material handling and work practices, the risk of fire during construction is very low.

The Applicant will conduct construction activities and provide firefighting and response equipment in compliance with WAC 296-155 Part D, National Fire Protection Association

(NFPA) 241 (Standard for Safeguarding Construction, Alteration, and Demolition Operations) and NFPA 5000 (Building Construction and Safety Code).

As discussed in section 4.1.4 below, Washington State chose to run its own workplace safety and health program, under the Washington Industrial Safety and Health Act (WISHA). WISHA safety standards are as stringent as or more stringent than applicable federal Occupational Health and Safety Administration (OSHA) codified in 29 Code of Federal Regulations (CFR) 1926; WISHA standards are implemented through WAC 296.

Although the risk for construction fires to spread beyond the construction boundary is possible, the nature of the construction materials primarily used at the site (e.g., metals, soils, aggregates, versus lumber) would minimize the potential for a fire to extend beyond the construction area, especially if fire control and response is quickly coordinated in accordance with a pre-established fire protection plan. The Applicant will consult with the Port, City fire officials, and other emergency responders to ensure their response is coordinated with the Applicant's provisions for construction site fire control, existing firefighting facilities, and capabilities at the site (i.e., fire hydrants). Fire prevention and control will include, but not be limited to:

- Ensuring that appropriate firefighting equipment (i.e., extinguishers) is staged in the construction areas, either in fixed locations or on mobile construction vehicles as appropriate.
- Ensuring that highly flammable materials are identified, stored, and handled in accordance with applicable fire prevention and safety regulations.
- Managing combustible wastes to prevent fires.
- Implementing appropriate work procedures so that fires are prevented (e.g., hot work and welding).
- Limiting smoking to approved areas.
- Providing fire safety training to all construction personnel, including the identification of ignitions sources, the initiation of fire alarms, the use of established egress routes and locations, worker gathering locations, and procedures for notification of emergency responders.
- Providing first responders with maps that identify primary and secondary site access locations in the event of a fire.

A preliminary construction fire prevention plan, part of the Construction Safety and Health Manual (Appendix D.2, Section 19, Fire Protection), has been submitted to EFSEC for review and approval. The Applicant will develop a construction emergency response plan, modelled on the operations emergency response plan presented in the Operations Facility Safety Program (Appendix D.3, Section 3.1, Emergency Response Plan). Final versions of the plans will be prepared and submitted to EFSEC prior to the beginning of construction.

These plans will establish the minimum requirements for the construction contractor and its subcontractors for developing and implementing their plans to address the prevention of and protection from fire hazards and emergency response procedures to ensure compliance with WISHA WAC 296-155-260 and NFPA requirements.

~~The construction management lead will develop and implement a construction fire prevention and response plan addressing the procedures for fire prevention and response. The fire prevention plan will be a component of the Facility construction site safety plan and will address:~~

- ~~A list of the major construction workplace fire hazards and their proper handling and storage procedures, potential ignition sources (such as welding, smoking, and others) and their control procedures, and the type of fire protection equipment or systems that can control a fire involving them;~~
- ~~Names or regular job titles of those construction site personnel responsible for maintenance of equipment and systems installed to prevent or control construction related ignitions or fires; and~~
- ~~Names or regular job titles of those personnel responsible for control of fuel source hazards at the construction site.~~

~~The construction fire prevention and response plan will be submitted to EFSEC for review and approval prior to the beginning of construction activities.~~The following provides a summary of the main elements of the preliminary construction fire prevention plan presented in Appendix D.3.

(a) Section 19.3 of the plan establishes responsibilities for establishing the plan, verifying compliance with the plan's procedures, monitoring activities associated with the plan, and documenting and reporting incidents, investigations, reports, and corrective actions relative to the plan.

(b) Section 19.4 of the plan establishes general requirements, including the responsibility for:

1. Establishing and maintaining a list of locations for which the Contractor has fire protection equipment and the type of equipment.
2. Having available engineering drawings or up-to-date descriptions of each fire protection system under the Contractor's control.
3. Developing procedures and schedules for implementing fire equipment inspection and testing requirements.
4. Promptly identifying and reporting fires, fire protection impairments, and instituting interim precautions, such as a fire watch, during the impairment, if conditions warrant.
5. Conducting and reporting investigations.

(c) Section 19.5 of the plan describes plan implementation activities, including:

1. Preparing a pre-fire plan for each the Contractor's activities at the Facility Construction site, and submitting the plan to the Safety Health Environmental & Quality (SHEQ) Manager.
2. Locating portable fire extinguishers will be located throughout facilities in accordance with NFPA requirements and WAC 296-155-260.
3. Conducting and documenting monthly fire prevention inspections, and tracking implementation of corrective actions.
4. Installing special extinguishing systems, if needed, only with advance approval by Vancouver Energy, and using, inspecting, maintaining such systems in accordance with manufacturers, OSHA and NFPA requirements.
5. When applicable, providing a means of controlling liquid run-off from a credible fire so that contaminated or polluted liquids will not escape the site, and documenting such control measures in the pre-fire plan.

6. Preparing a fire prevention plan in consideration of the requirements of WAC 296-155-265, and providing this plan to the SHE&Q Manager.
7. Maintaining a fire prevention program to address the following areas:
   - Ignition hazards
   - Temporary buildings
   - Open yard and indoor storage
   - Housekeeping
   - Electrical components
   - Flammable liquids use
8. Identifying operations that require special emphasis, and providing safety inspections and walkthroughs to ensure compliance with applicable requirements.
9. Providing life safety provisions and an adequate means of safe exit for all facilities in accordance with NFPA 101, Life Safety Code.
10. Providing special fire protection requirements such as adequate fire lanes, measures for work areas with the potential for accumulation of flammable vapors, and control of flammable and combustible materials.
11. Adequate fire lanes will be maintained to permit fire department access to buildings or equipment.
12. Providing training.
13. Establishing exceptions for welding, cutting, or heating is being conducted in fabrication/maintenance shop areas designated for that purpose.

4.1.2.2 Operations

Flammability Characteristics of Crude Oil

As noted in the introduction in section 2.10, the Applicant proposes to handle light, medium, and heavy crude oils with an American Petroleum Institute (API) gravity ranging from ~~10~~ 15 to 45 degrees.

Across and within this spectrum, crude oils contain a variable mixture of relatively lighter ~~and~~ to relatively heavier~~y~~ hydrocarbons. Crude oil is a heterogeneous mixture of hydrocarbons, including solids, liquids, and gases. The composition of crude oil varies depending on the source, extraction methods, and at-well processing. Most crude oils are more than 95 percent hydrocarbons, with small amounts of water, nitrogen, oxygen, varying amounts of sulfur, and traces of other elements. After completing at-well or infield processing, it is common for many crude oils to be near 99 to essentially 100 percent hydrocarbons.

~~Light crude oils contain a higher proportion of lower molecular weight ("light") hydrocarbons, resulting in an overall higher vapor pressure, i.e., they vaporize more easily at ambient temperature and pressure. Heavier crude oils contain a smaller proportion of light hydrocarbons, resulting in lower vapor pressures – i.e., they vaporize less easily at ambient temperature and pressure. As described below, the vapor pressure of crude oils is an important factor in their flammability.~~

NFPA standard 704 (NFPA 704), *Standard System for the Identification of the Hazards of Materials for Emergency Response*, establishes a standard system for evaluating the flammability rating of materials. NFPA 704 establishes five Degrees of Flammability Hazards, ranging from Degree of Hazard "0" – materials that will not burn under normal conditions, to Degree of Hazard "4" - materials that will burn readily under normal conditions. Table 4.1-9 presents the specific definition of the NFPA 704 Degrees of Flammability Hazards.

Table 4.1-9~~4.1-9~~. NFPA 704 Table 6.2 Degrees of Flammability Hazards

Degree of Hazard	Definition
0	Materials that will not burn under typical fire conditions and are not reactive with water, including intrinsically noncombustible materials such as concrete, stone, and sand.
1	Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur. Materials in this degree also include finely divided suspended solids that do not require heating before ignition can occur. Materials, which in themselves are normally stable, even under fire exposure conditions and which are not reactive with water.
2	Materials that must be moderately heated or exposed to relatively high ambient temperature before ignition can occur. Under normal conditions, these materials would not form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating they could release vapor in sufficient quantities to produce hazardous atmospheres with air. Materials in this degree also include finely divided suspended solids that do not require heating before ignition can occur. Materials that readily undergo violent chemical change at elevated temperatures and pressures or which react violently with water or which may form explosive mixtures with water.
3	Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions. Materials that in themselves are capable of detonation or explosive decomposition or reaction but require a strong initiating source or which must be heated under confinement before initiation or which react explosively with water.
4	Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or are readily dispersed in air and burn readily. Materials that in themselves are readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.

The Degree of Hazard is based on a material's "boiling point" and "flashpoint." The boiling point is the temperature at which a liquid begins to vaporize. For the purposes of NFPA 704, the boiling point is the temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure. The flashpoint of a material is the minimum temperature at which a liquid or a solid emits vapor sufficient to form an ignitable mixture with air near the surface of the liquid or solid. The NFPA adopts standard test measures for determining boiling points and flashpoints. Generally speaking, materials with a high flashpoint will only emit ignitable vapors at higher temperatures. Materials with low flashpoints will emit ignitable vapors at lower temperatures.

Based on this standard Degree of Hazard, crude oils fall into NFPA 704 degrees 3 and 4. Heavier crude oils are more likely to fall into degrees 2 and 3 and will require the application of heat to produce ignitable vapors. Lighter crude oils are more likely to fall into degrees 3 and 4 and can be ignited at most ambient temperatures. Regardless of the degree, the presence of three conditions is necessary to cause a material to ignite: (1) the presence of combustible components (the fuel); (2) the presence of an oxidizing chemical in the correct proportions to the combustible components (e.g., air), and (3) the presence of an ignition source. Without all three of these components, a material will not burn. For example, in order for a hydrocarbon/air mixture to ignite, the hydrocarbon-to-air ratio has to be 1 to 6 percent (for example, 1 percent fuel and 99 percent air). This ratio varies depending on the specific hydrocarbons that are present. Avoiding the generation of vapors, minimizing exposure to oxygen, and avoiding sources of ignition allows safe handling of crude oil under typical industrial conditions. However, should these conditions not be avoided, ignition of the vapors emitted by crude oil can cause a fire, whereby the vapors are combusted; however, in the absence of the presence of these ignitable vapors, liquid crude oil will not ignite even in the presence of air, under ambient pressures and temperatures.

Other organizations have identified additional parameters that may influence the flammability of any specific crude oil. The U.S. Department of Energy conducted a literature review of crude oil properties relevant to handling and fire safety of crude oil in transportation (Sandia National Laboratories 2015). The report states:

> *"There is no single parameter that defines the degree of flammability of a fuel, rather several parameters are relevant. They include:*
>
> - ***Flashpoint:*** *Temperature that results in a vapor concentration in air corresponding to the lower flammability limit. When this temperature is reached there will be a flash of flame without sustained burning. The fire point is the temperature at which sustained burning occurs and is higher than the flashpoint.*
> - ***Flammability limits:*** *Range of vapor concentration in the air that will support combustion. These are termed lower flammability limit (LFL) and upper flammability limit (UFL).*
> - ***Auto-ignition temperature:*** *Minimum temperature at which a fuel-air mixture ignites.*
> - ***Minimum ignition energy:*** *Minimum energy required to ignite a flammable fuel-air mixture.*
> - ***Burning velocity:*** *Velocity at which a fuel-air mixture issuing from a burner burns back to the burner.*
>
> *A fuel with a lower flashpoint, wider range of flammability limits, lower auto-ignition temperature, lower minimum ignition energy, and higher maximum burning velocity is considered more flammable. From a fuel classification and regulation standpoint, the main parameter considered relevant is the flashpoint. For operational handling, the above parameters are useful".*

Among a very large and much wider number of physical and chemical properties, as noted above, crude oils are in part also characterized by vapor pressure or volatility. Reid vapor pressure (measured by ASTM Method D 323, historically, and now more commonly by ASTM

Method D 6377) is the absolute vapor pressure exerted by a liquid at 100°F, and is used in order to quantitatively characterize vapor pressure when comparing crude oils to each other. The higher the Reid vapor pressure, the more volatile the oil and the more readily it vaporizes. Light crude oils typically contain a relatively higher proportion of lower molecular weight ("light") hydrocarbons, often resulting in an overall higher vapor pressure, i.e., they vaporize more easily at ambient temperature and pressure. Heavier crude oils typically contain a relatively smaller proportion of light hydrocarbons, usually resulting in lower vapor pressures – i.e., they vaporize less easily at ambient temperature and pressure.

Current governmental and industry focus has not been on reducing vapor pressure. More detailed technical study work suggests that the probability of igniting a fire is only slightly reduced by lowering vapor pressure. Notwithstanding such potential reduction in vapor pressure, for example, Bakken crude would still be in the same Guide 128 for Flammable Liquid in the Emergency Response Guide (ERG) and called "highly flammable" in the ERG, and would still be a Hazard Class 3 Flammable Liquid per US DOT transportation regulations and likely still be Packing Group I or borderline Packing Groups I/II.

~~As noted above, the vapors emitted from crude oils can ignite when mixed with air in the appropriate proportions, and when an ignition source is present.~~

Crude oil as a Hazard Class 3 Flammable Liquid does not present all the same hazards as a Hazard Class 1 Explosive or a Hazard Class 2 (Division 2.1) Flammable Gas. The description of potential explosion from crude oil, set forth in Guide 128 of the ERG (PHMSA 2016), differs significantly from the protocols for potential explosions from Explosives in Guides 112 and 114 and Flammable Gas in Guide 115. While it is possible that vapor from crude oil may form explosive mixtures with air, this situation is relatively unlikely, and if it were to occur, all the crude oil itself does not explode. This limits the hazards of potential vapor-air mixture explosion (as compared to Explosives or Flammable Gases), unless there are exceptional conditions or circumstances.

~~"Flashbacks" andbtwo " and "boilovers" are twoextreme, but very rare under typical handling conditions, types of events related to vapor ignition that can be erroneously construed as explosions. Flashbacks and boilovers can occur during the inappropriate handling of many types of materials that can produce ignitable or expandable vapors, not just crude oils. Boilovers are caused by an entirely different set of circumstances. Threekey elements must be present for boilover to occur in its severest form: an open top tank fire (due to ignited hydrocarbon vapors on the surface of the crude oil); a water layer in the tank (present from water being sprayed into the surface of oil to abate the ignited vapors), and the development of a high temperature, relatively dense hot zone in the stored product – usually the surface layer of crude oil under the ignited vapors that has been heated to a very hot temperature. When the hot zone of product falls through the fuel and hits the water base at the bottom of, or elsewhere in the tank, the water boils, turns to steam and pushes up through the fuel above. The result is an eruption of tank contents that can boil over the tank walls, and spread beyond the tank. As described further below, the Facility will be carefully designed to avoid the potential for both flashbacks and boilovers.~~

Although crude oil does not generally have the characteristics of a reactive or explosive material, one of its components, hydrogen sulfide (H_2S), when emitted in extreme or very large enough concentrations, can explode. Hydrogen sulfide is a highly flammable, explosive gas. The explosive range of hydrogen sulfide in air is 4.5 to 45.5 percent. This range is substantially very

much higher than the personal exposure limit ~~(PEL)~~ (see section 4.1.4) and would be a very remote possibility due to the crude oil properties and facility operations (even prior to any controls discussed below). The amount of H_2S that exists or could develop in the crude oil transported to the Facility would be nowhere near the level required to qualify as a UN1053 Hydrogen Sulfide shipment or a UN3494 Petroleum Sour Crude Oil, Flammable, Toxic shipment[1]. Proper facility design and operating practices would prevent H_2S exposure on site and off site as described in section 4.1.4.4 below.

Potential for Fire and Explosions at the Facility

Fire and explosion hazards at the Facility may result from the presence of combustible gases and liquids and ignition sources during rail unloading and vessel loading activities, releases of flammable liquids and gases, and maintenance activities involving combustible or ignitable materials or equipment that is handling or has handled such materials. Possible ignition sources include sparks associated with the buildup of static electricity, lightning, and open flames. Static electricity may be generated by crude oil moving in contact with other materials, including pipes, transfer pipelines, and storage tanks during crude oil conveyance. Water mist and steam generated during maintenance related tank and equipment cleaning can also become electrically charged, in particular with the presence of chemical cleaning agents. Finally improper hot-work practices, or smoking outside of approved areas could also cause fires.

~~Mechanical explosions result when a sealed or partially sealed container bursts under internal pressure. Under some conditions, crude oil being stored under anomalous conditions could produce vapors, that when constrained to a certain volume under high pressure could cause the failure of the storage system~~.

The Applicant commissioned qualitative and quantitative risk assessments relative to fires and explosions potentially occurring at the Facility (respectively, Flint 2014, and Appendix P.3 to this ASC). The following provides a summary of the types of fire and explosion events that have the potential to occur at the Facility as a result of crude oil handling and storage activities.

As described above, a fire or explosion event may occur in the presence of a release of crude oil exposed to the atmosphere and an ignition source. The type of fire event depends on numerous factors, including but not limited to:

- The rate and size of release
- Whether the crude oil is released under pressure
- The rate of hydrocarbon vaporization resulting in formation of a flammable plume, and plume dispersion
- The presence of a pooled flammable liquid
- If and how the surroundings confine the flammable plume
- Whether ignition of the plume occurs early after the release, or after a delayed period of time

[1] Thus, the H_2S associated with UN1267 Petroleum Crude Oil (or equivalent shipments) received at the Facility is managed as an OSHA workplace health hazard, not as part of transportation hazard classification for either flammability or toxicity.

In combination, the above factors can lead to several types of fire events:

- Pool fires resulting from the presence of a pool of a flammable liquid at atmospheric pressure, ignited soon after the release; pool fires represent the majority type of potential fires based on the activities occurring at the Facility, i.e. handling of pipeline quality crude oil with minimum exposure to the atmosphere and storage at atmospheric pressure.
- Jet fires resulting from early ignition and combustion of pressurized flammable vapors and two phase materials released under pressure into air.
- Flash fires resulting from late ignition of a mixture of air and dispersed flammable substance (i.e., flammable plume), in absence of congestion/confinement.
- Deflagrations resulting when a flammable plume intersects an area of congestion, such as process equipment or vegetation, before igniting, provided that deflagrations inside the storage tanks are highly unlikely.
- Fires can also result in confined spaces (e.g., buildings and control rooms) when a flammable plume is present.

The intrinsic purpose of the Area 600 boilers and MVCUs is to combust fuel to provide heat or to destroy volatile organic compounds (VOCs) exhausted from vessel cargo compartments during loading for safety reasons. As a result, they can be the source of internal explosions from combustion zones or fireboxes present in the equipment. A leak from the natural gas supply line in the Area 600 Boiler Building can also cause a fire or explosion.

As described above, the concentrations of H_2S present in the crude oil are well below the threshold to cause the crude oil to be classified as an explosive material, and explosions resulting from the presence of H_2S in the crude oil are remote. ~~Chemical explosions may occur if H_2S is released in sufficient quantities.~~

Given the non-explosive nature of crude oil, an “explosion” event involving crude oil being handled in the manner as proposed for the Facility, is property defined as a “deflagration”, not a “detonation.” Deflagrations are very rare under the handling conditions at the Facility as they would require a large release to occur, meteorological and climatic conditions such that a large vapor plume is created, and a delayed ignition source. The risk for occurrence of a deflagration is therefore minimized by designing a Facility to avoid unintentional releases of product that can create hydrocarbon vapors, and through the application of fire protection and prevention measures to avoid ignition of such vapors should they be created.

As described in Appendix P.3, the risk to populations resulting from potential fire and explosion events was evaluated based on methodology established by the American Institute of Chemical Engineers (Center for Chemical Process Safety), which is endorsed by the Hazardous Materials Cooperative Research Program sponsored by the Pipeline and Hazardous Materials Safety Administration. The U.S. government does not have applicable standard risk tolerance criteria, so risk was charted against the UK standard risk tolerance criteria (HSE 2001). The study specifically assessed potential explosion incidents, flash fire, and jet or pool fires. The study concluded that the risk to offsite populations is within the range that is typically considered negligible and risk to onsite populations is within the range that is typically considered tolerable, presenting a total risk that is within typical industry risk tolerance criteria.

Fire Prevention and Suppression

Fire prevention actions during operations will be directed towards Facility design to avoid conditions that could lead to a fire, and implementing appropriate practices to safely handle and work in the vicinity of flammable materials.

For all of quality, commercial, regulatory classification, and safety purpose, the Applicant will manage and monitor the properties of crude oil being shipped by rail into the Facility. The Applicant will require all shippers of crude oil trains to the Facility to adhere to ANSI/API Recommended Practice 3000 for the Classifying and Loading of Crude Oil into Rail Tank Cars ("API RP 3000") (Straessle 2014). This recommended practice was developed in 2014 with focused and significant involvement of all parties involved in the crude by rail supply chain, and with the input and support of national regulators from both the United States and Canada. Furthermore, API RP 3000 was favorably referenced by the USDOT/PHMSA in its final crude by rail regulations released on May 1, 2015 (USDOT 2015) and also technically referenced in the oil preconditioning order from Industrial Commission of the State of North Dakota.

Following API RP 3000 ensures that, based on a written sampling and testing program, all crude oil shipped by rail has the proper classification as a Hazard Class 3 Flammable Liquid and the proper associated packing group assignment (including additional labeling or information as relevant and needed for the shipment), along with a proper rail tank car fill (so as not to have overfills) and that loaded railcars are properly inspected and sealed prior to shipment. In addition, The Applicant will effectively verify all shipping terminals' compliance by sampling and testing inbound crude oil and by checking the inbound condition and loading of rail tank cars.

Similar to the requirements of API RP 3000, with all shippers the Applicant will contractually require certain crude oil quality and specifications in order to manage the integrity of the crude oil received at the Facility. These requirements would cover the full range of relevant hazard classification, safety, and commercial needs for the crude oil. The Applicant will require all terminals shipping crude oil trains to the Facility to regularly demonstrate their compliance with the crude oil quality and specifications. In addition, the Applicant will effectively verify all terminals' compliance by sampling and testing received crude oil.

Crude oil quality and specifications will include, but not be limited to:

- Hazard Class 3 Flammable Liquid in Packing Group I, II, or III (or Combustible Liquid) per 49 CFR Part 173 (A Hazard Class 3 Flammable Liquid classification, with UN ID number UN1267 for Petroleum Crude Oil, is based on a number of parameters, such as being within regulatory requirements for Initial Boiling Point, Flash Point, Vapor Pressure, Light Ends Content, H_2S, Corrosivity, etc.)
- API gravity (density)
- Sediment and water content
- Sulphur content
- H_2S content
- Vapor pressure
- No unusual characteristics or content that would make the crude oil not as readily and as typically marketable and handle-able as expected

Fire suppression actions during operations will be directed towards integrating fire suppression systems into the design of the Facility, and developing and implementing a fire response plan.

The Facility will be designed and operated according to federal, state, and local standards for the prevention of fire and explosion hazards, including provisions for distances between tanks in the Facility and between the crude oil-handling facilities and adjacent buildings. Examples of other risk-based management approaches that can be implemented include:

- Implementing safety procedures for unloading of crude oil from rail cars and loading to vessels, including using fail-safe control valves and emergency shutdown equipment.
- Protecting against potential ignition sources and lightning by (1) proper grounding to avoid static electricity buildup and formal procedures for the use and maintenance of grounding connections; (2) using intrinsically safe electrical installations and non-sparking tools; and (3) implementing permit systems and formal procedures for conducting any hot work during maintenance activities, including proper tank cleaning and venting.
- Reducing emissions of VOCs and evaporative losses by:
  - Conducting all unloading, conveyance, storage and loading operations using a closed system, where product is not exposed to the atmosphere; and
  - Using a double seal internal floating roof in each of the crude oil storage tanks to eliminate vapor space.
- Installing pressure, flow and temperature sensors to ensure all storage and conveyance activities are conducted within appropriate parameters, and to quickly identify any abnormal situations that could potentially lead to a fire.
- Designing electrical equipment to WAC 296-24-95711 which addresses the requirements for electric equipment and wiring in locations that are classified depending on the properties of the flammable vapors, liquids or gases, or combustible dusts or fibers that may be present therein and the likelihood that a flammable or combustible concentration or quantity is present.
- Installing a dock safety unit at the loading berth and a MVCU to minimize the risk of explosive conditions being created during the marine vessel loading operations.
- Installing stationary H_2S detectors in relevant locations around the facility to detect H_2S concentrations that could be unsafe to personal health (which is substantially very well below the levels at which flammability is possible).
- Requiring all personnel to wear Lower Explosive Limit (LEL) detectors to detect hydrocarbon concentrations that could lead to ignition conditions; requiring all personnel to wear H_2S detectors to detect H_2S concentrations that could be unsafe to personal health (which is substantially very well below the levels at which flammability is possible).
- Requiring all personnel to wear Lower Explosive Limit (LEL) detectors to detect hydrocarbon concentrations that could lead to ignition conditions; requiring all personnel to wear H_2S detectors to detect H_2S concentrations that could be unsafe.
- Monitoring for fugitive emissions from pipes, valves, seals, tanks, and other components with vapor detection equipment and maintaining and/or replacing components as needed.
- Using environmentally friendly firefighting foam, such as Universal Gold Foam (National Foam, ~~1999~~2015) or Solberg self-healing biodegradable foam.

Fire suppression equipment will be installed to allow control of fires should they occur. Fire suppression equipment and systems will be designed to NFPA and API requirements, the more

stringent Factory Mutual Global insurance requirements, and state and local regulations, and will include automatic and engineered controls. Buildings will be fireproofed and emergency egress will be provided in accordance with applicable fire and building codes. The foam-water sprinkler system will be activated when the linear heat detection signals a fire or when a manual release station has been activated. The linear heat detection cables will be installed at the roof level, connected to the sprinkler piping and at the pump level in the near vicinity of the pump. Manual release stations will be provided at the base of the stairs or ladders and also at grade all egress points out of the structure. Upon either activation, the respective pre-action suppression valve for that zone will be tripped and the closed-head foam water pre-action sprinkler system will be flooded/filled with foam-water solution. Also, the zones on either side of the zone activated will also be flooded/filled with foam-water solution. Upon the operation of a sprinkler, the foam-water solution will begin discharging to control the fire. ~~All fire suppression systems will be designed to activate automatically and will be equipped with manual trip stations.~~

The design of fire suppression systems for specific proposed project elements is discussed below. See Appendix N.1 for additional details on the systems in each area.

Area 200 – Unloading and Office. The rail car unloading area will be served with a closed-head foam-water pre-action sprinkler system installed inside the rail car unloading building at the roof level, under walkways (as required by code) and in the pump basin areas. The structure will be divided in to five zones, each zone will be activated either manually from the foam manual release stations or automatically from the linear heat detection that will be installed at the roof level and at the pump basin level for that associated zone. ~~The rail car unloading area will be served with single interlock pre-action 3 percent foam/water sprinkler systems designed to activate as necessary in five segments of the building.~~ Design density will be 0.30 gallon per minute/4,000 square feet with a hose allowance of 500 gallons per minute. The system will include linear heat detectors, gas detectors, temperature monitors, pump monitors, automatic exterior alarm horns and strobes, manual alarm stations, automatic and manual foam release systems, and tamper-resistant systems. Note that this system is a closed-head foam-water pre-action sprinkler system. Foam-water solution will only be discharged once the fire is large enough to activate the linear heat detection, trip the valve and then activate the sprinklers above the fire. Foam will be used to control and extinguish the crude oil pool fire and will also provide cooling to the rail cars (DOT 117 or better, which include a thermal jacket) and any adjacent equipment or building elements.

Fire hydrants will be located along the south side of the building at 300-foot intervals. All systems will interface with the rail car unloading building control room. The office and support buildings will be equipped with extinguishers.

A closed-head wet-pipe sprinkler system will be provided for the Fire Pump and Foam Building in accordance with NFPA 20, Section 4.12.1.1.2.

The fire foam water system installed in Area 200 (and in Areas 300 and 400 as described below) will utilize foam that is flourosurfactant free. This type of foam does not contain surfactants that persist and bioaccumulate in the environment (Scheffey and Hanauska 2002). The foam system and fire pump systems will be tested and inspected before operations and regularly during operations. The foam will be tested by discharging foam at a test port to a confined area approximately 10’x30’ in size for testing. The foam is discharged until a consistent foam supply is achieved and then stopped. After samples are taken the foam will be collected and disposed of

at an off-site facility. The pumps will be operated weekly to ensure they work properly, but no water or foam will be discharged. The testing requirements will also require discharge of water from the system on a more infrequent basis. On a similar time frame, the foam concentrate will be tested by retrieving a small sample of the concentrate for testing, but no foam or foam solution will be discharged to the land or water during the event.

Area 300 – Storage. The storage tank area will be served by six foam water sprinkler zones, one per storage tank. An automatic fixed foam system will be placed inside each tank to protect the seal area of the internal floating roof. This system will be a pre-action system activated by the linear heat detection system installed at the foam dam of the floating roof or by the manual foam release stations associated with that tank[2]. ~~Each foam water sprinkler zone will be designed to discharge into the inside of the storage tank it protects.~~ The system will include linear heat detectors and warning horns and strobes, as well as manual alarm and foam release stations. A fire water loop will be provided with hydrants and monitors spaced at a maximum of 300 feet and configured so that each tank can be reached by two hose streams. Each tank will be protected by a fixed 3 percent foam/water suppression system on the seal area surface.

In addition, fire hydrants will be located on the dike spaced every 300 feet along with two fire hydrants located inside the dike area near the intersection of the intermediate dikes. Each hydrant will be equipped with a monitor nozzle and foam eductor capable of reaching the neighboring tank of the one in incident.

A monitor nozzle supplied with foam-water from the Fire Pump and Foam Building will be located near the crude oil pump basin with the primary purpose of providing manual fire suppression to the pump basin. A closed-head wet-pipe sprinkler system will be provided for the Fire Pump and Foam Building in accordance with NFPA 20, Section 4.12.1.1.2.

All systems will interface with the tank ~~area~~Area 200 control room. The ~~east boiler~~storage building in Area 300 will be served by adjacent hydrants. Smoke detectors, automatic and manual alarms, and hand held fire extinguishers, will be located as appropriate inside and outside the ~~boiler~~ storage building as required by local fire code. Based on the construction type and occupancy classification, sprinkler systems are not necessary for fire control in the ~~east boiler~~ storage building.

Area 400 – Marine Terminal. There is a manual fire suppression system at the existing dock loading area that will be removed and replaced with a new fire main supply line. A fire pump located in the combination fire pump/foam building shore side will supply the fire main.

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[2] The use of an internal floating roof, a covered tank, and foam application for fire response also minimize the risk of boilover resulting from fire. Boilovers, very rare under typical handling condition, are caused when three key elements are present: an open top tank fire (due to ignited hydrocarbon vapors on the surface of the crude oil); a water layer in the tank (present from water being sprayed into the surface of oil to abate the ignited vapors), and the development of a high temperature, relatively dense hot zone in the stored product – usually the surface layer of crude oil under the ignited vapors that has been heated to a very hot temperature. When the hot zone of product falls through the fuel and hits the water base at the bottom of the tank, the water boils, turns to steam and pushes up through the fuel above. The result is an eruption of tank contents that can boil over the tank walls, and spread beyond the tank.

Two remote-controlled elevated monitor nozzles will be provided on the dock for firefighting purposes. Spacing of the monitor nozzles takes into account the limited space available on the dock. The monitor nozzles will be strategically located, taking into consideration the spacing requirements of NFPA 307, Section 7.2.~~Two elevated fire monitors will be installed at the marine loading dock with hydrants connected to the existing on-site water supply.~~

The monitor nozzles will be supplied from the Fire Pump and Foam Building with foam-water. Activation of the foam-water monitor nozzles will be by manual foam release stations. The controller for the nozzles will be located in the E-house, located shore side. A hydrant will also be connected to the existing water system. This system is primarily for fires on the berth, but can be used to assist in the event of a vessel fire.

The vessels berthing at the Marine Terminal are required to have on-board systems as well as contracts with commercial marine firefighting companies to respond in the event of a shipboard fire (see Appendix B.1). A universal firewater connection will be installed at Berth 13. Vessels moored at the dock will be able to connect to this connection and will thus be able to use the water for fire suppression. This system is redundant with respect to a vessel's capability to use river water for fire suppression.

Area 500 - Transfer Pipelines. The pipeline area will be served by existing and new (as constructed to serve specific Facility areas) hydrants in the vicinity of the pipeline alignment.

Area 600 ~~– West~~ Boiler. The boiler building and area will be served by adjacent hydrants. Smoke detectors, automatic and manual alarms, and hand held fire extinguishers, will be located as appropriate inside and outside the boiler building as required by local fire code. Based on the construction type and occupancy classification sprinkler systems are not necessary for fire control in the Area 600 boiler building.

Rail Infrastructure. The location of rail infrastructure improvements will be served by existing and new (as constructed to serve specific Facility areas) hydrants in the vicinity of the rail loop alignment.

The Applicant will consult with the Port, City fire officials, and public fire and emergency responders to develop an Operations Fire Prevention and Control program coordinated with existing local response capabilities. The Applicant will consult with local responders to identify gaps in existing firefighting equipment, and will provide training opportunities at the nationally recognized Texas A&M Engineering Extension Service Emergency Training Services Institute on a biannual basis. Such training would include crude oil train derailment response, crude oil transshipment response at a marine terminal, industrial rescue, industrial fire suppression, flammable liquids handling and fire suppression, and foam application. Participants would also obtain NFPA 1081 certification.

These measures will be documented in the Operations ~~Site Safety Plan~~Safety Program and the fire protection plan or other plans related to Facility operations as appropriate to the activity being addressed (e.g., the inadvertent release or contingency plans associated with Marine Terminal loading activities, as required to comply with applicable state and federal regulations). ~~The~~ A preliminary ~~fire prevention plan~~fire protection plan (Appendix D.3, Operations Safety Program, 16.0 Fire Protection) ~~will be developed in~~has been developed in compliance with WAC 296-24-567, and ~~will~~ addresses the following requirements:

- The fire prevention plan will be in writing.

- The fire prevention plan will include:
  - A list of the major workplace fire hazards and their proper handling and storage procedures, potential ignition sources (such as welding, smoking and others) and their control procedures, and the type of fire protection equipment or systems which can control a fire involving them;
  - Names or regular job titles of those personnel responsible for maintenance of equipment and systems installed to prevent or control ignitions or fires; and
  - Names or regular job titles of those personnel responsible for control of fuel source hazards.
  - Accumulations of flammable and combustible waste materials and residues will be controlled so that they do not contribute to a fire emergency. The housekeeping procedures will be included in the written fire prevention plan.
- Training will include:
  - Informing employees of the fire hazards of the materials and processes to which they are exposed.
  - Reviewing with each employee upon initial assignment those parts of the fire prevention plan which the employee must know to protect the employee in the event of an emergency.
- Keeping the written plan in the workplace and making it available for employee review.
- Regularly and properly maintaining, according to established procedures, equipment and systems installed on heat producing equipment to prevent accidental ignition of combustible materials. The maintenance procedures will be included in the written fire prevention plan.

Explosion Prevention

~~As noted above, two sources of explosions could potentially occur at the Facility – mechanical explosions due to overpressure conditions, and explosions due to the release of H_2S.~~ In addition to the fire prevention and suppression elements listed above, Facility design and operating procedures will include, but not be limited to, the following explosion prevention elements:

- The storage tanks will be operated at atmospheric pressure, and will be equipped with internal pressure relief devices to vent gases should an overpressure situation arise;
- Internal pressure relieving systems will be incorporated throughout the Facility, including the transfer pipelines, marine terminal loading equipment, and rail cars;
- Installing pressure, flow and temperature sensors to ensure all storage and conveyance activities are conducted within appropriate parameters, and to quickly identify any abnormal situations that could potentially lead to an explosion;
- Including expansion loops in the design of the transfer pipelines to ensure the pipelines can expand and contract to accommodate changes in ambient temperature;
- Implementing spill containment measures, and spill preparedness and planning measures described in section 2.10 above; and
- Equipping the facility with stationary H_2S monitors and personnel with wearable H_2S detectors, which will trigger alarms at personal safety levels substantially very well below the explosive concentrations of emitted H_2S gases ~~emitted~~.

In addition to the Fire Protection Response Plan, a licensed Fire Protection Engineer from the state of Washington will be responsible for the 100 percent design documents, shop drawings, system installation, and final commissioning/acceptance testing of the fire suppression and

detection systems for these facilities. The respective Fire Protection Engineer will work closely with the fire department and local code enforcement agencies to ensure the systems are code compliant and within the limitations of the codes and standards adopted by the local jurisdiction applicable to these facilities.

The gas-fired Area 600 boilers will be designed, installed, and operated in accordance with the applicable provisions of Labor and Industry's Boiler and Unfired Pressure Vessel laws (RCW 70.79) and rules (WAC 296-104).

4.1.2.3 Stand-by and Non-use

The Applicant anticipates that the Facility will operate continuously. However should there be a period during which the Facility is not operating at full capacity and some portion of the Facility is not in use, the Applicant will ensure that the temporarily shut down equipment is maintained in a fashion to prevent conditions that could result in a fire, consistent with the measures described above. Regardless, all fire detection and suppression systems would continue to be operated and maintained as though the entire Facility was in operation.

4.1.2.4 Dismantling and Restoration

Decommissioning of the Facility is discussed in section 2.3.9. The Applicant anticipates that fire and explosion prevention measures similar to those implemented during construction will be implemented during decommissioning and site restoration. Prior to beginning decommissioning the Applicant will submit a detailed facility decommissioning plan, and such plan will address fire and explosion prevention measures.

4.1.3 Releases or Potential Releases to the Environment Affecting Public Health

This section addresses the treatment or disposition of all solid or semisolid construction and operation wastes including spent fuel, ash, sludge, and bottoms, and show compliance with applicable state and local solid waste and how these wastes will be handled in compliance with applicable state and local regulations. The Facility is being proposed at a location where industrial and solid wastes from the construction and operation of a former aluminum smelter were stored in waste piles and consolidated in landfills on site over the years; an overview of the restrictive covenants in place at this location is therefore also provided. Spill prevention and control are addressed in section 2.10.

4.1.3.1 Site History

Terminal 5 is the former location of the Alcoa/Evergreen Aluminum smelter, which operated until 2000. Industrial and solid wastes from the construction and operation of the aluminum smelter were stored in waste piles and consolidated in landfills onsite over the years. Hazardous contaminants in these wastes include petroleum hydrocarbons, polychlorinated biphenyls (PCBs), cyanide, fluoride, trichloroethylene (TCE), low-level organic chemicals, and metals. Prior to the Port's purchase of the properties in 2009, Alcoa and Evergreen completed site remediation and facility decommissioning under Consent Decree No. 09-2-00247-2 and Enforcement Order 4931 with Ecology. Efforts included removing structures and foundations to a depth of approximately 4 feet and the site soil and sediment with concentrations of chemicals of concern above the cleanup levels established by the consent decree.

~~Five~~ Six locations within the boundary of the proposed Facility are subject to the Ecology consent decree and the environmental restrictive covenants discussed below. Figure 4.1-3~~2~~ illustrates the location of the portions of Terminal 5 where restrictive covenants are in place. Portions of the Facility, including the rail unloading building and additional rail lines, may be located in these areas.

Consent Decree No. 09-2-00247-2

Consent Decree No. 09-2-00247-2 for the Alcoa Inc. site was entered into on January 30, 2009, and an amended Consent Decree on July 2011. It included the areas of the site that are listed below.

- **Vanexco/Rod Mill Site –** The 1995 consent decree (95-2-03268-4) for the Vanexco/Rod Mill building called for the building foundation (floor slabs) and building roof to serve as a cap to address PCB contamination beneath the building. Ecology approved an amendment in the 2009 consent decree (superseding the 1995 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 site is located in Area 200 and is the location of the administrative and support buildings and the rail unloading building that are 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 covering it with either a polyvinyl chloride (PVC) or high-density polyethylene (HDPE) membrane or a 2-foot-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 apply to the site.
- Consent decree 09-2-00247-2 (discussed in additional detail below) 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.

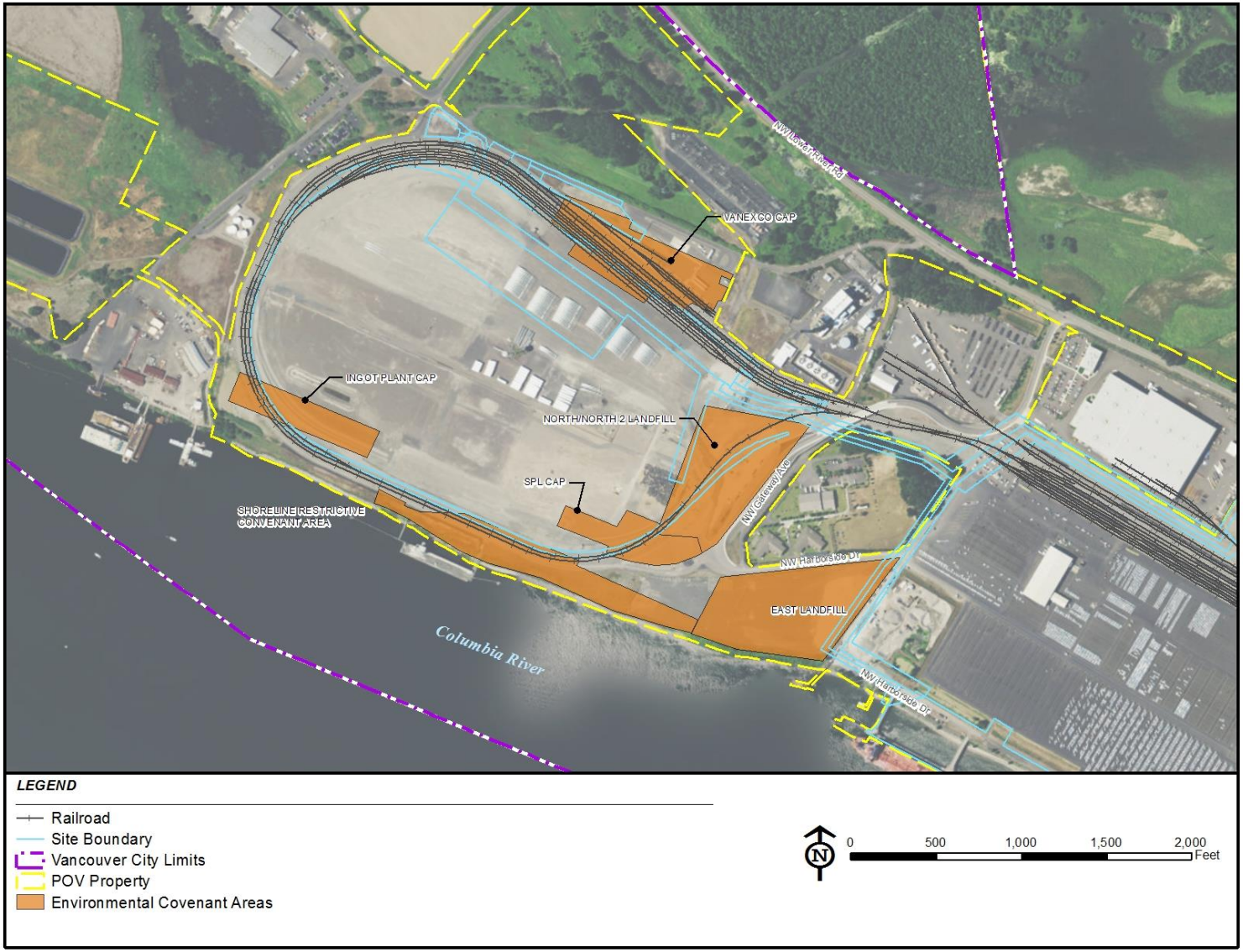

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Figure 4.1-3. Ecology Consent Decree (Revised)

- In April 2010, with Ecology approval, as part of its West Vancouver Freight Access (WVFA) project, the Port placed an asphalt cap over the HDPE liner that had previously covered the area of contaminated soil. 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.
- **East Landfill -** A multi-layer impermeable cap consisting of a geosynthetic liner and a clay layer covered with HDPE, a synthetic drainage net, a 19-inch layer of compacted fill soil, a 6-inch layer of soil, and vegetation was placed over the east landfill area as part of Consent decree 09-2-00247-2 to address lead, cyanide, fluoride, PCBs, petroleum hydrocarbons, VOCs, and polynuclear aromatic hydrocarbons (PAHs).
- **North/North 2 Cap –** On March 26, 2009, former landowner Alcoa Inc. entered into an environmental restrictive covenant in favor 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 WAC 173-340-720 and 740. These 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.
- **Shoreline Restrictive Covenant –** On March 26, 2009, Alcoa Inc., the former landowner, entered into an environmental restrictive covenant in favor of Ecology pursuant to its consent decree with Ecology effective January 30, 2009 restricting activity in the shoreline area. This restrictive covenant was necessary because of the residual concentration of contaminants on the properties that exceeded cleanup levels for soil established in the MTCA under WAC 173-340-720 and 740.
- **Ingot Plant Cap –** On December 31, 2008, former landowner Evergreen Aluminum LLC entered into a restrictive covenant with Ecology restricting activity in the ingot plant cap area. The covenant was necessary because the residual concentration of PCBs exceeds unrestricted use levels under WAC 173-340-740. A 1-foot layer of soil constitutes the cap.

Environmental Restrictive Covenant

The environmental restrictive covenant entered pursuant to Consent Decree No. 09-2-00247-2 established multiple conditions for the development of the site and addresses the East Landfill, SPL storage area, shoreline area, and the North/NN2 landfills. The sections are summarized below.

- **Section 1** requires that the site be used solely for industrial purposes (per RCW 70.105D.020[23]) and allowed under City of Vancouver zoning regulations (VMC Title 20). The reference to the RCW is outdated and the current definition of Industrial Properties is located at RCW 70.105D.020(14); it reads as follows:

  'Industrial properties' means properties that are or have been characterized by, or are to be committed to, traditional industrial uses such as processing or manufacturing of materials, marine terminal and transportation areas and facilities, fabrication, assembly, treatment, or distribution of manufactured products, or storage of bulk materials, that are either:

(a) Zoned for industrial use by a city or county conducting land use planning under chapter 36.70A RCW; or

(b) For counties not planning under chapter 36.70A RCW and the cities within them, zoned for industrial use and adjacent to properties currently used or designated for industrial purposes.

The Facility consists of a marine terminal and is consistent with the definition from RCW 70.105D.020(14). As noted in section 2.23, the area of the project is zoned Heavy Industrial and the Facility is an allowed use in the zoning district.

- **Section 2** requires that any activity that may result in release or exposure to the environment of the contaminated soil within the restricted areas (noted above) or create new exposure pathway is prohibited without approval from Ecology. Examples of activity that require Ecology approval include drilling, digging, placement of objects, or the use of any equipment that deforms or stresses the surface beyond its load-bearing capacity as well as piercing the surface with a rod, spike, or similar item or bulldozing or earthwork. Activities similar to these will be performed in each of the restricted areas noted above and, pursuant to the covenant, will require approval from Ecology. It is anticipated that this approval will be considered as part of the site certification agreement through EFSEC.
- **Section 3** prohibits the use of groundwater for consumption or other beneficial purposes but allows construction dewatering. A waste determination is required for any water that is extracted during dewatering activities and water must be handled, stored, and managed according to applicable laws and regulations. Wells or groundwater extraction are specifically prohibited in the vicinity of the East Landfill. As noted in section 2.6, water for domestic, industrial, and fire protection uses will come from existing municipal sources and no groundwater extraction is proposed for beneficial purposes. Excavations for utilities or building foundations may encounter groundwater and dewatering may be necessary.
- **Section 4** specifically prohibits activity on the property that may interfere with the integrity of the remedial action and the continued protection of the human health and the environment.
- **Section 5** requires Ecology approval for activities that may result in the release, exposure of, or creation of a new exposure pathway for hazardous substances that remain on the property
- **Section 6** requires written notification to Ecology for any proposed conveyance of title, easement, lease, or other interest in the property.
- **Section 7** requires the owner to restrict the use of the property and notify lessees of the restrictive covenant.
- **Section 8** requires Ecology approval for uses that may be inconsistent with the covenant.
- **Section 9** allows Ecology to enter the property and inspect records.
- **Section 10** defines a process to eliminate the covenant.

Environmental Restrictive Covenant (Enforcement Order No. 4931)

The environmental restrictive covenant entered into on December 31, 2008 for Evergreen established multiple conditions for the development of the former Evergreen site and addresses the ingot plant cap area. The sections are summarized below.

- **Section 1** requires that the site be used solely for industrial purposes (per RCW 70.105D.020[14]) as allowed under the Clark County Unified Development Code and that the existing cap may not be altered, modified, or removed without prior written approval

from Ecology. It also states that any activity, that may result in release or exposure to the environment of the contaminated soil within the restricted areas or that creates a new exposure pathway, is prohibited without prior written approval from Ecology. Examples of activity that require Ecology approval include drilling, digging, placement of objects, or use of any equipment which deforms or stresses the surface beyond its load bearing capacity as well as piercing the surface with a rod, spike or similar item or bulldozing or earthwork.

- **Section 2** specifically prohibits activity on the property that may interfere with the integrity of the remedial action and continued protection of the human health and the environment.
- **Section 3** prohibits activity that may result in the release or exposure to the environment of a hazardous substance remaining on the Ingot Plant Capped Area as part of the Remedial Action or create a new exposure pathway is prohibited without prior written approval from Ecology.
- **Section 4** requires written notification to Ecology for any proposed conveyance of title, easement, lease or other interest in the property.
- **Section 5** requires the owner to restrict use of the property and notify lessees of the restrictive covenant.
- **Section 6** requires Ecology approval for uses that may be inconsistent with the covenant.
- **Section 7** allows Ecology to enter the property and inspect records.
- **Section 8** defines a process to eliminate the covenant.

4.1.3.2 Construction

Releases to the environment affecting public health are not anticipated during construction due to the limited types and relatively small quantities of hazardous materials that will be used during construction. Measures to prevent and contain any inadvertent release of hazardous materials will be provided as described in section 2.10 Spill Prevention and Control.

During construction of the Facility, solid construction debris, such as scrap metal, cable, wire, wood pallets, plastic packaging materials, and cardboard, will be removed by licensed disposal operators and disposed at local landfills licensed to accept such waste. Should any hazardous waste be generated, it will be collected, handled, stored and disposed of in accordance with applicable federal, state, and local regulations.

As noted in section 4.1.3.1, areas of the site and/or adjacent to the site are restricted for use because of the presence of subsurface soil and/or groundwater contamination from previous historic uses. Disturbance of those areas will be avoided to the extent practical. However, construction is necessary in each of the restricted areas. Construction will comply with the site-specific restrictive covenants, consent decrees, MTCA, RCRA, and Dangerous Waste Regulations.

- **Vanexco/Rod Mill –** Contaminants in this area consist of PCB-impacted soils (Anchor 2008), Monitoring indicated that groundwater is not affected by the PCB-impacted soils (Consent Decree No. 09-2-00247-2). The building foundations and floor slabs were left in place to form a cap over the contaminated soils as required by the consent decree (95-2-03268-4) and surface materials above the foundation are sloped to provide drainage away from the area or that the foundation is replaced with an impervious layer and stormwater control facilities are located above the layer.

The Facility includes the construction of parking facilities and a portion of the rail unloading area within the Vanexco/Rod Mill restricted covenant area (see Figure 2.3-~~5~~6). The parking facilities will not require deep excavations that penetrate the cap and will serve as an additional impervious layer to prevent precipitation from reaching the PCB-contaminated soils. Approximately 250 lineal feet of the northern edge of the rail unloading area is located above the cap. The building will require excavation for concrete foundations or driving piles within the cap area. The cap materials and excavated materials from beneath the cap will be segregated, characterized, and properly disposed of based on the characterization. Any material exceeding Ecology soil cleanup levels for unrestricted use (that cannot be used on site) must be disposed of at a Subtitle D landfill in accordance with WAC 173-350. After construction of the foundation or pile driving, the cap will be restored with appropriate materials to form an impervious surface and restore the integrity of the cap.

- **Spent Pot Liner (SPL) Storage Area –** Contaminants in this area consist of residual affected soils containing cyanide and fluoride beneath a cap (Anchor 2008). The cap consists 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.

  The Facility will construct ~~two~~one additional rail loop~~s~~ within the SPL Storage Area. However, no excavation into the caps or the contaminated materials they cover will be necessary for the construction and no approval is required from Ecology.

- **North/NN2 Cap –** The North/NN2 cap covers former landfill areas that were remediated by disposing of materials off site and in the East Landfill and the resulting excavation was used to dispose of PCB-contaminated dredge materials from the cleanup of shoreline areas on the site. 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.

  The Facility will construct ~~two~~ one additional rail loop~~s~~ within the North/NN2 cap. However, no excavation into the caps or the contaminated materials they cover will be necessary for construction and no approval is required from Ecology.

- **Shoreline Restrictive Covenant Area** – The shoreline restrictive covenant area was remediated by removing soil and materials. Residual levels of contamination may remain and there is no cap or other surface material specifically placed in the area (Anchor 200~~9~~8). The Facility will construct ~~two~~ one additional rail loop~~s~~ within the area. Work will include manhole relocations that require excavation up to 20 feet below ground surface. These will be installed by cutting a trench, installing the manhole and pipe, and backfilling with soil and compacting. Utility relocations will be installed by cutting a trench, placing the conduits, and backfilling with soil and compacting. Excavation and grading on the north side of the shoreline berm will take place to allow the removal and relocation of the Terminal 5 access driveway and loop tracks. This construction will require approval from Ecology under the covenant.

- **Ingot Plant Cap –** The ingot plant cap covers residual affected soils containing PCBs. The cap consists of a 1-foot layer of clean soil.

The Facility will construct ~~two~~ one additional rail loop~~s~~ within the ingot plant cap. However, no excavation into the cap or the contaminated materials it covers will be necessary for the construction and no approval is required from Ecology.

- **East Landfill –** The east landfill area contains contaminated material from the South Bank and North/North 2 landfills. A multi-layer impermeable cap consisting of a geosynthetic liner and a clay layer covered with HDPE, a synthetic drainage net, a 19-inch layer of compacted fill soil, a 6-inch layer of soil and vegetation was placed over the east landfill area.
- Construction within the east landfill cap area consists of grading a suitable level bench within the area to construction foundations for the aboveground crude oil pipeline. Improvements in this area are designed to not impact the engineered cap or the contaminated materials it covers will be necessary for the construction and no approval is required from Ecology.

The following construction methods are anticipated based on construction within the restrictive covenant areas:

- Measures to prevent releases will be included in a contaminated media management plan and construction specifications. For all work, the contractor will be required to follow a work plan, a health and safety plan, a stockpiling plan, and a decontamination plan.
- In Shoreline Restrictive Covenant Areas, excess materials will be tested and disposed of in accordance with Ecology-approved Port procedures.
- Clean fill or back fill will be used.
- Areas that are disturbed or removed as part of final construction will be covered with at least 1 foot of clean soil fill to prevent a future direct contact hazard. ~~Where asphalt (road) is laid, it will substitute for 1 foot of clean fill to prevent a future direction contact hazard.~~
- Where asphalt (road) is laid, it would substitute for 1 foot of clean fill to prevent a future direct contact hazard.
- Soils that are excavated will either be:
  - Direct loaded or stockpiled, sampled and analyzed for ~~polynuclear aromatic hydrocarbons (~~PAHs~~)~~ and total petroleum hydrocarbons and other parameters based on the anticipated contaminants, and disposed of off site, or
  - Reused on site in accordance with applicable regulations and covenant restrictions.
- Standard dust control measures such as spraying exposed soil surfaces with water will be employed during construction to prevent the release of airborne particulates.
- Equipment employed in the shoreline restrictive covenant area will be decontaminated at a location to be specified in the contractor's decontamination plan.
- Construction workers will employ appropriate health and safety measures during the handling of contaminated soils.

Excavation in other areas of the site is not expected to encounter soils with contaminant concentrations greater than industrial cleanup levels and can be reused on site. Excess excavated soils that will not be used onsite will be direct loaded or stockpiled, sampled and analyzed for PAHs and total petroleum hydrocarbons and other parameters based on the anticipated contaminants, and disposed of off site in an appropriate location based on the results of the analysis.

At Terminal 5, groundwater has been shown to be contaminated throughout the site (Ecology 2008). Dewatering may be necessary during excavations for building foundations, utilities, and

pipelines. Groundwater that is pumped out of the excavations will be stored, characterized, and treated in accordance with state and federal regulations prior to disposal. The water may be treated onsite and disposed of via the City's sanitary sewer system (if appropriate), or removed by a licensed commercial waste disposal facility for off-site treatment and disposal. If not exceeding state water quality levels, dewatering water will be managed in accordance with the National Pollutant Discharge Elimination System Construction Stormwater ~~General~~ Permit requirements.

4.1.3.3 Operations

Wastes Resulting from Normal Operations

The following solid waste streams are anticipated to be generated during normal operation of the F~~f~~acility:

- Oily and non-oily waste and rags resulting from cleaning of F~~f~~acility components;
- Oily sludge recovered from the bottom of the storage tanks when these are cleaned on a 10-year interval according to API standards;
- Domestic garbage and packing materials (cardboard, paper, plastic).

There are no wastes generated as a by-product from handling of crude oil at the Facility. The Applicant will identify the appropriate designation of the wastes produced, and if they designate as hazardous waste, they will be collected, handled, stored and disposed of in accordance with applicable federal, state, and local regulations. Solid wastes (i.e. non-hazardous) will be collected and recycled or disposed of at a licensed waste handling facility.

Wastes Resulting from Handling of Inadvertent Releases

Section 2.10 and Appendices B.~~2~~3 and C.2 describe the comprehensive spill prevention activities the Applicant will implement at the Facility during the operational phase. However, should an inadvertent release occur, the Applicant will be responsible for spill control and collection, and disposal of the resulting wastes.

Generally, small spills or releases of oil that remain within secondary containment systems will be managed via the Facility's oil-water separators and stormwater treatment systems, as outlined in the operations stormwater pollution prevention plan (oSWPPP) (Appendix C.2). Management procedures of wastes generated from releases to surface water, or larger releases that do not remain within secondary containment will be addressed in accordance with the ~~Prior to beginning operations, as part of its~~ oSPCCP and oil spill contingency plan (Appendices B.3 and B.4 (Section 7.5) respectively).

The Applicant will work closely with Ecology to develop a plan for the disposal of oily waste. Recovered oil and oily debris will be recycled and reused to the extent feasible to reduce the amount of oily waste that must be incinerated or taken to landfill. ~~the Applicant will identify a process for dealing with wastes resulting from cleaning up inadvertent releases.~~ This ~~process~~ plan will address the types of waste materials likely to be collected, the means for their characterization to determine if they are designated as solid waste or dangerous waste, and potential methods of disposal based on the waste type and its designation. Designation procedures and waste management requirements are contained in Dangerous Waste Regulations

(Chapter 173-303 WAC). The Dangerous Waste Regulations also apply to other wastes and are more stringent than Federal Hazardous Waste Regulations (40 CFR, Parts 261 to 279).

Based on the types of waste identified, the Applicant will consult with spill contractors, chemical testing laboratories, and Ecology for advice on designating wastes as dangerous or solid. Testing of actual waste during a spill response activity may be required to determine whether such mixtures are designated as dangerous waste. If recovered, oily liquids and other materials contaminated by oil not designated as dangerous waste, will be classified as solid waste and subject to RCW 70.95. For example, recovered oily liquids and other materials contaminated by oil that are not designated as dangerous waste may be recycled, burned, or blended for fuel. Recovered oily liquids may be managed as "off specification fuels" under the exemption in the dangerous waste rules, as long as it is used as fuel. Recovered oily liquids and other materials contaminated by oil that cannot be recycled, burned, or blended for fuel are considered solid waste and subject to designation.

Oily waste may be designated as dangerous waste (dangerous waste or extremely hazardous waste) depending on characteristics, such as ignitability, corrosivity, reactivity, toxicity, and persistence.

Wastes may be designated as dangerous waste because they are:

- Listed (appear on lists for discarded chemical products or from specified industrial processes) or characterized as "dangerous waste" in the absence of knowledge of waste origination.
- Ignitable (flash point <140 degrees F);
- Corrosive (pH ≤~~£~~ 2.0 or ≥~~³~~ 12.5);
- Reactive (explosive, self-igniting, reactive with water);
- Toxic (specific standards and test methods apply, i.e. Toxicity Characteristic Leaching Procedure (TCLP) and DW bioassay; and
- Persistent (specific standards and test methods apply).

If a waste is classified as a dangerous waste, the Applicant will ensure safe management procedures to collect, handle, and dispose of the waste, including, but not limited to:

- the waste is placed in proper tanks or stored in closed compatible drums,
- has appropriate labels and markings,
- is transported by authorized haulers,
- is shipped using a Hazardous Waste Manifest,
- is delivered to an authorized recycler or permitted treatment, storage or disposal facility.

The Applicant will use only licensed transporters and approved (or permitted) treatment and disposal facilities for waste handling and disposition, unless otherwise directed by Ecology. Permanent disposal of oil recovered and oily waste generated during response and cleanup operations will be conducted in accordance to guidelines provided in the Northwest ACP, Washington State Disposal Guidance, Section 9620.

4.1.4 Safety Standards Compliance

The implementation of a safety program for the Facility will be based on compliance with state and federal regulations, as well as the implementation of industry standards. The following discussion identifies the primary safety regulations applicable to the activities conducted at the

F~~f~~acility, and provides an overview of the numerous industry standards that the Applicant will implement in the design, construction and operation of the F~~f~~acility.

4.1.4.1 Washington State Safety and Health Standards

The U.S. Congress created ~~the Occupational Safety and Health Administration (~~OSHA~~)~~ in 1971 to develop and enforce workplace safety and health rules throughout the country. States may choose to enact and implement their own safety and health programs as long as they are at least as effective as OSHA. In 1973, the Washington State Legislature passed the Washington Industrial Safety and Health Act or WISHA (RCW 49.17), wherein the state chose to develop its own workplace safety and health program, which is implemented through WAC 296. In Washington, OSHA continues to cover workplaces with federal employees, nonfederal employees working on federal reservations and military bases, employees working on floating worksites (floating dry docks, fishing boats, construction barges), and employees working for tribal employers on tribal lands. The Facility will not have any such workplaces and is therefore entirely subject to WISHA.

The Facility will include multiple elements that will be subject to a host of health and safety standards. The following discussion identifies the most likely applicable chapters of WAC 296 and specific sections within them that address particular activities unique to the F~~f~~acility, such as rail operations, handling of crude oil, and longshore, stevedore, and waterfront-related operations. As described in additional detail in section 4.1.4.4, the Applicant has prepared preliminary safety programs that implement the requirements of the regulations summarized below.~~However, the Applicant recognizes that other standards will also apply, and intends to work with agencies during project review to refine and ensure compliance will all potentially applicable regulatory requirements. Many of the requirements of WAC 296 that apply to the Facility will overlap, with the more stringent requirements of a section prevailing over another. In developing the safety program for the construction, operation and decommissioning phases of the Facility the Applicant will review the entirety of WAC 296 and determine the scope of applicability of each chapter to the activities that are proposed to occur at the Facility.~~

WAC 296-24, General Safety and Health Standards

These regulations establish standards for the design and operation of specific equipment that may be installed and operated at the Facility, including the handling of rolling railroad cars and design standards for electrical systems.

- WAC 296-24-21501: Use of Mechanical Equipment
- WAC 296-24-21509: Clearance limits
- WAC 296-24-21511: Rolling railroad cars requirements; Under normal operating conditions, the unit trains will be moved by locomotive, which is exempted under this regulation; However, the regulation requires the employment of a clearly audible warning system when cars are being moved by car pullers or locomotives, and when the person responsible for the moving does not have assurance that the area is clear and that it is safe to move the car or cars
- WAC 296-24-21513: Guarding requirements
- WAC 296-24-235 through 296-24-23533: Overhead and gantry cranes requirements.
- WAC 296-24-237: Construction, operation, and maintenance standards for chain and electric hoists

- WAC 296-24-238: Air hoists requirements
- WAC 296-24-240 through 296-24-24019: Crawler cranes, locomotive cranes, wheel mounted cranes or other variations used for construction or operation
- WAC 296-24-245 through 296-24-24519: These regulations apply "to guy, stiffleg, basket, breast, gin pole, Chicago boom and A-frame derricks of the stationary type, capable of handling loads at variable reaches and powered by hoists through systems of rope reeving, used to perform lifting hook work, single or multiple line bucket work, grab, grapple, and magnet work."
- WAC 296-24-294 through 296-24-29431: These regulations apply if rigging is used in the construction or operation of the project
- WAC 296-24-295 through 296-24-295-29505: Compressed gases general requirements
- WAC 296-24-33013: This section provides the standards for a bulk plant, which is defined as "that portion of a property where flammable or combustible liquids are received by tank vessel, pipelines, tank car, or tank vehicle, and are stored or blended in bulk for the purpose of distributing such liquids by tank vessel, pipeline, tank car, tank vehicle, or container, including tank storage requirements under WAC 296-24-33005 and piping, valves, and fitting requirements under WAC 296-24-33007."
- WAC 296-24-56525: Automatic sprinkler system requirements
- WAC 296-24-56527: Fire alarm signaling systems
- WAC 296-24-567 and WAC 296-24-56701: Employee emergency plans and fire prevention plans, as required by particular WISHA standards
- WAC 296-24-592 through 296-24-62911: These regulations govern the standards for fire suppression equipment depending on what type is used
- WAC 296-24-73501 through 296-24-73511: Requirements for walking-working surfaces
- WAC 296-24-75003 through 296-24-75011: Requirements for guarding floor and wall openings and holes
- WAC 296-24-76503 through 296-24-76555: Requirements for fixed industrial stairs
- WAC 296-24-85501: Requirements for dockboards
- WAC 296-24-92002 through 296-24-92011: Inspection requirements of compressed gas cylinders
- WAC 296-93003: General requirements for safety release devices for compressed gas cylinders
- WAC 296-24-93503: General requirements for safety relief devices for cargo and portable tanks storing compressed gas cylinders
- WAC 296-24-95701 through 296-24-95713: Design safety standards for electrical systems, especially WAC 296-24-95711 which covers the requirements for electric equipment and wiring in locations that are classified depending on the properties of the flammable vapors, liquids, gases, or combustible dusts or fibers that may be present therein and the likelihood that a flammable or combustible concentration or quantity is present
- WAC 296-24-960 through 296-24-985: Electrical safety-related work practices.

WAC 296-56, Safety Standards -- Longshore, Stevedore and Waterfront-Related Operations

This chapter sets out the specific safety standards for the waterfront-related operations at the F~~f~~acility. The following list is a summary of provisions anticipated to apply to the waterfront activities conducted at the F~~f~~acility:

- WAC 296-56-60006: Personnel requirements
- WAC 296-56-60007: Housekeeping requirements
- WAC 296-56-60009: Accident prevention program
- WAC 296-56-60010: Emergency action plans
- WAC 296-56-60011 through 296-56-60047: Waterfront operations requirements
- WAC 296-56-60049 through 296-56-60053: Requirements for hazardous cargo, hazardous materials, and hazardous atmospheres and substances. It is necessary to first determine whether crude oil is a hazardous cargo, material, substance, or atmosphere which is defined in WAC 56-60005
- WAC 296-56-60071 through 296-56-60099: Cargo handling gear and equipment requirements
- WAC 296-56-60109 through 296-56-60133: Personal protection requirements
- WAC 296-56-60209: Requirements for fixed ladders
- WAC 296-56-60211: Requirements for portable ladders
- WAC 296-56-60213: Requirements for Jacob's ladders
- WAC 296-56-60215: Requirements for fixed stairways
- WAC 296-56-60217: Requirements for spiral stairways
- WAC 296-56-60219: Requirements for employee exits
- WAC 296-56-60221: Illumination requirements
- WAC 296-56-60223: Requirement for passage between levels and across openings
- WAC 296-56-60225: Requirements for guarding temporary hazards
- WAC 296-56-60229: Sanitation requirements
- WAC 296-56-60231: Signs and marking requirements
- WAC 296-56-60233: Machine guarding requirements for related terminal operations and equipment
- WAC 296-56-60235: Welding, cutting and heating (hot work) requirements
- WAC 296-56-60237: Requirements for spray painting connected with maintenance of structures, equipment, and gear at the marine terminal and of transient equipment serviced at the terminal. It does not apply “to overall painting of terminal structures under construction, major repair or rebuilding of terminal structures, or portable spraying apparatus not used regularly in the same location.”
- WAC 296-56-60239: Requirements for working with compressed air
- WAC 296-56-60241: Requirements for compressed air receivers and equipment used for operations such as cleaning, drilling, hoisting, and chipping. It does not apply to equipment used to convey materials or in transportation applications such as railways, vehicles, or cranes
- WAC 296-56-60243: Fuel handling and storage requirements
- WAC 296-56-60245: Battery charging and changing requirements

- WAC 296-56-60247: Prohibited operations
- WAC 296-56-60249: Petroleum dock requirements

WAC 296-62, Occupational Health Standards

This chapter provides the general occupational health standards related to the handling of toxic and hazardous substances, if such standards are present during construction or operation of the Facility:

- WAC 296-62-055 through 296-62-05520: Requirement to retain Department of Transportation Labeling
- WAC 296-62-060: Control requirements for hazardous conditions in addition to those specified in this chapter
- Parts F through L: Specific control requirements for certain toxic and hazardous substances

WAC 296-155, Safety Standards for Construction Work

This chapter provides the safety standards for construction of the Facility and addresses:

- General safety and health provisions
- Occupational health and environmental control and hazard communication
- Personal protective and life-saving equipment, and fall protection requirements for construction
- Fire protection and prevention
- Signaling and flaggers
- Storage, use, and disposal
- Rigging requirements for material handling
- Tools—hand and power
- Welding and cutting
- Electrical
- Stairways and scaffolds
- Cranes, rigging, and personnel lifting
- Motor vehicles, mechanized equipment, and marine operations
- Excavation, trenching, and shoring
- Concrete, concrete forms, shoring, and masonry construction
- Steel erection
- Underground construction
- Miscellaneous construction requirements
- Demolition
- Power distribution and transmission lines
- Rollover protective structures and overhead protection

WAC 296-800, Safety and Health Core Rules

This chapter is applicable to the non-waterfront-related operations, and regulates:

- WAC 296-800-110 through 296-800-11045: Employer responsibilities for a safe workplace
- WAC 296-800-120 through 296-800-12005: Employee responsibilities
- WAC 296-800-130 through 296-800-13025: Safety Committees and Safety Meetings
- WAC 296-800-140 through 296-800-14025: Accident prevention program

- WAC 296-800-150 through 296-800-15040: First aid summary
- WAC 296-800-160 through 296-800-16070: Personal protective equipment
- WAC 296-800-170 through 296-800-18020: Chemical hazard communication and material safety data sheets
- WAC 296-800-190 through 296-800-19005: Safety bulletin board
- WAC 296-800-200 through 296-800-20005: WISHA poster requirement
- WAC 296-800-210 through 296-800-21005: Lighting requirements
- WAC 296-800-22005 through 296-800-22022: Housekeeping requirements
- WAC 296-800-22025 through 296-800-22030: Drainage requirements
- WAC 296-800-22035 through 296-800-22040: Storage area requirements
- WAC 296-800-230 through 296-800-23075: Sanitation and hygiene facilities and procedures
- WAC 296-800-240 through 296-800-24005: Environmental tobacco smoke in the office
- WAC 296-800-250 through 296-800-25015: Stairs and stair railings
- WAC 296-800-260 through 296-800-26010: Floor openings, floor holes, and open-sided floors
- WAC 296-800-270 through 296-800-27020: Workplace structural integrity
- WAC 296-800-280 through 296-800-28045: Basic electrical rules
- WAC 296-800-300 through 296-800-30025: Portable fire extinguishers
- WAC 296-800-310 through 296-800-31080: Exit routes and employee alarm systems
- WAC 296-800-320 through 296-800-32025: Accident reporting and investigating

WAC 296-817, Hearing loss prevention (noise)

This chapter addresses requirements applicable for hearing loss prevention in the workplace.

WAC 296-841, Airborne Contaminants

This chapter is applicable when employees are, or could be, exposed to an airborne hazard. WAC 296-841-100 lists examples of airborne contaminants that may become airborne hazards in some workplaces, including the chemicals listed in Table 3 of WAC 296-841-20025. Emissions of hydrogen sulfide (H_2S) are a hazard associated with activities involving the handling of crude oil. H_2S is a colorless gas with a rotten egg odor, but odorless at poisonous concentrations. H_2S deadens the sense of smell so that odor cannot be relied upon to warn of the continuous presence of this gas. It is also heavier than air and will tend to accumulate at the bottom of poorly ventilated spaces. Facility employees working in areas where they can be exposed to H_2S will be required to wear personal H_2S detectors, which will alert them of ~~poetically~~ potentially dangerous concentrations of the gas, and allow them to evacuate problem areas. Fixed H_2S sensors will also be located in enclosed spaces, setting off evacuation alarms should safety threshold concentrations be reached in the ambient air, in the unloading buildings for example.

- WAC 296-841-20003: Employee protective measures
- WAC 296-841-20005: Requirements for exposure evaluations
- WAC 296-841-20010: Exposure controls
- WAC 296-841-20015: Respirators
- WAC 296-841-20020: Notification requirements
- WAC 296-841-20025: Permissible exposure limits

WAC 296-824, Emergency Response
This chapter is applicable if employees are, or could become, involved in responding to inadvertent releases of hazardous substances in a workplace or any other location. For example, the requirements of this chapter would apply in the event of an inadvertent release of crude oil. The chapter addresses:

- WAC 296-824-200 through 296-824-20005: Requirement for employers to anticipate and plan for emergency response operations by developing an emergency response plan
- WAC 296-824-30005: Training for employees
- WAC 296-824-400 through 296-824-40010: Medical surveillance requirements
- WAC 296-824-500 through 296-824-50030: Incident requirements
- WAC 296-824-600 through 296-824-60015: Personal protective equipment requirements
- WAC 296-824-700 through 296-824-70005: Post-emergency response requirements

WAC 296-860, Railroad clearances and walkways in private rail yards and plants
This chapter applies to all railroad clearances and walkways in rail yards and plants, including logging railroad yards, such as mill yards, maintenance yards, and sorting yards.

In addition, the Applicant commits to having every train attended upon taking control of the unit train from BNSF until the time control is released back to BNSF when the train leaves the Facility.

WAC 296-901, Globally harmonized system for hazard communication
This chapter requires all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. It applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

4.1.4.2 U.S. Coast Guard (USCG) 33 CFR Part 154 Subpart E – Vapor Control Systems

During ship loading, crude oil is conveyed from the transfer pipeline through loading hoses into the cargo tank of the vessel. During this loading, vapors inside the vessel ~~tanks~~ cargo compartments are displaced. Vapors displaced from vessels as they are filled with crude oil will consist primarily of hydrocarbons. These vapors are conditioned, as needed, with natural gas to ensure a safe concentration in excess of the upper flammable limit. All vapors, including any conditioning gases, will be collected and routed to the MVCU for safe disposal.

Subpart E, regulates the manner in which these vapors are collected, conditioned, and then disposed of to ensure the safety of the loading operation at all times.

The regulations address the following topics:

- vapor line connection
- facility requirement for vessel liquid overfull protection
- vessel pressure protection
- cargo vapor conditioning
- protection from fire
- explosion and detonation

- equipment requirements for flame and detonation arrestors
- vapor compressors, vapor blowers and vapor recovery and destruction units
- personnel training and operational requirements

The regulations require that a "certifying entity" review the plans and calculations for the MVCU, and conduct inspections and witness tests that demonstrate the facility conforms to the certified plans and specifications, meets the requirement of the applicable regulations and operates properly. Prior to beginning operations, and based upon the inspection and testing, the facility must receive a letter of adequacy from the USCG Captain of the Port (COPT) with jurisdiction over the geographical location where the facility is located.

The F~~f~~acility will incorporate a dock safety unit and MVCUs as described in section 2.3.7, in compliance with 33 CFR 154 Part E. The Applicant will seek the necessary review and approval of the dock safety unit and MVCU from the USCG prior to beginning operations of the marine vessel loading components of the Facility.

4.1.4.3 Representative Industry Codes and Standards

Numerous industry codes and standards apply to the design, construction and operation of the F~~f~~acility and its specific elements. The Applicant will incorporate the requirements of these codes and standards as applicable, including but not limited to the codes of the following associations:

- ACI - American Concrete Institute
- AISC - American Institute of Steel Construction
- ANSI - American National Standards Institute
- API - American Petroleum Institute
- AREMA - American Railway Engineering and Maintenance of Way Association
- ASCE - American Society of Civil Engineers
- ASME - American Society of Mechanical Engineers
- AWS - American Welding Society
- BNSF -Burlington Northern Santa Fe Railway Company
- BPVC - Boiler and Pressure Vessel Code of ASME
- FM - Factory Mutual
- FMEA - Factor Mutual Engineering Association
- IBC - International Building Code, 2012
- ICEA - Insulated Cable Engineers Association
- IEEE - Institute of Electrical and Electronic Engineers
- ISA - Instrument Society of America
- MSHA - Mine Safety and Health Administration
- NACE - National Association of Corrosion Engineers
- NEC - National Electric Code
- NEMA - National Electrical Manufacturer's Association
- NESC - National Electrical Safety Code
- NFPA - National Fire Protection Association
- NIST - National Institute of Standards and Technology
- SMACNA - Sheet Metal and Air Conditioning Contractors National Association

4.1.4.4 Methods of Compliance with Safety Standards

The Applicant will demonstrate compliance with all applicable safety standards as follows:

Project Design

The Applicant will cause the Facility to be designed in compliance with all applicable safety regulations and requirements, including applicable industry standards. Prior to beginning construction of the Facility the Applicant will submit a complete set of construction plans to EFSEC for approval. These construction plans will identify the safety regulations and industry standards that apply to the Facility, and as appropriate will specify which standards apply to specific element designs.

Project Construction

Fire and explosion hazards may result from the presence of flammable or combustible gases and liquids in the presence of ignition sources during construction activities. Mobile equipment fuel and oils and solvents would be present at the proposed Facility location in small quantities. Welding would be conducted during assembly of Facility components and transfer pipelines, resulting in the use and storage of flammable gases. Blasting would not be required to assist with excavation, and no explosives would be used or stored at the construction site.

If potentially flammable materials are improperly handled or stored, or welding activities are improperly conducted, ignition of flammable materials could occur, leading to fire. The proposed Facility would be located in a developed industrial area; the majority of the locations proposed for the Facility are devoid of vegetation thereby limiting the potential for fire propagation due to combustible vegetation.

Exposure of other Port tenants or the public to a potential construction-related fire could occur if the fire has the possibility to spread beyond Facility construction boundaries.

The Applicant will prepare and implement a cSPCCP, a construction fire protection plan, and a construction emergency response plan (see sections 2.10.3 and 4.1.2.1). An objective of these plans is to control the hazards at the location of their occurrence to avoid off-site impacts altogether.

Hazardous waste would be removed by licensed disposal operators and disposed of in accordance with applicable federal, state, and local regulations; the public would not have access to the activities associated with the handling of such wastes.

Chemicals, fuels, and industrial gases used during construction would be stored in containers specifically designed for their individual characteristics. In accordance with the Port lease, the Facility would not use, store, or handle chlorinated solvents onsite. Small quantity chemicals would be stored in their original containers to minimize risk of upset. Construction personnel working with chemicals would be trained in proper handling technique and in emergency response procedures for chemical spills or accidental releases. Personal protective equipment would be provided in compliance with WISHA requirements; material safety data sheets would be provided and maintained onsite as required by WISHA regulations.

Through the construction management program described in section 2.16, the Applicant will ensure that the Facility has been constructed to the specifications of the construction drawings approved above. The Applicant will conduct pre-operational commissioning tests in accordance with industry standards and applicable regulations, including but not limited to the following:

- Hydrostatic testing of piping systems, transfer pipelines and storage tanks

- Testing and certification of the dock safety unit and MVCU in accordance with the provisions of 33 CFR 154 Subpart E
- Testing of fire and alarm systems in accordance with applicable fire and building safety codes

Project Operation

The Applicant will ensure that all safety systems inherent in the project design will be operated according to applicable industry standards and state and local regulations and codes. The Applicant will develop operations manuals to address appropriate measures for operation of F~~f~~acility safety systems and their ongoing maintenance. Facility systems will be tested according to industry standards and applicable state and federal regulations.

The Applicant will implement the usage of personal and facility sub-area-wide Lower Explosive Limit (LEL) hydrocarbon detection systems and H_2S detection systems[3]. H_2S and LEL monitors are located at each unloading station. H_2S, LEL, and oxygen (O_2) monitors are located in each pump ~~pit~~ basin. Personal detection systems will notify individual employees when concentrations of hydrocarbons or H_2S exceed safe thresholds and they must evacuate their immediate work area. The action levels for the monitors are: LEL (10 percent of LEL), ~~) and~~ H_2S ~~H2S meters~~ (10 ppm~~).~~), and O_2 (19 percent). ~~).~~ Similarly, sub-area-wide detectors will trigger evacuation alarms. LELs used in below grade locations and confined spaces will also detect oxygen levels to ensure safety of personnel in confined spaces. See Appendix D.3, Operations Facility Safety Program, for additional information on these and other safety systems that will be included in the Facility.

Safety Program

The Applicant will develop, implement and document a F~~f~~acility safety program to ensure compliance with state and federal requirements. The program will incorporate applicable industry design standards. Appendix D.1 includes the Applicant's preliminary Health Safety Security and Environmental (HSSE) Execution Plan. This plan lays out a process through which the Applicant will develop and implement its facility safety program, and identifies the various safety processes and organizational and staff responsibilities, and the training that will occur as a result of the implementation of the program.

The program will include the preparation of construction and operations safety plans, which will be submitted to EFSEC prior to the beginning of facility construction and operations respectively. The plans will address the requirements of WAC 296, as described above, and the requirements of 33 CFR 154 Part E, as well as any additional related requirements required under other applicable state and federal regulations and spill contingency planning processes described elsewhere in this Application.

As described in section 2.16, the Applicant has developed a construction health and safety manual (CHSM) (Appendix D.2) and will require construction contractors to prepare their own plans aligned with the CHSM.

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[3] The potential hazards of any acute H_2S exposure would be quite localized to the immediate worker or working area. H_2S, while fatal at elevated concentrations, rapidly dissipates in the open air. OSHA provides clear guidance and standards on H_2S exposure (OSHA 2016a-c).

The Applicant has prepared a preliminary operations facility safety program (OFSP) (Appendix D.3). This OFSP describes how the Applicant will provide necessary instruction and guidance for the health and well-being of Facility staff, contractors, and visitors. The program is written as a guide to address the broadly applicable health and safety requirements of WAC Title 296, as administered by the Washington Department of Labor and Industries. Where applicable, federal regulations of OSHA found in Chapter 29 of the CFR are also cited. This program includes

- Operations Rail Operating Safety and Maintenance Program
- Emergency Response Plan and Security Plan
- Distributed Power Training
- Locomotive Daily Inspection
- Cardinal Rule Training
- Managing Fatigue
- Procedures
- Crude Oil Transfer Rail Car to Manifold Procedure
- Tank Car Inbound Inspection Procedure
- Tank Car Outbound Inspection Procedure
- Baseline Procedures
- Hot Work Permit (Site Specific Rules)
- Site Specific H_2S Detection
- Genie Z45/25 Aerial Lift Certification
- Train Air Brake Tests and Inspections
- SHAPS
- Safety Topic of the Week
- Rail Bulletins
- Ergonomics and Back Safety
- Misc. Forms
- Waste Management and Disposal
- Lockout_Tagout Procedure
- Fire Protection Plan

Prior to beginning of operations, the Applicant will prepare a final OFSP for submittal for review by EFSEC. This final version will include revisions and refinements based on actual Facility design and resulting operation practices. In addition, the final OFSP will incorporate the revisions to address EFSEC's review of the preliminary plans as presented in Appendix M.

4.1.5 Radiation Levels

Pursuant to WAC 463-60-115, the Applicant requests a waiver of the information required by WAC 463-30-352(5). The Facility will not handle, store or use or release any radioactive materials during operation.

The Applicant discloses that controlled use of testing equipment containing very minor amounts of radioactive materials will occur during construction of the Facility and may occur during maintenance activities associated with Ffacility operation. This use occurs only in connection with standard testing equipment used to conduct radiographic testing of welds to ensure weld integrity.

4.1.6 Emergency Plans

4.1.6.1 Emergency Response Infrastructure

The Facility, located within an industrial zone at the Port of Vancouver, will be able to take advantage of the extensive emergency response infrastructure located in the Portland/Vancouver Metropolitan Area. Similar to the broad organization of spill response and contingency planning activities described in Appendix B.1, local, state, and federal agencies and industry cooperatives have established a framework for response for both upland and on-water emergencies.

The Vancouver Fire Department (VFD) responds to fires within the city limits, which includes most waterfront facilities. The Applicant will coordinate closely with the VFD and the Port to ensure the Applicant's emergency plans coordinate with both of these organization's needs with respect to both on-Facility-, and off-Facility-site events.

Vessels moored to piers at the Port of Vancouver are also provided fire protection by the VFD ~~protection~~. In addition to the VFD, the Maritime Fire and Safety Association (MFSA), established in November 1983, has in place a system to ensure an adequate, timely, and well-coordinated response to shipboard fires over the entire 110-mile channel of the Lower Columbia River. MFSA established the Fire Protection Agency Advisory Council (F-PAAC) to coordinate this effort. Multiple jurisdictions are involved: two states, seven counties, fourteen cities, seven port districts, and eleven local fire agencies. These eleven agencies comprise F-PAAC. All members have agreed to work and train together, so that when an incident occurs, each fire agency will be familiar with the resources and capabilities of other fire agencies and can rely on their assistance through mutual aid agreements between all F-PAAC agencies. Vancouver has a mutual aid agreement with Portland and all other F-PAAC agencies to provide additional manpower and equipment for waterfront and vessel fires within the City.

The City recently applied for and received a grant from Federal Emergency Management Agency and the Department of Homeland Security to purchase a Type IV Regional Emergency Response Vessel, to provide emergency service delivery on the lower Columbia River waterway and its tributaries. ~~The City has contracted for the construction of the vessel, and anticipates receipt of the vessel in mid- to late 2014~~The vessel was commissioned in March 2014 (City of Vancouver 2016). In addition to fire response, the vessel will have the ability to support multi-capability missions and carry people and equipment for:

- Hazmat Response
- Technical Rescue
- Oil Spill Support and Boom Carrying Capacity

WAC 118-40, implements the provisions of the federal Emergency Planning and Community Right-to-Know Act. Under the requirements of these state and federal regulations, local governments are required to form Local Emergency Planning Committees, and in coordination with other local, state and tribal agencies, and industries, plan for potential emergency events related to the release of hazardous materials. Clark County, the City of Vancouver, and other local jurisdictions located within Clark County conduct this planning exercise through the Clark County Local Emergency Planning Committee (LEPC). The LEPC supports preparedness for chemical emergencies and facilitates communication and coordination among those who have a stake in hazardous materials response and recovery. The LEPC is involved in: maintenance of the Clark County Hazardous Materials Response Plan; making information about chemical

inventories available to the public; assessment of industrial and transportation-related chemical hazards; coordinating training and exercises; supporting public-private partnerships for preparedness; and educating the public about chemical hazards and how they should prepare and respond (Clark County LEPC, 2013).

The LEPC is responsible for developing and maintaining the Clark County Hazardous Materials Emergency Response Plan (Clark County, April 2012) which describes the procedures and responsibilities for responding to emergencies caused by releases of hazardous materials within the County. The plan provides direction related to incident notification and response procedures as required by federal regulations. This plan is activated and followed if the release of a hazardous material results in the following; casualties or injuries, evacuations, request from a facility and/or transporter operator for response, required notifications under EPCRA or CERCLA, and when a release may involve multiple jurisdictions or agencies.

Facilities that are required to plan under WAC 118-40-300 and EPCRA are required to coordinate with the LEPC to ensure the LEPC's planning for emergencies is up-to-date. The Applicant will conduct this coordination as required under WAC 118-40-300.

4.1.6.2 Facility Emergency Plans

The Applicant has developed preliminary~~will establish~~ emergency response plans (Appendix D.3, Operations Facility Safety Program, Section 3.1 Emergency Response Plan) for the construction and operation phases of the Facility to ensure employee safety in the case of the following emergencies: on-site materials or chemicals accidental release, flood, medical emergency, major power loss, fire, extreme weather, earthquake, volcano eruption, and security threat. The purpose of this plan is to minimize hazards to human health, the environment and property, and to protect the work force, the surrounding community, the environment and property from fire, explosion, or any unplanned sudden or non-sudden accidental release of hazardous or flammable commodities at the Facility, or other natural disasters.

The operational emergency response plan is a component of the operations facility safety program (Appendix D.3) that was~~will be~~ developed based on industry standards and regulatory requirements, including, but not limited to, WAC 296-24 (Employee Emergency Plans and Fire Prevention Plans), WAC 296-56 (Safety Standards -- Longshore, Stevedore and Waterfront Related Operations), WAC 296-824 (Emergency Response), ~~and~~ 29 CFR 1910.38 (Emergency Action Plan~~).~~), CFR 1910.120(q) (Hazardous Waste Operations and Emergency Response), and 40 CFR 355 (Emergency Planning and Notification). The emergency response plan~~). Theemergency action plan will be in writing, and will~~ covers the designated actions employers and employees must take to ensure employee safety from fire and other emergencies~~. The emergency plan will~~and addresses the following elements:

- Emergency escape procedures and emergency escape route assignments
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate
- Procedures to account for all employees after emergency evacuation has been completed;
- Rescue and medical duties for those employees who are to perform them.
- The preferred means of reporting fires and other emergencies; and
- Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan.

- Alarm systems established in compliance with WAC 296-800-310.
- Types of evacuation to be used in emergency circumstances.
- Training and review:
  - Of a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees prior to implementation of the plan.
  - Review with each employee when the plan is initially developed, whenever the employee's responsibilities or designated actions under the plan change; and whenever the plan is changed, and
  - Review with each employee upon initial assignment those parts of the plan which the employee must know to protect himself/herself in the event of an emergency.

The Applicant will keep the plan at the workplace and make it available for employee review. A copy of this emergency response plan will be provided to the City (for the reference of the Fire Department and Police Department) and the Clark Regional Emergency Services Agency (CRESA), which is the designated LEPC. See Appendix D.3, Section 3.1, for additional plan details, procedures, and coordination.

In addition to Facility-specific emergency plans, the Applicant will coordinate with local emergency responders to ensure that major incidents or natural disasters that have the potential to affect the public and the environment off-site will be planned for. For example, the Facility site is located within the Clark County LEPC area of response. The LEPC is required to plan for a variety of emergency situations, including the risk of hazardous materials release under WAC 118-40. The LEPC has prepared and implemented a Hazardous Materials Response Plan to provide guidance for hazardous materials incident notification and response, including events from facilities, such as ~~the TSVEDT~~Vancouver Energy Terminal (Clark County, 2012). Emergency planning will also be coordinated with the Port of Vancouver. It is anticipated that emergency plans coordinated with public responders will include processes to implement an incident command structure to ensure orderly coordination of all response activities.

Section 4.2 – Land and Shoreline Use

WAC 463-60-362
Built environment – Land and shoreline use.

(1) The application shall identify land use plans and zoning ordinances applicable to the project site.

(2) Light and glare. The application shall describe the impact of light and glare from construction and operation and shall describe the measures to be taken in order to eliminate or lessen this impact.

(3) Aesthetics. The application shall describe the aesthetic impact of the proposed energy facility and associated facilities and any alteration of surrounding terrain. The presentation will show the location and design of the facilities relative to the physical features of the site in a way that will show how the installation will appear relative to its surroundings. The applicant shall describe the procedures to be utilized to restore or enhance the landscape disturbed during construction (to include temporary roads).

(4) Recreation. The application shall list all recreational sites within the area affected by construction and operation of the facility and shall then describe how each will be impacted by construction and operation.

(5) Historic and cultural preservation. The application shall coordinate with and provide a list of all historical and archaeological sites within the area affected by construction and operation of the facility to the Washington state office of archaeology and historic preservation and interested tribe(s). The application shall: (a) Provide evidence of this coordination; (b) Describe how each site will be impacted by construction and operation; and (c) Identify what mitigation will be required.

(6) Agricultural crops/animals. The application shall identify all agricultural crops and animals which could be affected by construction and/or operation of the facility and any operations, discharges, or wastes which could impact the adjoining agricultural community.

(Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-362, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-362, filed 11/6/92, effective 12/7/92.)

Section 4.2 Land and Shoreline Use

4.2.1 Land Use

4.2.1.1 Surrounding Land Uses and Zoning

~~Tesoro Savage~~ Vancouver Energy ~~Distribution~~ Terminal Site

The Facility is proposed for construction at the Port at three separate locations that will be linked by project elements: Terminal 5, Parcel 1A, and berths 13 and 14. (See section 2 for a more detailed description of the project elements.) This area of the Port – the project site – is zoned IH with an industrial comprehensive plan designation and is located within the City, within Clark County, Washington. The proposed Facility is located along the Columbia River at approximately Columbia River Mile (RM) 103.5.

The approximately ~~44.99~~47.4-acre site is accessed from NW Lower River Road (SR 501). Approximately 1.5 miles east of the site, NW Lower River Road connects to the Mill Plain Extension and West Fourth Plain Boulevard. West Mill Plain and West Fourth Plain boulevards connect to I-5, SR 14, and points beyond.

Rail access is provided from the east by the Port's internal rail network. Trains will access the Port system from the BNSF and UP main lines approximately 2.25 miles east of Terminal 5. The Port has recently completed a new entrance ~~is currently constructing a new access~~ to the Port rail system as part of the WVFA project. Access for marine vessels to berths 13 and 14 is provided by the Columbia River deep draft channel. This navigation channel is maintained at a minimum 600 feet in width and 43 feet in depth. The site is approximately 103.5 river miles from the Pacific Ocean. See Figure 2.1-1 for a map of the vicinity of the site.

West Vancouver Freight Access Project - The WVFA project is a multi-phase project initiated in 2007 by the Port to move freight more efficiently not only through the Port but also along the BNSF Railway and Union Pacific Railroad mainlines that connect the Pacific Northwest to major rail hubs in the Midwestern and Southern U.S. as well as to Canada and Mexico.

The WVFA project aims to improve the capacity of the Port's rail infrastructure to meet the current and future industrial needs of Vancouver and Southwestern Washington. The WVFA project relieves congestion, improves operational efficiencies, and ensures continued safe rail operations as rail traffic grows in and around the port and along the existing BNSF north/south and east/west mainlines. The WVFA project removed a significant chokepoint from the regional rail system, freeing up tracks for both freight and passenger rail, and allows full unit trains carrying a single product to be handled within the port. The project increases the port's internal track miles from 16 to over 50, providing more efficient rail access to port marine terminals.

~~The WVFA project aims to improve the capacity of the Port's rail infrastructure to meet the current and future industrial needs of Vancouver and Southwestern Washington. Currently, rail traffic into the Port travels on a single track (Hill Track) which runs east/west and crosses the north/south mainline at grade near the Port. When rail volumes are high, this intersection causes congestion and delays for Port tenants and mainline traffic. Three elements contribute to this problem of inadequate capacity and are likely to cause the situation to worsen in the future: 1) the Port's existing rail infrastructure does not allow unit trains to be assembled or handled efficiently; 2) projected economic growth will increase demands on existing and future tenants~~

~~for more efficient rail operations; and 3) projected increases in traffic along the BNSF mainline corridors will increase rail congestion within the general vicinity, further reducing service.~~

~~To address these issues, the WVFA project will:~~

- ~~Expand Port rail capacity and operations within the existing Port facility – in particular, those relating to unit train capacity – to enhance the rail network for future growth and development while minimizing disruption to existing Port tenants and businesses, and~~
- ~~Relieve congestion, improve operational efficiencies, and ensure continued safe rail operations as rail traffic grows in and around the Port and along the existing BNSF north/south and east/west mainlines.~~

The elements included in the multi-phase WVFA project extend from the BNSF mainlines (beginning at the intersection of Hill Street and 7th Street, adjacent to the Albina Fuel and Lafarge companies) and terminate in a loop track at Terminal 5.

As illustrated in Figure 4.2-1, the WVFA project consists of 21 work elements which involve a variety of actions, including an expanded rail facility, roadway modifications, building removal and relocation, the improvement and development of stormwater facilities, import of clean fill, the disposal of some excavation materials, utility relocation, wetland and riparian mitigation, and right-of-way acquisition.

In particular, in order to pass beneath the Columbia River rail bridge with minimum required clearances, a pile-supported trench ~~is~~ was ~~being~~ constructed along the Columbia River shoreline, effectively creating a grade-separated new entrance into the southeast side of the Port. ~~When fully constructed~~Completed in 2015, this element of the WVFA project ~~will~~ allows full-length unit trains to enter the Port without impeding traffic on the existing north/south BNSF rail line that carries both freight and passenger trains almost continually throughout the day. ~~Currently, each time a train enters the Port, this line must remain clear while the train is "broken" into pieces that can be processed and staged throughout the terminal. Upon completion, t~~The WVFA project is expected to reduce current delays in rail traffic by as much as 40 percent, thereby lowering transportation costs for the manufacturing and agricultural customers who use the Port and the regional rail infrastructure.

Table 4.2-1 lists the project elements and their completion status as of ~~June 4, 2013~~February 5, 2016. All WVFA project elements are expected to be completed by 2017.

Table 4.2-~~14.2-1~~. Status of WVFA Project Elements

Project Element	Completion Status
Grain Subdivision Phase A	Complete
Schedules 1A, 1B & 1C Rail Improvements	Complete
Utility Relocation Project	Complete
Terminal 5 Unit Train Improvements	Complete
Schedule 2 & 4 Property Acquisition	Complete & In Progress
Terminal 3 Rail Access	Complete
Grain Subdivision Phase B	Complete
Grain Track Unit Train Improvements Phase A	Complete
Malting Facility Relocation – Phase A	Complete
Schedule 2 Rail Trench In-Water Work Phase A	Complete
Terminal 5 Rail Expansion 4000A	Complete
Terminal 5 Rail Expansion SPL	Complete

Project Element	Completion Status
Bulk Unloading Facility Utilities	~~In Progress~~Complete
Malting Facility Relocation – Phase B	Complete~~In Progress~~
Malting Drumhouse Demolition	Complete~~In Progress~~
Schedule 2 Rail Trench Upland Work	Complete~~In Progress~~
Schedule 2 Rail Trench In-Water Work Phase B	Complete~~In Progress~~
~~Grade Separation Structure~~Gateway Avenue Overpass	Complete~~In Progress~~
BNSF C&M Commitments	In Progress
Bulk Unloading Facility	Future Improvements
Bulk Unloading Facility ~~Continuation~~Track Work	Future Improvements
Bulk Facility/Subaru Track Relocation	~~Future Improvements~~Complete
Grain Track Unit Train Improvements Phase B	~~Future Improvements~~In Progress
Grain Track Unit Train Improvements Phase C	Future Improvements

Since its inception, the WVFA project has undergone comprehensive permitting and review under local, state, and federal regulations, including but not limited to:

- Reviews under State Environmental Policy Act (SEPA) by the Port;
- Reviews under National Environmental Policy Act (NEPA) by Federal Highway Administration (FHWA) in coordination with Washington State Department of Transportation (WSDOT) and by the Federal Railroad Administration (FRA);
- Review under local ordinances and development regulations by the City; and
- Review under federal regulations by the U.S. Army Corps of Engineers (USACE), National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USFWS).

The most recent approval actions authorizing construction of the Terminal 5 rail loop occurred in 2009 and 2011, when permits were first obtained for the construction of the rail track and then subsequently revised to allow a southerly expansion of the rail loop closer to the Columbia River. A SEPA Addendum was issued by the Port in 2014; however, the project refinements addressed in the addendum were not applicable to the rail loop at Terminal 5. A chronological list of permits authorizing construction of the Terminal 5 rail loop follows.

April 2009 – Port Supplemental Mitigated Determination of Non-Significance (MDNS) for WVFA project revisions that included the Terminal 5 rail loop

July 2009 – City post-decision review of the WVFA allowing project modifications that included the Terminal 5 rail loop

August 2009 – NEPA approval for modifications to the WVFA project, including the addition of the rail loop at Terminal 5 by WSDOT with final review and approval by FHWA

September 2011 – FRA Finding of No Significant Impact (FONSI) in response to an environmental assessment as a requirement of the Port's funding request for Railroad Rehabilitation and Improvement Financing (RRIF) funds from the FRA

September 2011 – Port issuance of a Notice of Third Supplemental MDNS for the WVFA project

November 2011 – City approval of a Shoreline Substantial Development Permit, Shoreline Conditional Use Permit, Critical Areas Permit, and Tree Permit for the relocation of the WVFA rail tracks at Terminal 5 into shoreline jurisdiction

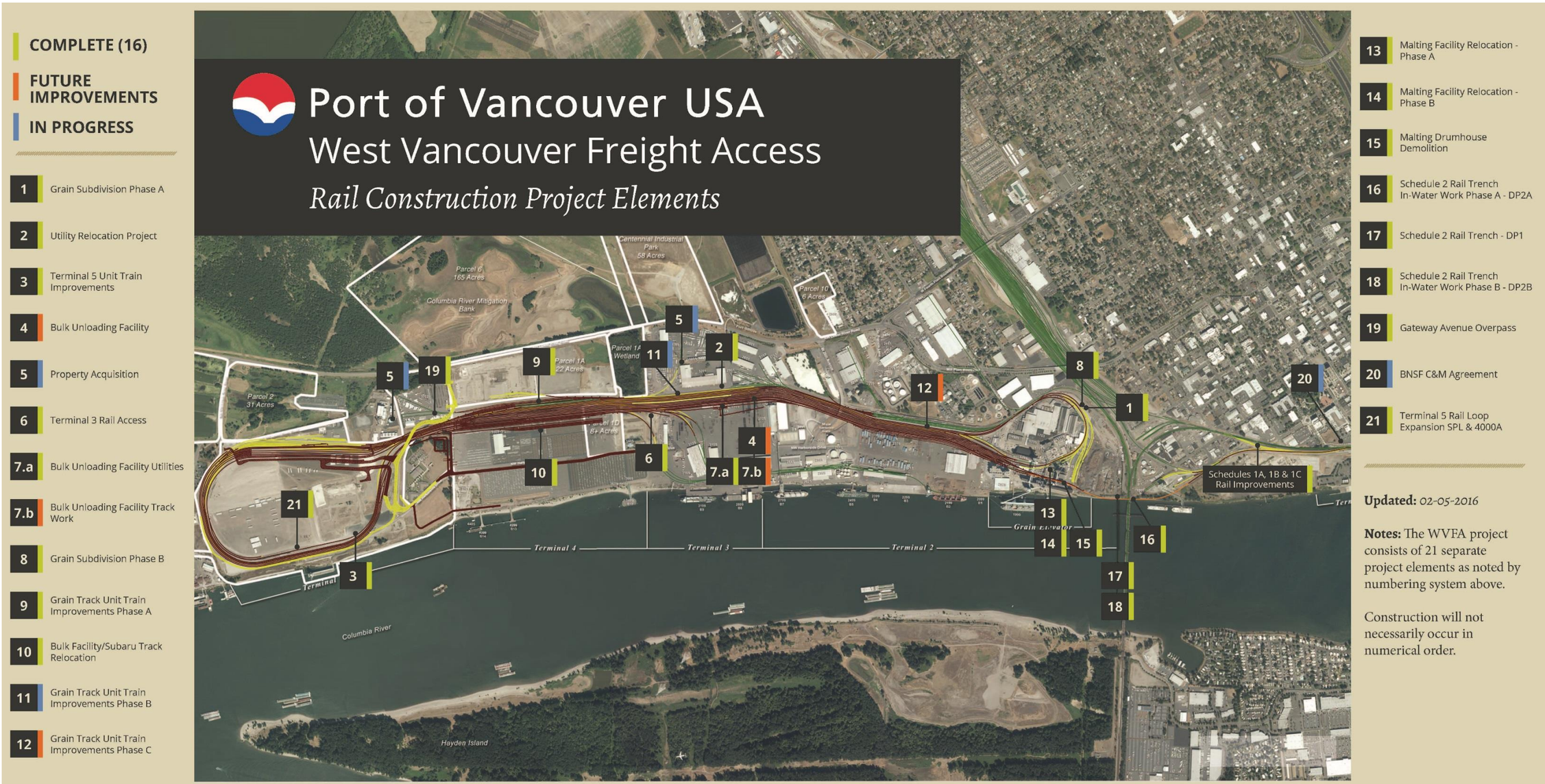

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Figure 4.2-1. WVFA Rail Construction Project Elements (Revised)

Area 200 – is located on the Port's Terminal 5 property. Terminal 5 has been the location of intensive historic industrial uses dating back to 1940s when the site was first developed for aluminum smelting operations through the early 2000s when aluminum processing activities on the property ended. The Port purchased Terminal 5 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 a rail loop including multiple rail lines for Port operations. The rail on the Terminal 5 site represents the westernmost segment of the WVFA project, as described above.

In addition to the WVFA project, BHP Billiton ~~plans~~ had planned to construct a potash export facility on portions of Terminal 5 (Figure 4.2-~~1i~~2). The approvals received for the project in 2012 included an additional rail loop track and a 301,400-square-foot storage building and an administrative and maintenance building, fuel station, conveyors, surge bin and shiploaders, and marine berthing facilities (City of Vancouver ~~Hearings Examiner~~ 2011b). The BHP Billiton project was cancelled in 2014; however, the Port is maintaining permit approvals for the proposed work. Initial grading and ground improvements for the BHP Billiton project had~~have~~ been completed.

Area 300 – As part of the proposed project, crude oil storage tanks will be located on Parcel 1A on the south side of NW Lower River Road just east of Farwest Steel (3703 NW Gateway Avenue). This site was first developed by the Port for industrial use beginning in the early 2000s and is currently temporarily partially occupied by a steel scrap storage yard operated by Pacific Coast Shredding.

Area 400 – 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 in in the early 1990s for short- and/or long-term moorage of ocean-going government and commercial vessels.

Area 500 – The area encompasses the planned pipeline routes used for transferring crude oil between the project elements. The pipeline routes will be located primarily in existing rail and roadway corridors.

Area 600 – The structure housing the west boiler will be located on the northwest corner of Terminal 5. This area is currently a vacant gravel pad surrounded by access roads to Terminal 5. It was previously part of the former aluminum facility on Terminal 5 and was the location of an electrical transmission tower for power lines.

Rail Infrastructure – rail infrastructure improvements required to support the Facility will be constructed at Terminal 5. ~~The Facility will construct two additional rail loops (tracks 4106 and 4107), in addition to the improvements described above for the WVFA project. 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 may be transferred to exclusive use by the Facility once a sustained volume of 120,000 barrels per day is received by the Facility.~~ The project will require the construction of approximately 1,500 feet of tracks 4106 and 4107 to be shifted by the Applicant for Vancouver Energy Terminal exclusive use at the north end of the Terminal 5 loop to allow for track tie-ins into the Area 200 unloading facility, release of cars back to the main track from the unloading facility, and for bad order tracks. Tracks 4106 and 4107 consisting of approximately 18,000 linear feet of new rail located on approximately 5.4 acres at Terminal 5 will be constructed by the Port, independent of

this project. 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. In the future, the Applicant will construct an approximately 4,900-foot-long additional track (to be permitted as part of the EFSEC Site Certification Agreement) that will be located on the outside of the Terminal 5 loop (Track 4101). A third rail loop (Track 4105) is permitted for general Port use. When Facility unloading volumes reach and exceed 120,000 bpd, Vancouver Energy will take over Track 4105 from the Port for exclusive use. The newly constructed Track 4101 will then be transferred to Port general use and will not be used by the Applicant.

Surrounding Land Uses and Zoning

Area 200 – Uses immediately surrounding Area 200 are as follows:

- North: Old Lower River Road (Port private road), Port Parcel 2 used for wetland, habitat and tree mitigation and a Bonneville Power Administration electrical substation

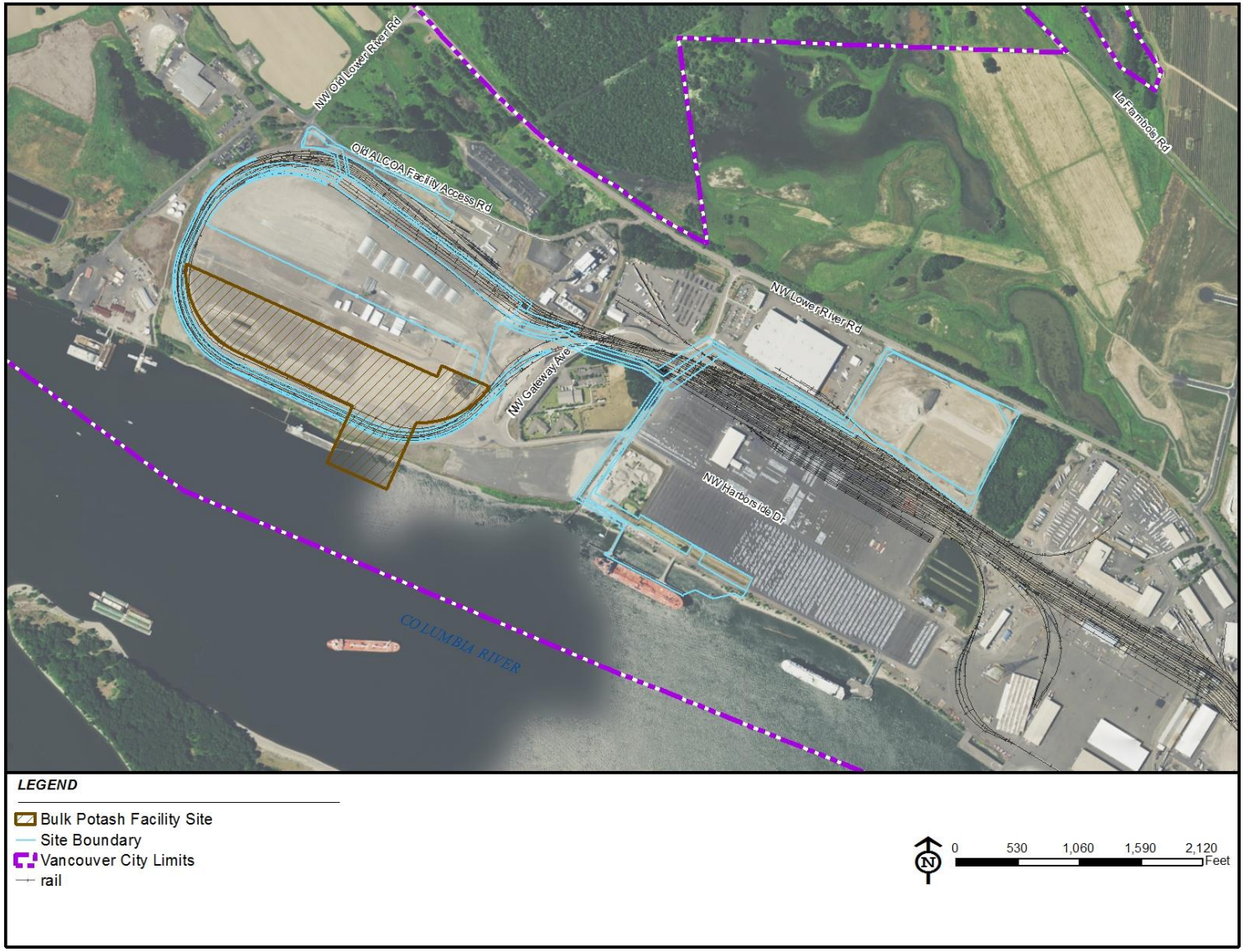

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Figure 4.2-2. ~~Figure 4.2-1i.~~ BHP Billiton Proposed Site (Revised)

- East: ~~Keyera Energy~~NGL Supply Terminal Co. -propane distribution facility~~ (Keyera)~~, ~~Jail Work Center~~ JWC (approximately 600 feet to the east), and the CPU River Road Generating Plant (100 feet to the northeast)
- South: Cargo laydown ~~and bulk potash handling facility (under construction)~~
- West: Tidewater Barge Lines and Tidewater Terminal Company (Tidewater)

The NGL Supply Terminal Co. ~~Keyera~~ propane facility is located on an approximately 4-acre parcel consisting of rail unloading, two 80,000-gallon propane storage tanks, truck loading racks, and a small office building. The ~~Jail Work Center~~ JWC 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 ~~occupy~~ occupies approximately 23 acres, including an office building for the corporate headquarters and ~~Tidewater Barge Lines operates~~ a marine terminal operated by Tidewater Barge Lines. The terminal handles containers and serves as a tug and barge maintenance and operations facility including marine and upland facilities.

These surrounding properties are all zoned IH (see Figure 4.2-~~2~~3)

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 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.

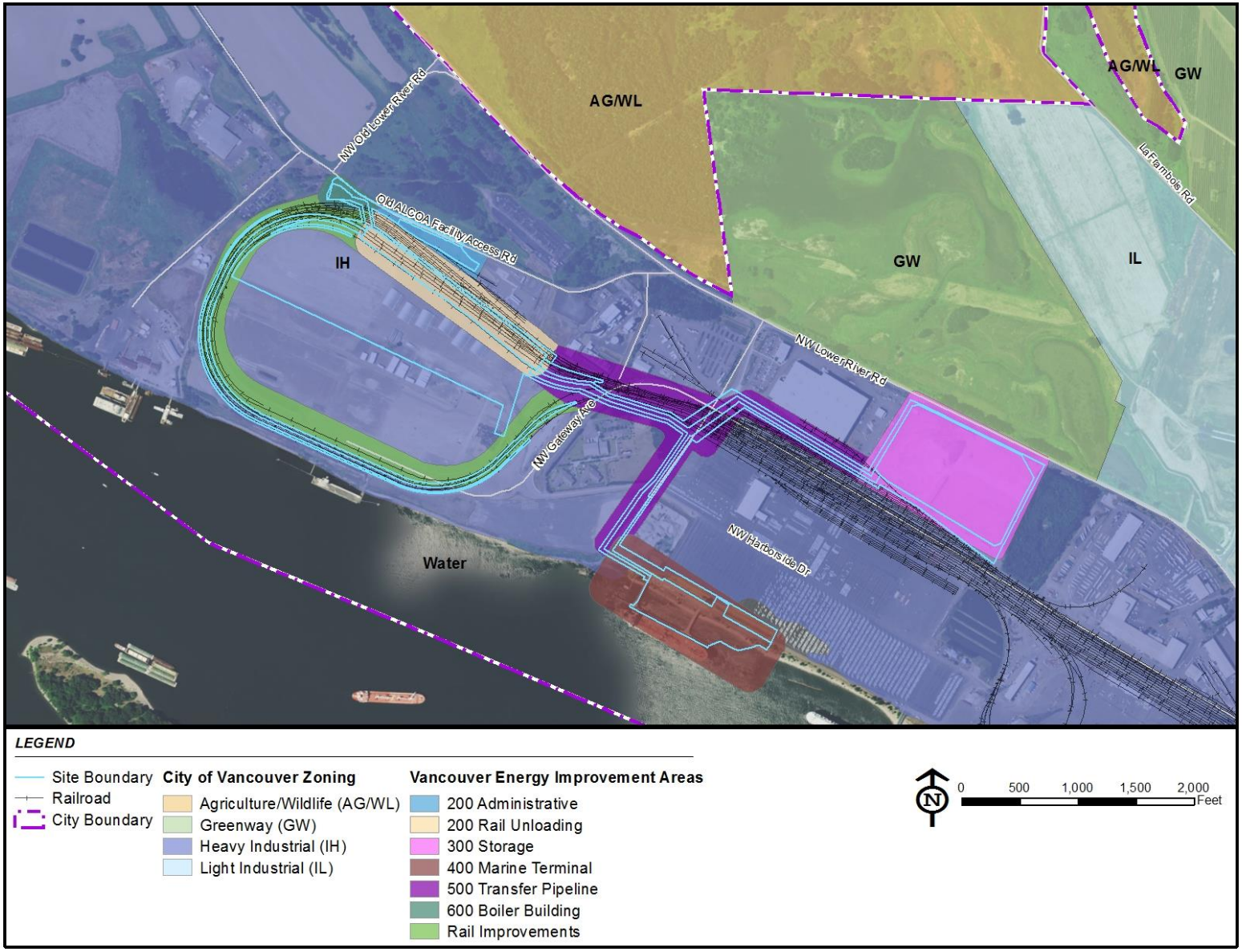

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Figure 4.2-3. City of Vancouver Zoning in Site Vicinity (Revised)

The surrounding properties are all zoned IH, with the exception of the Columbia River Wetland Mitigation Bank located north of Lower River Road which is zoned Greenway (see Figure 4.2-~~2~~3). The Greenway zone is intended to encourage the preservation of agricultural and wildlife use on land which is suited for agricultural production and is valuable for wildlife habitat (VMC 20.450.020(B)(2)).

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.

The surrounding properties are all zoned IH (see Figure 4.2-~~2~~3).

Area 500 – Properties adjacent to the pipeline routes are all industrial, with the exception of the ~~Jail Work Center~~JWC, previously described above, which is located south and west of the pipeline routes.

The surrounding properties are all zoned IH (see Figure 4.2-~~2~~3).

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.

The surrounding properties are all zoned IH (see Figure 4.2-~~2~~3).

Rail Infrastructure – The rail infrastructure improvements are located on Terminal 5. Surrounding land uses are industrial with the exception of the ~~Jail Work Center~~ JWC located to the east of the existing rail loop.

The surrounding properties are all zoned IH (see Figure 4.2-~~2~~3).

Port of Vancouver Land Uses

In addition to the land uses immediately surrounding the proposed project site, approximately 50 tenants use the Port for a variety of uses and activities. The Port occupies approximately 4 miles of waterfront and manages a total of 2,127 acres of which approximately 800 acres are currently developed, ~~including a new 108-acre industrial park;~~ 500 acres are undeveloped, 570 acres are devoted to mitigation and another 154 acres constitute the Columbia River Wetland Mitigation Bank. Within the Port's waterfront, there are five marine terminals with 13 shipping berths, with top exports currently including grain, scrap steel, bulk minerals, and pulp (Port ~~Quick Facts, 2013~~of Vancouver USA, 2015a). In addition to main exports, the Port also includes the import and/or export of automobiles, propane, liquid chemicals, and petroleum (including current operations by Tesoro at the Port). In addition to the export and import of products, the Port also provides over 2 million square feet of industrial warehousing.

Land Uses within the Project Vicinity

Land uses beyond the adjacent properties include a variety of land use activities in jurisdictions in Washington and Oregon.

Land uses within this area vary greatly, but primarily include urban and rural residential lands, commercial, industrial (primarily along the Columbia River), and agriculture and forestry (Clark County 2012). According to the Clark County Comprehensive Plan, the following land uses and their acreages for the County and the urban growth area of the City from 2007 are included in the Table 4.2-2 below and are shown in Figure 4.2-4~~3~~.

Table 4.2-2~~4.2-2~~. Clark County and Vancouver UGA Land Uses

Jurisdiction	Forestry	Agric	Comm'l	Industry/ Employment	Public Facilities	Parks	Residential
Clark County	158,068	35,760	320	307 (industry only)	10	8,968	101,704
Vancouver UGA	0	0	3,732	9,080	1,971	4,445	25,283

City of Vancouver Comprehensive Plan (2011–2030), the City's comprehensive plan, identifies land uses at the project site and those located nearest to it (Figure 4.2-5~~4~~). The downtown area, located approximately 2 miles southeast of the site, consists primarily of a mix of retail, commercial and residential uses (City of Vancouver, 2011a). Surrounding the downtown core and spreading out to the north and east are neighborhoods, including the Fruit Valley Neighborhood approximately 3,200 feet (0.6 mile) east of the site.

The Fruit Valley Neighborhood is the westernmost neighborhood in Vancouver. It consists of a mix of residential, industrial, business, and agricultural uses and natural areas (Fruit Valley Neighborhood~~ Action Plan [NAP]~~Association, 2008). The neighborhood consists of approximately 50 percent single family homes, 30 percent multi-family, 17 percent manufactured homes, and about 3 percent houseboats or other categories of houses (Fruit Valley NAP, 2008). To the north of the project site are parks and open space lands associated with Vancouver Lake (City of Vancouver, 2011a).

The residence nearest to the proposed Facility 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 car unloading facility. In addition, the Clark County ~~Jail Work Center~~ JWC is located off Gateway Avenue between the elements of the proposed project. This facility opened in 2000 and includes 224 beds in a minimum security setting (Clark County, see http://www.co.clark.wa.us/sheriff/custody/jwc.html).

To the south across the Columbia River in Oregon, land uses consist primarily of urban and rural residential, industrial (mostly along the Willamette and Columbia rivers), commercial, and agricultural lands.

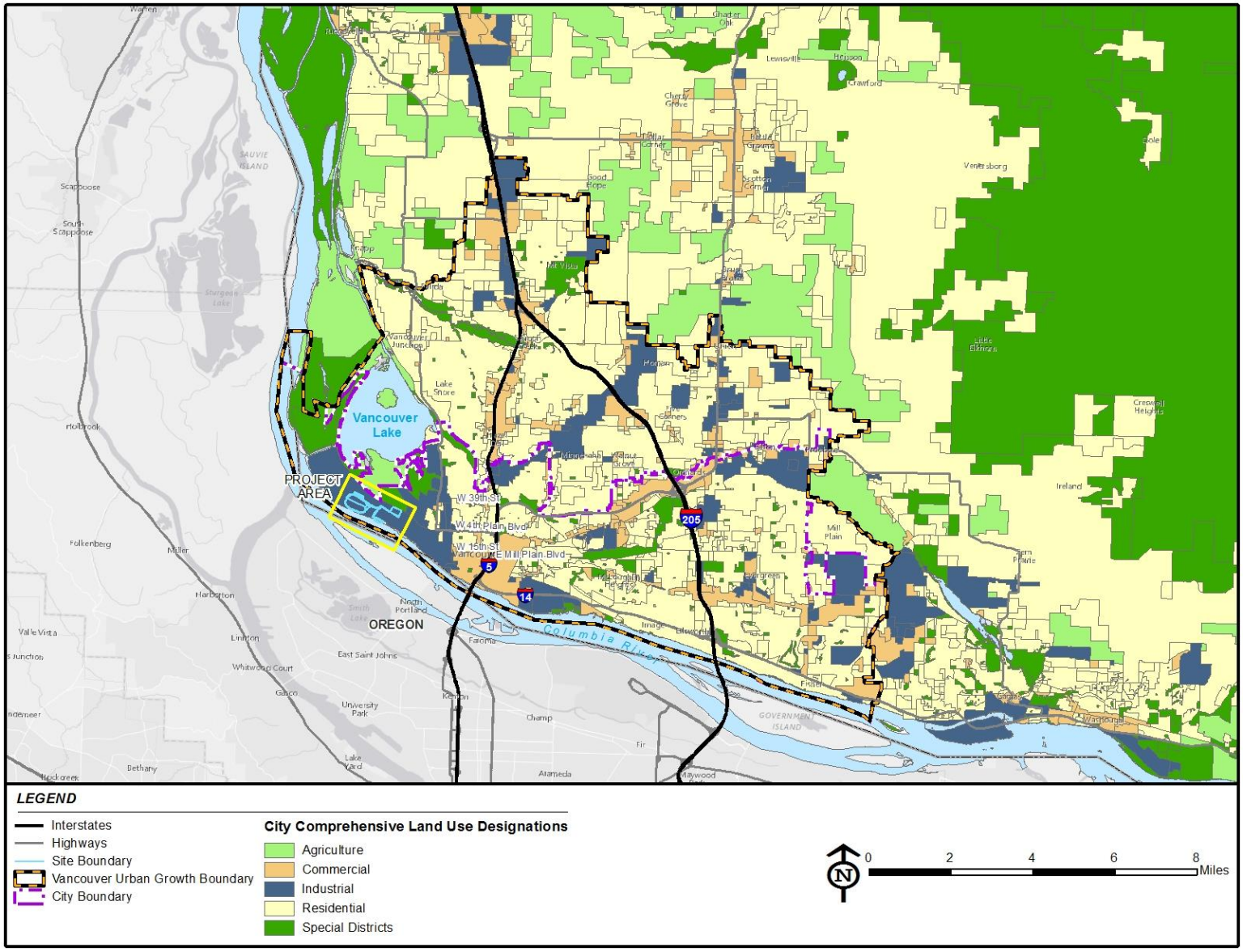

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Figure 4.2-4. General Comprehensive Land Use Designations (Revised)

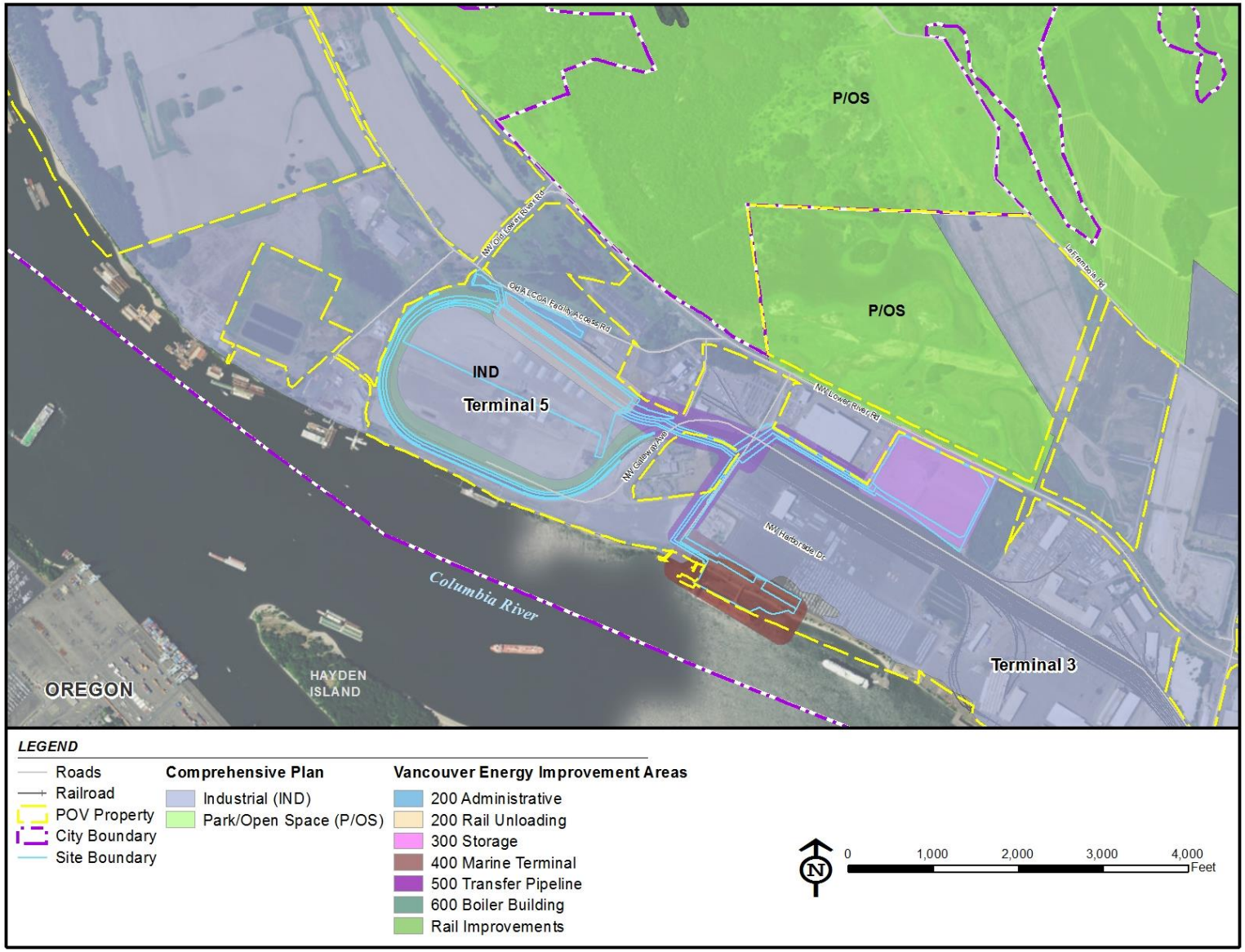

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Figure 4.2-5. Comprehensive Plan (Revised)

The Port of Portland's Rivergate Industrial District is located immediately across the Columbia River from the proposed project site and 9 miles northwest of downtown Portland. The site consists of 2,800 acres with two marine terminals, industrial warehouse areas, and rail lines. Terminals at this location include an auto import, container, grain, steel, and bulk handling facilities. The west end of Hayden Island is located in the Columbia River between the project site and the Rivergate district. This area of Hayden Island is owned by the Port of Portland and is undeveloped.

4.2.1.2 Relationship to Existing Land Use Plans and Policies

The proposed project site is located at the Port within the City. The property is addressed by the City's comprehensive plan and regulated by Title 20, Land Use and Development, of the Vancouver Municipal Code (VMC), which includes zoning and critical areas regulations, and the City's Shoreline Master Program (SMP). Applicable zoning regulations have also been addressed in section 2.23 of this application.

According to Washington's Growth Management Act (GMA), counties and cities meeting specific population and growth criteria are required to prepare comprehensive plans in accordance with the goals of the GMA as identified in Chapter 36.70A RCW. The County was an initial jurisdiction required to comply fully with the provisions of the GMA and both the City and the County have adopted comprehensive plans in their jurisdictions per the requirements of the GMA.

Land use plans and regulations applicable to the proposed project include the following:

- County
  - *Clark County Comprehensive Plan (2004–2024)*
- City
  - *City of Vancouver Comprehensive Plan (2011–2030)*
  - VMC
    - VMC 20.440 Industrial District (Zoning)
    - VMC 20.740 Critical Areas Protection
    - VMC 20.760 Shoreline Management Area
  - SMP (Effective 9/24/2012)
- Port
  - *Port of Vancouver Strategic Plan (201~~3~~6–202~~2~~5)*

A more detailed discussion follows of how these land use plans, policies, and regulations apply to the proposed project.

Clark County Comprehensive Plan

The County comprehensive plan was adopted in September 2007 and most recently amended in 2012 (Clark County 2012). The plan identifies goals and policies to guide growth in the County and includes the minimum requirements of the GMA. The GMA requires that a comprehensive plan consider the 20-year population forecasts, establish urban growth areas, and include (at a minimum) the following: land use, transportation, housing, utilities, capital facilities, and rural elements. The County's plan provides policy guidance and a process to help guide development. While the proposed project is located within the jurisdictional boundaries of the City, and therefore is subject to the City's comprehensive plan as described in the section below, the

County and the City must coordinate in the development of their respective comprehensive plans. Each jurisdiction retains exclusive authority to regulate land uses within its jurisdictional (municipal) boundaries, with the City of Vancouver holding such exclusive authority within the city.

The County's comprehensive plan established the Vancouver Urban Growth Area (UGA), including the project site, in 1995 (Clark County 1994). According to RCW 36.70A.110, UGAs are where urban growth should be encouraged. The plan also established land use designations for lands in the County (Figure 4.2-4~~3~~). The area of the proposed project is designated as Industrial (IND) by the plan as shown in Figure 4.2-5~~4~~ (Clark County 2012). The land use policies identified in the plan (Land Use Policy 1.1.1) state that the Vancouver UGA is now and will continue to be a major urban area with a full range of residential, commercial, and industrial uses, etc. The economic development policies included in Section 9.1 state that industrial uses should be encouraged in major urban centers, along with the promotion of the long-term holding of prime industrial land and the future development of these industrial lands.

City of Vancouver Comprehensive Plan

The City's comprehensive plan was most recently updated in 2011. As a city planning under the Growth Management Act, the comprehensive plan forms the policy foundation for the legislative enactment of specific land use and zoning regulations, adopted by ordinance. As such, it is the City's responsibility to enact land use and zoning regulations that are generally consistent with the comprehensive plan. To secure development entitlements, an applicant must demonstrate that a project is consistent with adopted land use and zoning ordinances. The proposed project lies entirely within the City limits and therefore is addressed by the City's comprehensive plan and is subject to applicable City land use and zoning code requirements. The proposed project is located within the UGA and is on land designated as Industrial by the City's plan (Figure 4.2-5~~4~~). This section addresses the policies of the City's comprehensive plan that apply to the project.

Community Development Policies – The community development chapter of the City's comprehensive plan provides policies that guide policy decisions on land use and development in the City. Table 1-5 of the comprehensive plan includes the City's land use designations and definitions of corresponding zoning. Under the Industrial designation, IH-zoned lands include the following activities: "[i]ntensive industrial manufacturing, service, production or storage often involving heavy truck, rail or marine traffic, or outdoor storage and generating vibration, noise and odors." Figure 4.2-5~~4~~ is the adopted comprehensive plan map for the City indicating the designation of the site and surrounding areas as Industrial. The following policies apply to the project:

- **CD-1 Citywide land supplies**
  Establish land supplies and density allowances that are sufficient to accommodate adopted long-term City of Vancouver population and employment forecast allocations.

The project site is within the UGA and designated Industrial. It is part of the land area designated by the City to fulfill this policy.

- **CD-3 Infill and redevelopment**
  Where compatible with surrounding uses, efficiently use urban land by facilitating infill of undeveloped properties, and redevelopment of underutilized and developed properties.

The project site has been previously developed and its redevelopment is supportive of this policy.

- **CD-9 Compatible uses**
  Facilitate development that minimizes adverse impacts to adjacent areas, particularly neighborhoods.

As indicated previously, the site and surrounding areas are zoned for the proposed use and contain similar industrial land uses with the exception of land used for wetland and tree mitigation activities. The Fruit Valley Neighborhood is the closest residential neighborhood to the site and is approximately 0.6 mile east of Area 300. Consistent with this policy, there are no anticipated impacts to the neighborhood from the proposal.

- **CD-11 Archaeological and historic resources**
  Protect and preserve cultural, historic and archaeological resources. Promote preservation, restoration, rehabilitation, and reuse of historically or architecturally significant older buildings. Continually increase knowledge and awareness of historic and archaeological resources, further developing the city's identity and allure. Work with Clark County to maintain state Certified Local Government Status.

As shown in section 4.2.5, consistent with this policy, there are no historic or archaeological resources that are known to be impacted by the project.

Economic Development Policies – The economic development policies of the plan are aimed at encouraging development that leads to increased numbers of jobs for residents and ensuring that enough land is available for industrial development. The following policies apply to the project:

- **EC-2 Family-wage employment**
  Promote the formation, recruitment, retention and growth of businesses that provide a wide range of employment opportunities, particularly family-wage employment. Prioritize family-wage employment in land use policies and practices.

As shown in section 4.4, the project will result in an additional 110 jobs when fully operational. The Socioeconomic Report (Appendix K) estimates 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. 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. The Socioeconomic Report estimates that the jobs directly associated with project operation of the project are likely to generate employee income that is substantially higher than the study area average wage.

- **EC-3 Public revenue enhancement**
  Promote development that enhances revenue generation for public services.

As discussed in section 4.4 and Appendix K, the project will result in additional revenues to the State and local agencies through property, business and occupation and sales taxes.

- **EC-6 Efficient use of employment land**
  Maximize utilization of land designated for employment through more intensive new building construction and redevelopment and intensification of existing sites.

Consistent with this policy, the project is part of the redevelopment of Terminal 5.

Environmental Policies – The plan's environmental policies promote the protection and enhancement of the environment while still meeting other goals of the comprehensive plan such as community and economic development and housing and infrastructure goals.

- **EN-6 Habitat**
  Protect riparian areas, wetlands, and other fish and wildlife habitat. Link fish and wildlife habitat areas to form contiguous networks. Support sustainable fish and wildlife populations.

As shown in section 2.23, the project is consistent with the City regulations regarding the protection of fish and wildlife habitat. The project will not impact riparian areas, wetland or other fish and wildlife habitat as shown in sections 3.4 and 3.5.

- **EN-7 Endangered species**
  Protect habitat for salmonids and other listed species and facilitate recovery. Encourage and support actions that protect other species from becoming listed.

As shown in section 3.4, listed salmonids and other species use portions of the site and the surrounding areas. As indicated in section 2.23, the project will undergo review under Section 7 of the ESA as part of the federal permit process for the dock improvements. Minimization and mitigation measures will be employed as necessary to protect listed species and habitat that occur in the project area.

- **EN-8 Water quality and quantity**
  Enhance and protect surface water, stormwater, and groundwater quality from septic discharge, impervious surface runoff, improper waste disposal, and other potential contaminant sources. Ensure safe and adequate water supplies and promote wise use and conservation of water resources.

Stormwater and wastewater will be generated from impervious surfaces and site operations. Stormwater will be collected and treated to adopted City standards prior to discharge to the Columbia River. Wastewater from both domestic and industrial sources will be discharged to the City sanitary system. If necessary, industrial wastewater will receive pretreatment.

- **EN-9 Trees and other vegetation**
  Conserve and restore tree and plant cover, particularly native species, throughout Vancouver. Promote planting using native vegetation. Protect historic and other significant trees. Work towards the Vancouver Urban Forestry Program goal of covering 28% of Vancouver's surface area with tree canopy.

As shown in section 3.4, most of the site is impervious and contains little vegetation. Some tree removal will be necessary for the pipeline but this will occur in an isolated area. The project will comply with VMC 20.770 and will plant additional trees to compensate for development that will impact pervious surfaces. In addition, trees will be planted as part of landscaped buffers and parking lot landscaping where currently no trees exist.

- **EN-10 Air quality**
  Protect and enhance air quality, in coordination with local and regional agencies and organizations.

As indicated in section~~s~~ 3.2 the project will generate emissions during both construction and operations. A permit for air discharge, included in section 5.1 of this application, will be obtained as part of the EFSEC process and the project will comply with all applicable regulations.

- **EN-11 Hazard areas**
  Manage development in geologically hazardous areas and floodplains to protect public health and safety.

The project area contains geologic hazards as described in section 3.1 and floodplains as described in section 3.3.3. The project will be built to comply with adopted standards for construction in seismic hazard areas. The only project element in floodplains is the dock. It will be constructed to withstand flooding and the dock surface will be above the 100-year flood level.

As shown, the proposed Facility is consistent with the City's comprehensive plan and applicable policies because the proposed use is an industrial use located on land designated as Industrial within the UGA; in addition, the Facility will promote economic development and will be designed and operated in compliance with all applicable environmental regulations and policies to ensure the protection of sensitive resources.

City of Vancouver Shoreline Master Program

The Shoreline Management Act (SMA) applies to all counties and cities that have "shorelines of the state." The SMA requires that these jurisdictions prepare and adopt shoreline master programs (SMP). The *City of Vancouver Shoreline Master Program* was approved in September of 2012 as required by RCW Chapter 90.58 and WAC Chapter 173.26. Within the project area, the Columbia River is a shoreline of statewide significance. The shoreline jurisdiction includes the waterbody and all areas within 200 feet of the ordinary high water mark (OHWM). The SMP 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.

The Facility includes a number of elements within the shoreline jurisdiction including ~~modifications to the existing rail loops~~construction of a new rail loop, dock improvements, and other activities associated with the shiploading within Area 400. Within the High Intensity and Aquatic designations, water-dependent industrial uses are permitted activities. The SMP 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 Facility is to transfer crude oil from rail cars 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 of the SMP lists water-dependent industrial uses as permitted in the High Intensity and Aquatic shoreline designations with no setback or height limits.

Compliance with applicable SMP policies is further addressed in **Error! Reference source not ound.**.

Vancouver Municipal Code

The project is located within the City and therefore subject to the VMC. Compliance with City development standards is also addressed in section 2.23 and in the Pre-Application Submittal and City Pre-Application Conference Notes included as Appendix I.1. The following zoning ordinances apply to the proposed project.

Industrial District (VMC 20.440) – Zoning – Zoning in the City is shown on the attached map (Figure 4.2-~~2~~3). The IH zoning of the site allows a variety of industrial uses, including the proposed Facility, which will comply with “warehouse/freight movement” as defined in Section 20.160.020 of the VMC. This definition is:

> *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.*

“Warehouse/Freight Movement” is listed in Table 20.440.030–1 in VMC 20.440 as a permitted use within the IH zone. In addition, “railroad yards” is listed as a permitted use within the IH zone.

Table 4.2-3 below shows how the proposal is consistent with the City’s development standards for the IH zone.

Table 4.2-3~~4.2-3~~. 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	Per VMC 20.925 5 feet (west side of Area 300) 10 feet (north side of Area 300)	5 feet for west side of Area 300 60 feet for north side of Area 300
Maximum Height	None	Approx. 50 feet (rail unloading)
Minimum Landscaping Requirement (% of total net area)	0%	≤5%

Critical Areas Protection (VMC 20.740) – The critical areas found on the site include fish and wildlife habitat conservation areas, frequently flooded areas, and geologic hazard areas (seismic

hazard). Development is proposed, to some extent, in each of these areas as described below. Compliance with this section of code is further addressed in Appendices I.1 and I.2.

Fish and Wildlife Habitat Conservation Areas (VMC.20.740.110) – Project activities at berths 13 and 14 in Area 400 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 low value because it is functionally isolated from the Columbia River.

Frequently Flooded Areas (VMC 20.740.120) – Plans include the use of the existing dock. 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 storage area on Parcel 1A (Area 300) is identified as an isolated floodplain previously approved for fill.

Geologic & Seismic Hazards (VMC 20.740.130) – The project site is mapped by Clark County GIS as having moderate-to-high potential for liquefaction or dynamic settlement within the site area of the proposed project. As discussed in detail in section 3.1, a ~~preliminary~~ geotechnical ~~report~~ investigation has been completed for the project that addresses the liquefaction potential on the site and recommends construction techniques to address any identified potential soil instability and seismic issues.

Shoreline Management Area (VMC 20.760) – Portions of the project area are located within 200 feet of the OHWM and are subject to the requirements of VMC 20.760 (Appendix I.2). The SMP is used to regulate uses within the shoreline management area as identified in VMC 20.760.030.

Port of Vancouver Strategic Plan

The *Port of Vancouver Strategic Plan (~~2013~~2016 ~~2022~~2025)* is a document that helps focus the Port's efforts in future planning and development. The strategic goals of the plan include the following: maximize marine business and development as well as industrial business and development, create a destination waterfront, develop and preserve multimodal transportation access, and generate and sustain diversified revenues. The proposed project will help increase the Port's marine business and diversify revenues at the Port to promote its long-term sustainability and economic base.

Port of Vancouver Comprehensive Scheme of Harbor Improvements

The Port has adopted a comprehensive scheme of harbor improvements per RCW 53.20.010.

State of Washington

The siting of the Facility is regulated at the state level by EFSEC, under Chapter 80.50 RCW (Energy Facilities - Site Locations) and Title 463 WAC. Applicants for certification from EFSEC are required to submit detailed information on the proposed development and its impacts. The application for site certification must also describe efforts to minimize or mitigate possible adverse impacts on the physical or human environment (WAC 463-60-085). Further, the Applicant is required to set forth insurance, bonding, or other arrangements proposed in order to mitigate for damage or loss to the environment (WAC 463-60-075). The proposed Facility is subject to EFSEC jurisdiction.

Chapter 80.50 RCW preempts all state and local approvals relating to energy facility sites that are under the jurisdiction of EFSEC. Certification pursuant to Chapter 80.50 RCW takes the place of any permit, certificate, or similar approval that would otherwise be required. Procedures to be followed by EFSEC in determining whether or not to recommend that the state pre-empt local land use plans or zoning ordinances for a site or portions of a site for an energy facility are set forth in WAC 463-28. The Council generally requires that the Applicant make reasonable efforts to achieve consistency with applicable local land use and zoning ordinances, as well as shoreline management plans in effect at the date of the application filing. If an Applicant is unable to resolve specific noncompliance issues, EFSEC may recommend that the Governor exercise the State's preemption.

4.2.1.3 Impacts

No impacts to existing land uses are anticipated.

4.2.1.4 Mitigation

As stated above, there are no impacts to existing land uses; ~~T~~therefore, no mitigation measures are identified.

4.2.2 Light and Glare

4.2.2.1 Existing Environment

The proposed Facility is located at the Port and in an area designated as industrial in the City's comprehensive plan. Existing ambient lighting levels at the site come primarily from neighboring sources that include Farwest Steel, Kelley Steel, Tidewater, the CPU River Road Generating Plant, the ~~Jail Work Center~~JWC, various import-export facilities using the adjacent rail lines and Columbia River terminals, and headlights along SR 501. Light from distant residential and commercial land use sources is minimal, primarily because of their distance from the site (1,000 feet or greater) and the low light associated with residential areas. Minimal, if any, light comes from the existing Port stormwater and mitigation facilities north of SR 501. While there are no permanent light sources on the Columbia River, there is a designated anchorage area directly across the channel from berths 13 and 14 and oceangoing vessels using the anchorage will have various levels of lighting.

4.2.2.2 Lighting

Construction phase: During construction, outdoor lighting may include limited construction lighting and on-site safety lighting or warning flashers.

Permanent lighting: The project proposes to install outdoor lighting in various areas. This lighting will include low-level lighting around exits (minimum 2 foot-candles) and general outdoor lighting (from 0.2 to 5 foot-candles) including ground level operating areas, roadways, fuel storage areas, and shiploading, rail car unloading, and parking areas. This lighting will be provided for operator access and safety under regular operating conditions. Precise detailed placement of lighting fixtures has not yet been determined, but outdoor lights will be a combination of pole-mounted and structure-mounted lights and likely will be standard streetlight height (20 to 40 feet). The American Petroleum Institute (API) 540 – Electrical Installations in Petroleum Process Plants, Section 7 – Lighting, and Illuminating Engineering Society (IES) codes and standards will be used for the basis of design for Facility lighting. Light fixtures will

be selected during final project design to achieve the levels of illuminance established by the above-listed standards.

Outside lighting likely will be placed above doorways, walkways, and stairs around the exteriors of buildings and ancillary equipment. Generally, lighting angles will be determined by an evaluation of the economics of fixture wattage, light patterns, and light levels.

Spot lighting will be provided for illumination-level enhancement where needed around loading equipment maintenance areas and stairwells and catwalks. This lighting will be higher in intensity than general outside lighting (up to 32 foot-candles), but will be limited to specific areas. This lighting can be adjusted to minimize light spillover or direct glare in response to specific site conditions.

4.2.2.3 Impacts

During construction, minor temporary outdoor lighting impacts may occur; however, most construction activities will occur during daylight hours and will be temporary in nature. There is the potential that ground improvements will occur during nighttime hours. The estimated construction duration is 9 to 12 months. Upon project completion, light and glare impacts on neighboring properties are expected to be negligible or nonexistent because the land uses on those properties are similar to the uses proposed for the Facility, as are their hours of operation and security needs.

Potential glare impacts will be minimized during the day by the use of non-reflective light paint colors on exterior surfaces. Using full cut-off light boxes, adjusting light direction, and using supplemental light shields/vegetation to provide additional screening, if necessary, will minimize light spillover at night. The Facility is expected to make a minimal contribution to overall ambient light levels in the immediate vicinity. There are no residential areas north, south, or west of the site that would be affected by proposed lighting. There are residential areas to the east within 1 mile of the Facility but most impacts are limited by the landform and existing vegetation. Impacts to wildlife as a result of construction and operational lighting is discussed in further detail in section 3.4.4.2.

4.2.2.4 Mitigation Measures

Construction

Most construction will occur during the day. If construction activities require night lighting, ~~At night,~~ lights will be directed towards the site and will be the minimum wattage required for safety and operations. Temporary construction lighting will be adjusted and/or shielded to minimize light spillover or direct glare.

Operation

~~Development elements, except for storage tanks, will be painted with earth tones.~~ The storage tanks will be painted with nonreflective white paint to reduce surface glare from direct sunlight during the day and headlights at night. Other d~~D~~evelopment elements ~~except for storage tanks,~~ will be painted with earth tones.

As described in section 3.4.4.3, Facility lighting impacts will be minimized with the use of the following mitigation measures:

- Provide directional lighting in areas adjacent to sensitive wildlife areas, including the north side of Area 300 to ensure lights are not pointed in the CRWMB and Area 400 to minimize the amount of light in aquatic habitats.
- Aim direction lighting away from sensitive habitats to the extent possible to minimize nightlight and glare.
- Incorporate LED bulbs that fall within optimum wavelengths in area lighting to reduce light pollution impacts where practicable and within safety regulations.
- In the Marine Terminal loading area use spot lighting only during loading operations if approved by the USCG in compliance with 33 CFR Part 105 and/or Part 154.

These measures will also serve to minimize light and glare impacts.

4.2.3 Aesthetics

This section describes the visual qualities of the existing landscape around the project area and the potential changes to these qualities resulting from construction and operation of the Facility.

4.2.3.1 Methodology

For the purposes of this assessment, methodologies used by federal resource managers were employed. The most widely known methodologies are those developed by the U.S. Department of Agriculture, Forest Service (*Landscape Aesthetics, A Handbook for Scenery Management*, USDA USFS, 1995) and the U.S. Department of Transportation, Federal Highways Administration (*Visual Impact Assessment for Highway Projects*, USDOT FHWA, 1981). While neither methodology applies directly to this project, conducting a visual inventory and identifying viewer sensitivity form a general framework for assessing the project's potential visual impacts. While EFSEC has used both of these methodologies in prior proceedings (most recently in analyzing visual impacts of wind energy facilities), the landscape and land use setting for this facility are considerably different, necessitating consideration of the industrial landscape as context, both in measuring impacts as well as the expectations and sensitivities of viewers.

The visual resource methodology used to inventory and assess the potential impacts of this project includes the following steps:

- Prepare an inventory existing visual quality;
- Identify and evaluate potentially sensitive viewers and viewpoints within the landscape context of the development;
- Use visual simulations to describe the visual changes introduced by the construction and operation of the Facility;
- Assess the visual impacts from potentially sensitive viewpoints within the visual context of the project and an existing heavy industrial zone; and
- Recommend mitigation measures.

Field reconnaissance was conducted to determine the general visibility of the proposed Facility from the identified potentially sensitive viewpoints (e.g., residences, travel routes, public parks or other sensitive viewpoints). Visual impacts were assessed based on the visibility of changes from potentially sensitive viewpoints as a result of construction and operation of the project. Visual simulations of facilities were produced using scaled site photographs and 3-dimensional modeling software. These simulations allowed the assessment of potential impacts and the development of recommendations for mitigation.

4.2.3.2 Inventory

The project site is located within a highly industrialized area at the Port on the north bank of the Columbia River and west of the downtown area of the City. As described in earlier sections, the project includes construction and operations at five different locations within the Port. The dominant natural features of the area are the Columbia River, Vancouver Lake, and the Vancouver Lake Lowlands. The site, which is generally flat, is south of NW Lower River Road (SR 501). The adjacent natural areas include deciduous riparian vegetation, open grassland, and natural and modified shoreline conditions. The site has been highly modified by riverbank stabilization, imported fill, and the development of heavy industrial land uses and transportation corridors. The site is zoned IH. Surrounding uses include Farwest Steel, Kelley Steel, the CPU River Road Generating Plant, the ~~Jail Work Center~~JWC, a propane terminal, and various import-export facilities using the adjacent rail lines and Columbia River terminals. The 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.

Past Industrial Use

Alcoa began operations at the Port of Vancouver in the early 1940s at the site of the proposed project. The new aluminum plant was constructed in Vancouver to take advantage of the inexpensive hydropower produced from the dams recently constructed along the Columbia River. The smelter and fabrication facilities produced rod, wire, cable, and other aluminum products that were shipped throughout the world. The extent of the aluminum smelting and manufacturing activity is illustrated on the historic aerial photo, Figure 4.2-6~~5~~. Alcoa operated the facility through the early 2000s. As indicated in section 2.1.1.1, the Port completed the purchase of the 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 Ecology approvals (see Figure 4.2-7 ~~below~~ for a current aerial photo of the site).

Since the plant's closure, site has been remediated to Ecology's standards and redeveloped for other industrial uses. Because of its industrial history, manufacturing processes and structures have dominated the appearance of the project site for more than 70 years. These historic uses resulted in the development of numerous large structures, utility, and transportation facilities. The proposed project is consistent with historic industrial uses and will not result in new visual impacts to the site and adjacent areas.

Landscape Setting

In addition to adjacent industrial Port lands, the landscape setting is characterized by the Vancouver Lake Lowlands. This landscape area includes Frenchman's Bar Regional Park, Shillapoo Wildlife Area, Vancouver Lake Regional Park, and other open space lands owned by the state and managed for wildlife. East of the site, residential and industrial areas are found along Fruit Valley Road. Additional residential areas are located on the bluffs overlooking Vancouver Lake and the Port. These residential areas range from approximately 0.6 mile to 1.25 miles from the project site. The Columbia River is directly south of the site. The Port of Portland owns the western end of Hayden Island on the south shore of the Columbia River across

from the Port of Vancouver. Figure 4.2-8 illustrates the location of Facility elements relative to the current configuration of Port Terminals 4 and 5.

Visual Quality

The general character and setting of the existing landscape are described above. Within the project limits, past and current industrial activities have modified the landscape character greatly. SR 501, other industrial uses, and overhead utility lines separate the project area visually and physically from the adjacent natural features. The visual quality of the project area is consistent with the manmade conditions within the Port.

Based on the described character and setting, three general descriptions were developed to characterize the visual quality of the project site. These visual quality descriptions were developed from the land uses and the visual patterns created by the existing natural and manmade features. The descriptions follow.

- **Urban/Industrial –** This landscape is common to urban areas and urban/industrial fringes. Human elements are prevalent or landscape modifications exist which do not blend with the adjacent natural surroundings (low visual intactness and unity). The character and setting of the site, and its visibility from surrounding areas, will be that of a heavily industrialized landscape, dominated by rail infrastructure, commodity storage, processing and shipping, with or without the project.
- **Rural –** The landscape exhibits reasonably attractive natural and human-made features/ patterns, although these are not visually distinctive or unusual within the region. The area provides some positive visual experiences such as natural open space with some existing agricultural areas (farm fields, etc.) or well-maintained and landscaped urban areas.
- **Unique/Distinctive –** This landscape exhibits distinctive and memorable visual features (landforms, lakes and rivers, etc.) and patterns (vegetation/open space) that are largely undisturbed—usually in a rural or open space setting.

Viewer Sensitivity

Potential viewer sensitivity depends on viewer types and exposure (number of viewers and view frequency), view orientation and duration, viewer frame of reference and expectation, and viewer awareness/sensitivity to visual changes. For the purposes of this report, levels of viewer sensitivity were evaluated using the following criteria:

- **Low** – Viewer types representing low visual sensitivity include industrial/warehouse, utility, and shipping and transportation workers. Compared with other viewer types, the number of viewers is generally considered small and the duration of their view is short. The activities of these viewers typically focus their attention and limit their awareness/sensitivity to the visual setting immediately beyond the workplace.
- **Moderate** – Viewer types representing moderate visual sensitivity consist of highway and local travelers. The awareness and sensitivity of this set of viewers are considered moderate because destination travelers often have a focused orientation. The level of sensitivity is influenced by the rate and frequency of travel. Delivery drivers who often travel a particular route will have less sensitivity than pedestrians who move slowly through an area.
- **High** – Residential and recreational viewers and viewers accessing public places (parks, beaches, etc.) are considered to have comparatively high visual sensitivity. Their views may be of longer duration and higher frequency.

Viewpoints

To assess the potential visual impacts resulting from this project, the existing conditions were reviewed. This work included a photographic inventory of the landscape setting to identify important viewpoints where visual impacts from the project may be observed. This task considered sensitive viewers in determining final viewpoints. Areas of the project not visible from public roadways and lands, including adjacent Port industrial operations, were not included in the analysis. The viewpoints and the project vicinity are illustrated in Figure 4.2-9~~7~~.

Four viewpoints were determined to assess potential impacts resulting from project:

- **Viewpoint 1** was selected to assess potential impacts for motorists, bicyclists, and pedestrians traveling SR 501 and viewing the storage area (Area 300). This viewpoint is approximately 400 feet from the storage area. Primary viewers include Port tenants and customers, park users traveling to/from Frenchman's Bar and Vancouver Lake parks, and recreational bicyclists. Because of the short duration of view, recreational users passing by the storage area have been assigned moderate viewer sensitivity. Port tenants and customers have been assigned low viewer sensitivity (see Figure 4.2-10~~8~~).
- **Viewpoint 2** was selected to assess potential impacts for users at Franklin Neighborhood Park and residents of the Northwest Neighborhood. This viewpoint includes two separate sub-viewpoints (Viewpoint 2a and Viewpoint 2b) with slightly different perspectives of the storage area to assess potential impacts for different viewers. It should be noted that other park and residential areas are located closer to the Facility in the Fruit Valley Neighborhood. Because of the flat topography and the existence of natural features and built structures located between the neighborhood and the Facility, the site is not visible from the Fruit Valley Neighborhood. No visual impacts are anticipated. Located on a bluff overlooking the Port, Franklin Park is approximately 1.25 miles from the storage area and the Northwest Neighborhood is approximately 0.65 mile from it. Because of the proximity of residential and park areas to the Facility, viewers have been assigned moderate viewer sensitivity rather than the high sensitivity typically associated with this viewer type (see Figure 4.2-11~~9~~).
  Viewpoint 3 was selected to assess potential impacts for commercial maritime and recreational boaters on the Columbia River. Dock facilities located at Area 400, and to a lesser extent the storage area, will be visible from the Columbia River. This viewpoint is approximately 0.30 mile from dock and 0.75 mile from the storage area. Maritime users have been assigned a low sensitivity. Because boaters are likely to be viewing the Facility from a distance of at least 0.3 miles, recreational viewers have been assigned moderate viewer sensitivity rather than the high sensitivity typically associated with this viewer type (see Figure 4.2-12~~10~~).
- **Viewpoint 4** was selected to assess potential impacts for motorists traveling NW Old Lower River Road. This viewpoint is approximately 100 feet from the west boiler area (Area 600) and 750 feet from the unloading and office area (Area 200). Traffic through this roadway corridor is relatively light consisting primarily of Port tenants, customers, and agricultural workers. Because of the duration, frequency, and types of user groups traveling through this corridor, a low viewer sensitivity has been assigned (see Figure 4.2-13~~11~~).

Table 4.2-4 below summarizes the four viewpoints that were selected for this analysis, the sensitivity of viewers, and existing visual quality from these viewpoints.

Table 4.2-~~44.2-~~4. Viewpoints, Sensitive Viewers, Existing Visual Quality

View Number	Viewpoint	Sensitive Viewers (Sensitivity)*	Visual Quality
1	SR 501, looking west	Motorists, bicyclists, and pedestrians traveling SR 501. Primary users include Port tenants and customers (L), park users traveling to/from Frenchman's Bar and Vancouver Lake parks (M), and recreational bicyclists (M).	Urban/Industrial Rural
2a & 2b	Franklin Neighborhood Park (2a) and Northwest Neighborhood (2b), looking southwest	Park users and residents of the Northwest Neighborhood (M).	Urban/Industrial Rural
3	Columbia River Shoreline, looking north	Maritime (L) and recreational river (M) users.	Urban/Industrial
4	NW Old Lower River Road, looking east	Motorists traveling NW Old Lower River Road (L). Primary users include Port tenants and customers and employees and visitors of adjacent industrial sites (e.g. Tidewater).	Urban/Industrial

*L = low; M = moderate; H = high viewer sensitivity

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Figure 4.2-6. Historical Aerial Photo

BergerABAM	**Figure 4.2-7. Current Aerial Photo (New)**

BergerABAM	**Figure 4.2-8. Bird's Eye Photo Simulation (Revised)**

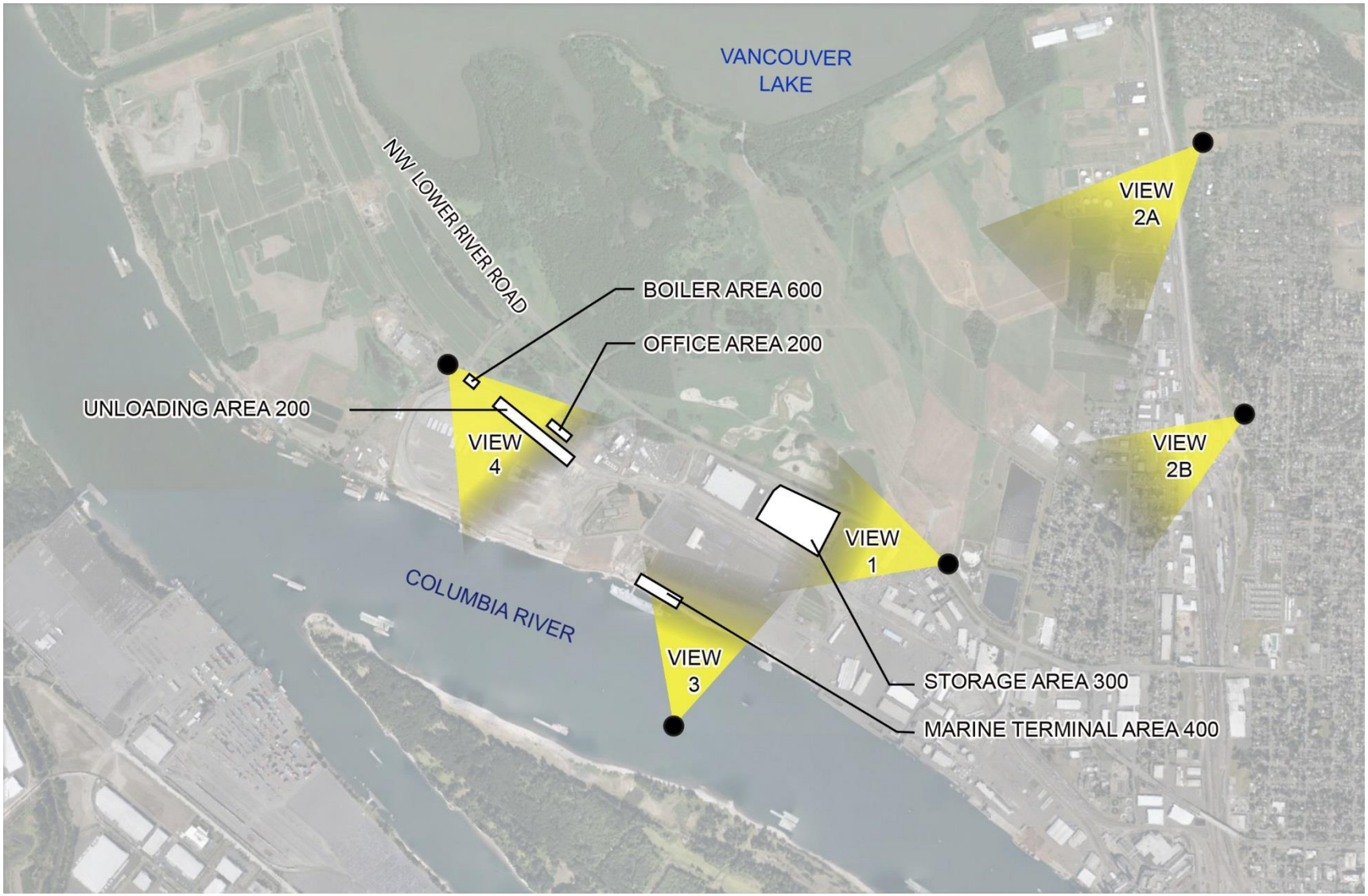

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Figure 4.2-9. Viewpoints and Vicinity (Revised)

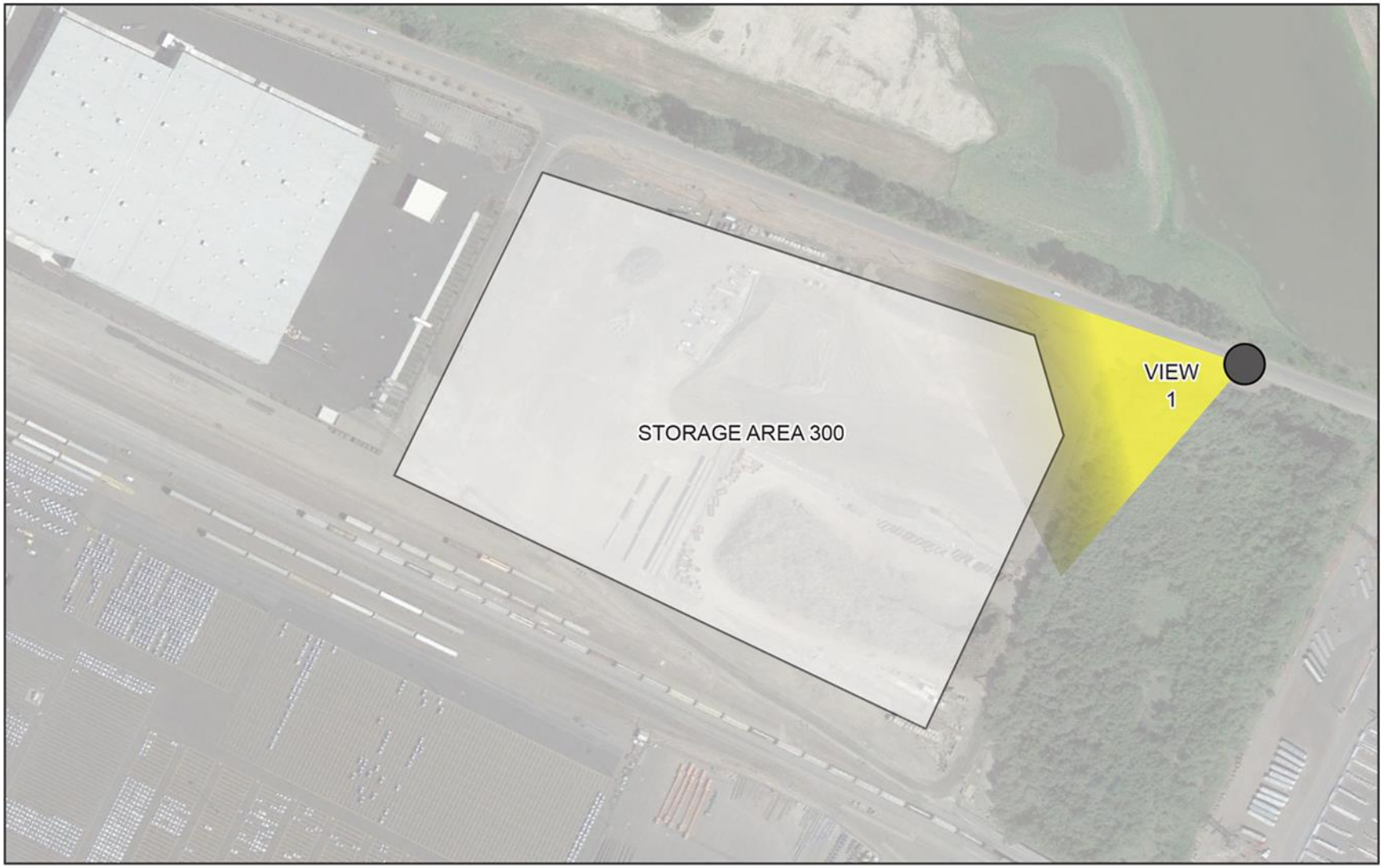

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Figure 4.2-10. Viewpoint 1

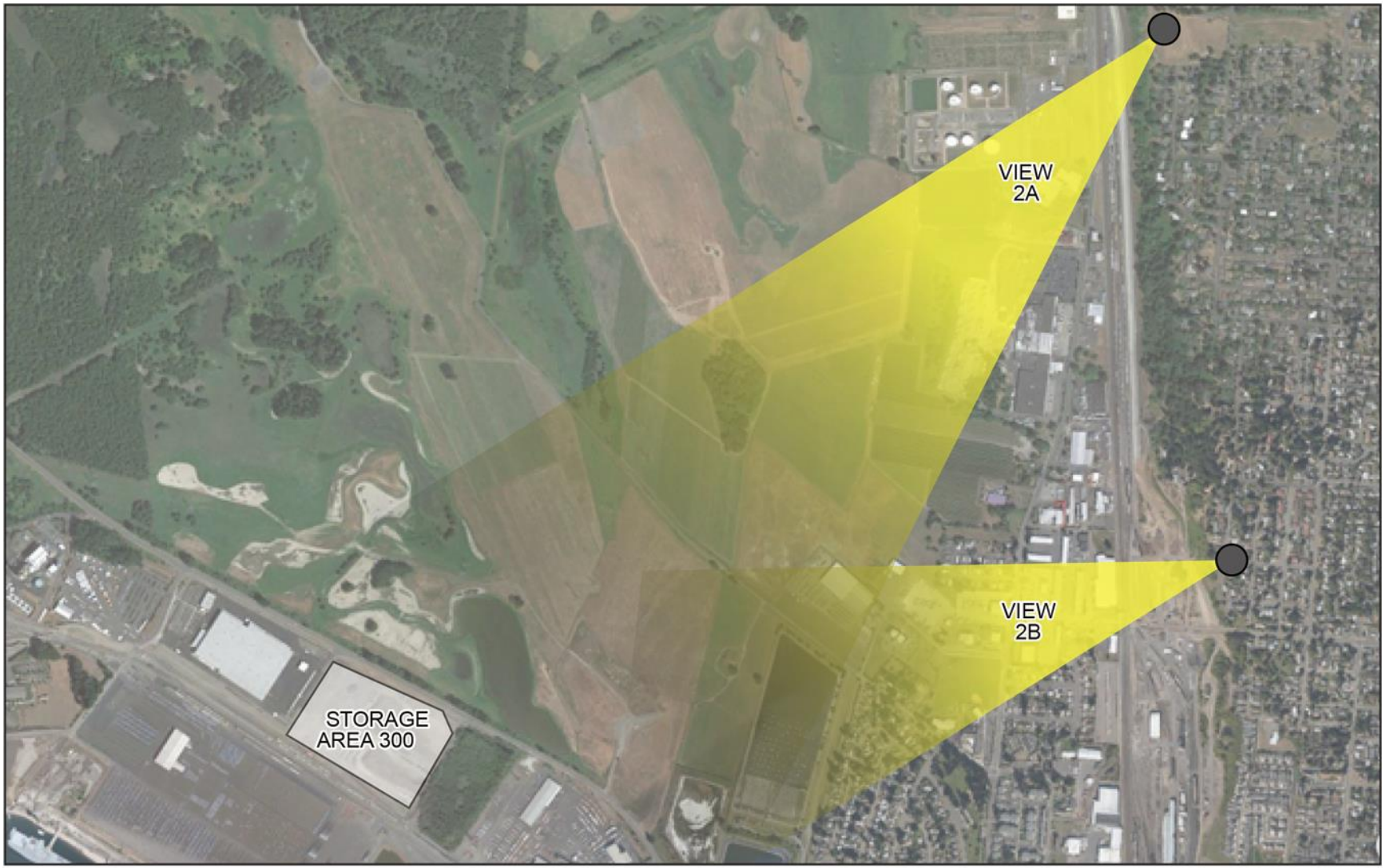

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Figure 4.2-11. Viewpoint 2

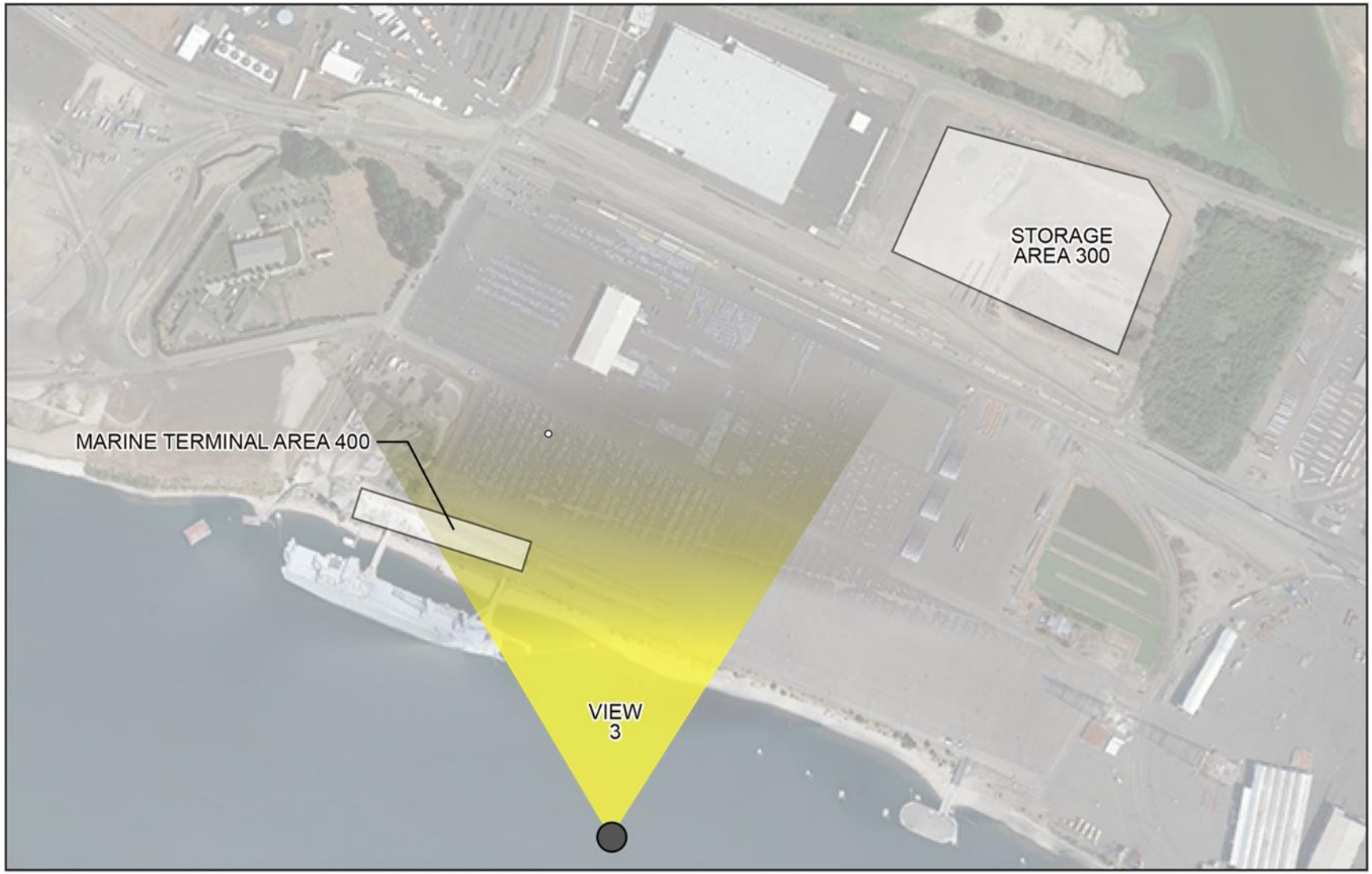

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Figure 4.2-12. Viewpoint 3

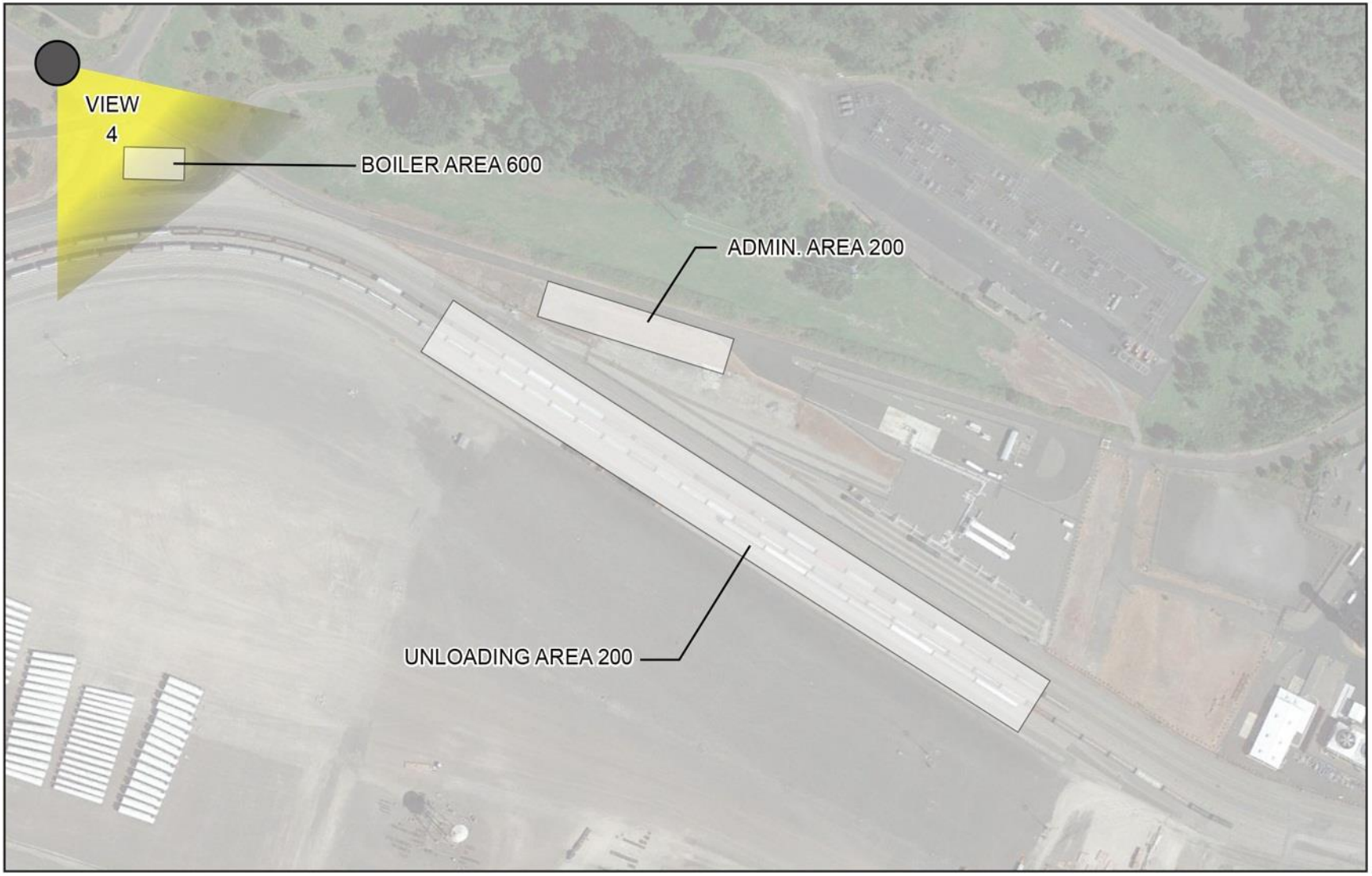

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Figure 4.2-13. Viewpoint 4

4.2.3.3 Visual Assessment

In order to assess the impacts to landscapes and views potentially affected by the proposed Facility, visual simulations were prepared illustrating the constructed condition of the project. The visual simulations were developed using photographs taken with a digital SLR camera from various focal lengths from 27 mm to 105 mm. Photographs were taken of the existing topographic and vegetative features showing both close-in and distant views of the affected adjacent developed, recreation, residential, neighborhood, roadway and river areas. 3-D models and illustrations were created of the proposed structures using a combination of AutoCAD, Google Sketchup Pro, and Adobe Photoshop. The 3-D models were then geo-referenced and placed in Google Earth Pro. Perspective views of the 3-D models were generated for each structure using the camera locations used for the digital photographs. Images exported from the 3-D model were then superimposed over the high-resolution digital photographs to simulate the constructed condition of the built structures and proposed landscape improvements within the existing landscape setting. The digital photographs and the simulations represent before and after images and help describe the visual change associated with this project. No other photo editing or touchup work was done to the simulations.

The tentative heights of the components of the Facility are presented in Table 4.2-5.

Table 4.2-~~54.2-5~~. Estimated Heights of Components

Structure	Height (feet)
Tanks	~~48~~50
Boiler Building	45
Administration/Office Building	12
Rail Car Unloading Building	48

The visual simulation task and analysis provided the following visual assessment.

SR 501

The assessment of visual impacts on those who use the public roadway abutting and directly north of the storage area (Area 300) used one vehicle point (Figures 4.2-~~12~~14 and 4.2-15~~13~~). Views from other locations along NW Lower River Road will be similar in nature. NW Lower River Road is a vehicular and non-motorized transportation corridor for travelers bound for the Port and for users of the recreation resources in the area such as Vancouver Lake and Frenchman's Bar parks, the Columbia River, and state recreation lands within the Vancouver Lake Lowlands. The Port property to the east of the storage area is covered with trees that obscure most views of the site from the east. Views of the project are apparent as the traveler nears the storage area. The tanks and the containment berm and fencing will be visible from this viewpoint, although the construction of the storage area is proposed to include a 6-foot-high containment berm that will screen most of the industrial activities from pedestrian and vehicular views. The project will include buffer landscaping including street trees, shrubs, and groundcover plantings. The proposed landscape will soften the views of the storage area from SR 501. Although the storage area structures will be visible from SR 501, this view is not inconsistent with other Port industrial facilities and uses along this corridor.

BergerABAM	**Figure 4.2-14. Viewpoint 1 Existing**

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Figure 4.2-15. Viewpoint 1 Simulation

Franklin Park and Northwest Neighborhood
This viewpoint (see Figures 4.2-~~14~~16 and 4.2-17~~15~~) illustrates the potential visual impacts of the Facility from the urban open spaces overlooking the Port. A second viewpoint – a street-level view from a residential street within the Northwest Neighborhood – was selected. This viewpoint (see Figures 4.2-18~~16~~ and 4.2-19~~17~~) illustrates the potential visual impacts of the Facility from the residential neighborhood overlooking the Port. The park and neighborhood are at an elevation approximately 150 feet above the proposed Facility. Although the elevated perspective of this viewpoint provides open westerly views, the distance from the viewpoint to the Facility and the extensive trees and many manmade structures in the foreground restrict views of the proposed structures and the potential impacts are minimal.

Columbia River Shoreline
The project includes buildings and loading structures at the existing marine terminal (Area 400) located on the Columbia River (see Figures 4.2-20~~18~~ and 4.2-21~~19~~). The evaluation included the potential visual impacts of the Facility as seen by users at the Columbia River water level. Although the primary use of the river in this area is heavy marine, recreational boaters pass through en-route to recreational areas up- and downstream of the project and views are potentially affected by the proposed Facility. The shoreline at the Port includes several docks, piers, and other industrial structures. Because of the working nature of this waterfront, the proposed cranes and structures associated with this project will have limited visual impact to river users.

NW Old Lower River Road
One viewpoint was used to assess visual impacts on those who use the public roadway near the west boiler building and rail car offloading facility. A short segment of NW Old Lower River Road is adjacent to this part of the Facility and the proposed structures may be briefly visible to roadway users traveling through this corridor. The proposed visual simulation (see Figures 4.2-~~20~~22 and 4.2-23~~21~~) examines the potential impacts of the Facility on a viewer located in the public right of way. Although the structures will be visible from NW Old Lower River Road, this view is not inconsistent with other Port industrial facilities and uses along this corridor.

Temporary Visual Impacts
Temporary visual changes introduced by construction activities include changes during construction. Viewers will observe earthwork equipment, construction trailers, building construction, and cranes. Construction will last 9 to 12 months and no interim screening will be provided. Standard erosion control measures will be implemented during construction periods.

4.2.3.4 Visual Impacts
In general, visual impacts to the overall landscape setting resulting from construction of the Facility are expected to be low. The proposed uses are similar to the historic, existing and ongoing land disturbances created by other industrial development. Required landscaping along SR 501 and at proposed parking areas will provide screening, shaded areas, and some unity with surrounding landscape when mature (approximately 10 years). The form, color, and scale of buildings and elements will be similar to nearby heavy industrial developments and the Facility will be visually compatible with the industrial land uses surrounding the development.

This analysis examines the aesthetic impacts of this project. The primary concerns are the potential impacts from the residential and recreation areas and recreation users near the site.

BergerABAM	**Figure 4.2-16. Viewpoint 2a Existing**

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Figure 4.2-17. Viewpoint 2a Simulation

BergerABAM	**Figure 4.2-18. Viewpoint 2b Existing**

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Figure 4.2-19. Viewpoint 2b Simulation

BergerABAM	**Figure 4.2-20. Viewpoint 3 Existing**

BergerABAM	**Figure 4.2-21. Viewpoint 3 Simulation**

BergerABAM	**Figure 4.2-22. Viewpoint 4 Existing**

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Figure 4.2-23. Viewpoint 4 Simulation

Because of the industrial nature of the Port, the proposed Facility is generally consistent with the existing land uses and built environment. The visual impact assessment was based on the evaluation of the changes to the existing visual quality and sensitive viewers. Viewer sensitivity should be considered within the context of reasonable expectations of those experiencing views of a heavily industrialized area. The assessment of impacts was based on the visual simulations of the changes portrayed in each image. The levels of impacts are identified as high, moderate, and low:

- **High Level of Impact (H) –** assigned in situations in which the storage area, buildings, or other structures would be highly visible to a high number of sensitive viewers and would impact the visual quality of the landscape setting negatively. Mitigation measures may or may not provide benefit to this level of impact.
- **Moderate Level of Impact (M) –** assigned in situations in which the storage area, buildings, or other structures would be visible to a moderate number of sensitive viewers. Moderate impacts may be generally consistent with adjacent land uses and some mitigation may be required to minimize impacts to sensitive viewers. Views of the storage area from SR 501 are considered to have a moderate level of impact although the mitigation measures that are already part of the project will reduce impacts.
- **Low Level of Impact (L) –** assigned in situations in which the storage area, buildings, or other structures would be minimally visible or visual impacts would be difficult to perceive because of distance, compatibility with other existing land uses, or screening or buffering. Industrial facilities in the foreground of other industrial facilities would not change the visual quality and would be considered a low level of impact. A project that affects a low number of viewers may be a low level of impact. The views from Franklin Park and the Northwest Neighborhood are considered to have low levels of impact because of the distance of the viewpoint from the existing landscape and the manmade structures in the foreground. The views from the Columbia River and NW Old Lower River Road are considered to have low levels of impact because of the viewpoint distance and industrial context.

Potential visual impacts are summarized in Table 4.2-6 below.

Table 4.2-6~~4.2-6~~. Summary of Visual Impacts from Representative Viewpoints

View Number	Viewpoint	Existing Visual Quality	Existing Visual Sensitivity*	Anticipated Visual Impacts*
1	SR 501, looking west	Urban/Industrial Rural	M, L	M
2a & 2b	Franklin Neighborhood Park and Northwest Neighborhood, looking southwest	Urban/Industrial Rural	M	L
3	Columbia River Shoreline, looking north	Urban/Industrial	L, M	L
4	NW Old Lower River Road, looking east	Urban/Industrial	L	L

*Visual sensitivity and impact: L = low; M = moderate; H = high

4.2.3.5 Mitigation Measures

While visual impacts are not considered to be significant, to minimize impacts to all viewpoints, the project will implement the following mitigation measures.

Construction

During construction, the majority of construction activities will be conducted during daylight hours to avoid light and glare on adjacent communities. At night, lights will be directed towards the Facility location and be limited to the minimum wattage required for safety and operations.

Operation

The following mitigation measures~~e~~ are ~~already~~ required by the City ~~and are~~as standard development requirements. They include:

- Existing trees will be used as landscape buffers and will remain along SR 501 to reduce visual impacts.
- A landscape buffer with street trees, shrubs, groundcovers will be established along SR 501, entrance roads, and facilities along Old Lower River Road.
- Landscaping will be provided in parking lots per City requirements.
- Non-reflecting light colors will be used on structures.

During the operation, developed elements of the Facility, including all building features except for storage tanks, will be painted with earth tones. The storage tanks will be painted with non-reflective white paint to reduce surface glare from direct sunlight during the day, area lighting and headlights at night. Covered and directional area lighting will reduce impacts from spillover and glare on adjacent lands. Screening requirements for industrial facilities under Vancouver municipal code Section 20.925.070 will further reduce visual impacts to adjacent lands and roadways from any new open storage facilities that are part of the Facility. As a result of these measures, adverse impacts on visual resources and aesthetics occurring during the operational lifetime of the Facility will not be significant.

4.2.4 Recreation

4.2.4.1 Inventory of Recreational Facilities

Regionally popular recreational activities include outdoor sports such as boating, windsurfing, fishing, hiking, biking, rock climbing, and camping. As a result of the area's proximity to many rivers, streams, and mountains, many outdoor recreation opportunities are readily available to residents. Recreational opportunities in the immediate vicinity (within an approximately 2-mile radius) of the proposed Facility are listed in Table 4.2-7 and shown in Figure 4.2-24~~22~~.

Table 4.2-74~~.2-7~~. Public Park and Recreation Facilities in the Immediate Vicinity of Project

Name of Park/Facility	Facilities	Owner
Vancouver Lake Park	• 234-acre regional park located along the west shore of Vancouver Lake • 2.5 mile trail connection to Frenchman's Bar Park • Lake access with a sandy beach • Playground equipment • Picnic shelters • Restrooms • Hand launched watercraft access • Vancouver Lake Rowing Club	~~Vancouver-Clark Parks & Recreation~~Clark County (County) ~~(VCPRD)~~

Name of Park/Facility	Facilities	Owner
Frenchman's Bar Park	• 120-acre regional park located on the Columbia River • 2.5 mile trail connects to Vancouver Lake Park • River access with a sandy beach • 8 sand volleyball courts • Playground equipment • Picnic shelters • Restrooms	~~VCPRD~~County
Shillapoo Wildlife Area (Vancouver Lake Unit)	• 477-acre unit at the south end of Vancouver Lake • Boat launch on the south shore • Trails • Wildlife viewing • Hunting, trapping, fishing • Target Shooting/ trap shooting/archery	Washington Department of Fish and Wildlife (WDFW)
Burnt Bridge Creek Greenway Trail	• 8-mile hard-surfaced shared-use trail	~~VCPRD~~City of Vancouver (City)
Franklin Park	• 12-acre neighborhood park • Play equipment • Sports fields • Picnic tables	City~~VCPRD~~
Fruit Valley Park	• 6-acre neighborhood park • Play equipment • Paved pathways • Picnic tables	~~VCPRD~~City
Liberty Park	• 0.2-acre park developed in conjunction with the completion of the Mill Plain Blvd. Extension • Play equipment	~~VCPRD~~City
Various Neighborhood Parks (Lynch, Hidden, Carter, Brickyard, and John Ball Parks)	• Small neighborhood parks (approximately 1 to 5 acres) located in neighborhoods west of I-5 and south of Burnt Bridge Creek • Play equipment • Multi-use fields/open lawn areas • Picnic tables	~~VCPRD~~City
Kelley Point Park	• 102 acre multi-use park • Canoe launch • Restroom • Historical site • Paved and unpaved trails • Picnic tables • Willamette and Columbia River Access	Portland Parks and Recreation
Smith & Bybee Wetlands Natural Area	• Approximately 2,000 acre natural area • Paved 1-mile trail • Wildlife viewing platforms • Boat launch	Metro

Name of Park/Facility	Facilities	Owner
Vancouver Lake Sailing Club	• Private sailing facility • Boat launch • Facilities	Vancouver Lake Sailing Club
Lakeview Par 3 Golf Challenge	• Par 3 Golf Course	Lakeview Par 3
Vancouver Waterfront Park	• 7.3 acre waterfront park • Columbia River Access • Picnic tables • Paved trails	City of Vancouver

The City's comprehensive plan identifies the various types of parks in the community as neighborhood parks, community parks, regional parks, natural areas and open space, and trails and greenways (City of Vancouver, 2011). Neighborhood parks are approximately 2 to 5 acres in size and provide access to basic recreation opportunities for residents located nearby the park, community parks are typically 20 to 100 acres in size and provide a gathering place for larger groups of users, Regional parks serve residents both throughout the County and beyond and are typically larger than 50 acres in size and provide a diversity of recreational opportunities. Natural areas and open space are reserved for primarily undeveloped spaces that are managed for natural, ecological values as well as for light-impact recreational uses. Lastly, trails and greenways provide paths for non-motorized travel or passage by the general public. While schools are not designated recreation facilities, many schools offer play equipment and soccer fields for public use. There are additional parks and recreation areas beyond the immediate vicinity of the proposed project area. These parks are not addressed in greater detail here because no impacts are anticipated because of their distance from the Facility.

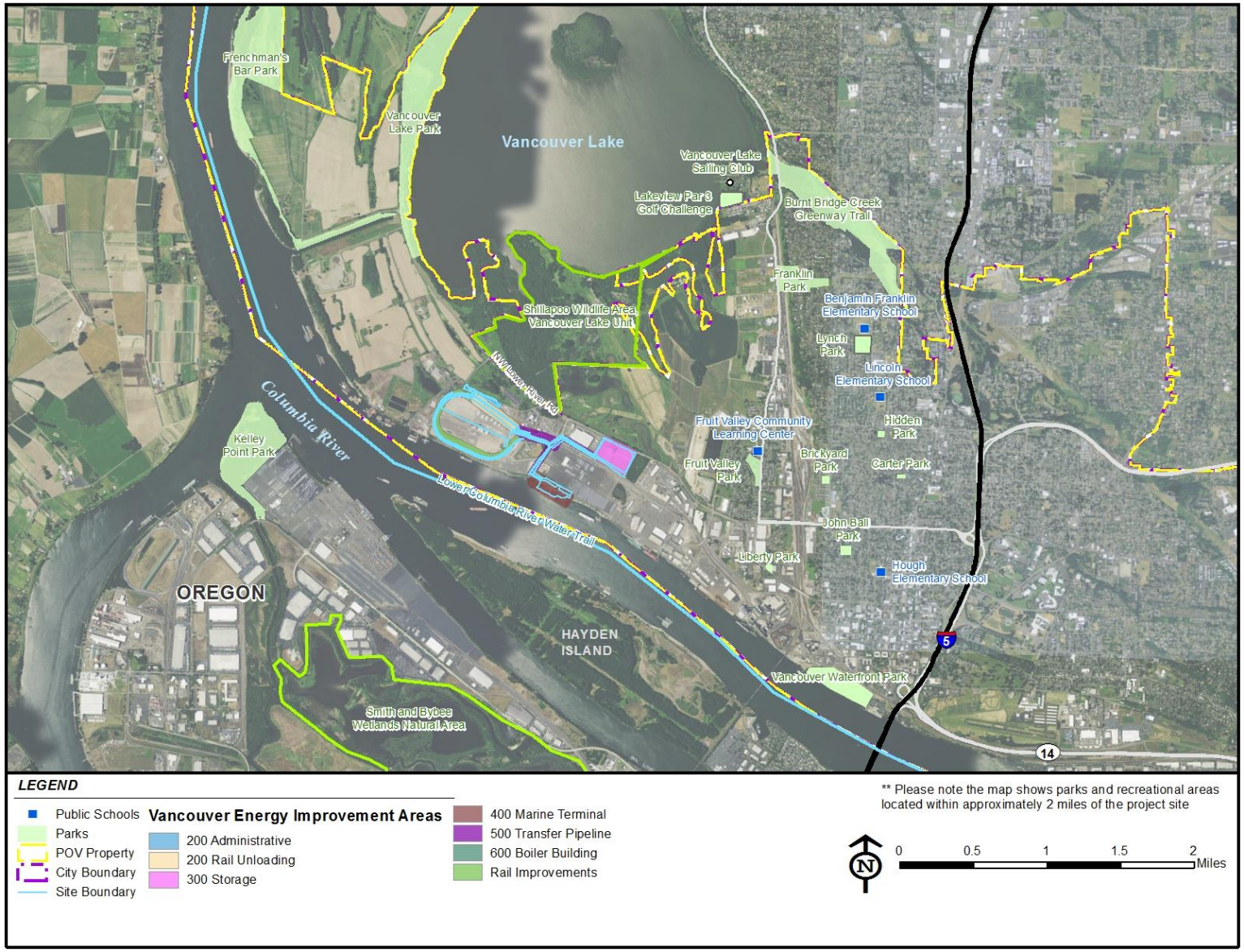

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Figure 4.2-24. Recreational Facilities (Revised)

In addition to established parks and recreational facilities, other recreation areas and sites are located within the vicinity of the Facility. These include NW Lower River Road, which is used for biking, and the Parcel 1A trail, which is a 1,200-foot-long path that runs along the south side of NW Lower River Road from Gateway Avenue to the eastern boundary of the parcel, and provides biking, walking, and wildlife viewing. In addition, the Columbia River is used for boating, fishing and other forms of water recreation.

There are three national recreation areas within 25 miles of the proposed Facility. Fort Vancouver National Historic Site approximately 3 miles to the southeast provides a variety of programs, hands-on educational activities, and living history events. The western end of the Columbia River Gorge National Scenic Area approximately 25 miles to the east provides many outdoor activities, including camping, hiking, fishing, boating, windsurfing, and wildlife viewing. The southeastern corner of the Gifford Pinchot National Forest is located approximately 25 miles to the northeast of the Facility; the national forest provides opportunities for recreational activities including camping, cabins, backpacking, hiking, biking, fishing, hunting, and winter sports.

4.2.4.2 Parks and Recreation Plans

The City and County completed the *Vancouver-Clark Comprehensive Parks, Recreation, and Open Space Plan* in May 2007. This plan covers both jurisdictions and is under the jurisdiction of the consolidated Vancouver-Clark Parks and Recreation Department (VCPRD). The plan identifies current and future recreational needs in the area and establishes priorities for the development of parks, open space, and recreational facilities. The plan also provides a framework for establishment of park policies.

The proposed Facility will not have any direct impact on current or planned park and recreation areas. The development will occur entirely within IND-designated lands zoned for high-intensity development (City of Vancouver 2011). Therefore, the proposed Facility will not interfere with the goals and objectives of the park plan.

The proposed Facility will not be required to dedicate land for park or open space and/or pay any park impact fees as industrial development is not subject to these requirements. No state or federal recreation regulations or plans apply to the proposed Facility.

4.2.4.3 Impacts

There are no long-term impacts anticipated to recreational facilities as a result of the proposed Facility. No park land or other recreational facilities will be directly impacted by development of the proposed Facility. The increases in the number of area employees attributable to construction and operations employees will be small portions of the population currently served by the park system and the increased use of recreational facilities will likely not be perceptible. There may also be temporary noise and/or visual impacts during construction, but the activities will be similar in nature to other Port activities and are not anticipated to affect recreational facilities or those using these facilities.

4.2.4.4 Mitigation Measures

As stated above, impacts to recreation users and facilities are not anticipated or will be temporary in nature ~~and will occur~~ during the construction phase. Mitigation measures specifically related to noise and air quality will minimize potential impacts during construction.

The Applicant will participate in Lower Columbia River Harbor Safety Committee efforts to develop additional boater safety educational outreach through programs such as the PTP (Prevention Through People) model used by the San Francisco Harbor Safety Committee.

4.2.5 Historic and Cultural Preservation

4.2.5.1 Introduction

WAC 463-62-362 (5) requires that the Applicant identify all historical and archaeological sites within the area affected by construction and operation of the Facility, and coordinate with the Washington State Department of Archeology and Historic Preservation (DAHP) and interested tribe(s). Archaeological Investigations Northwest, Inc. (AINW) completed the cultural resource review presented below to identify all historical and archaeological sites within the area affected by construction and operation of the Facility. The discussion below presents information in response to this requirement.

4.2.5.2 Coordination

On July 30, 2013, Applicant representatives and AINW and BergerABAM staff, met with Robert Whitlam, State Archaeologist, to introduce the project and discuss cultural and historic resources potentially present at the site. The cultural resources review methodology was described and the results of the review were presented.

To initiate Tribal coordination as required by WAC 463-62-362 (5), correspondence was sent to cultural resource representatives of the Cowlitz Indian Tribe, Confederated Tribes of the Grande Ronde Community Oregon, Chinook Tribe, Confederated Tribes of the Chehalis Indian Reservation and the Yakama Indian Nation by AINW on behalf of the Applicant requesting information on cultural resources, or any other concerns that the Tribe might have with this development. Copies of these letters are attached in Appendix A.1. Coordination between the Applicant and the Tribes is ongoing.

4.2.5.3 Study Area

The proposed Facility is located at the Port in Vancouver, Clark County, in the western lowlands region of Washington. The project is in the Port's industrial area, bounded on the north by NW Lower River Road and the Columbia River to the south. The cultural resources study area for purposes of this application are those areas to be directly impacted by construction activities located within sections 18, 19, and 20 Township 2 North, Range 1 East, Willamette Meridian. The study area includes the Facility site boundary, as well as the area contained within the temporary construction boundary and temporary laydown areas (see Figure 2.17-1).

4.2.5.4 Environmental Setting

The site is located along the Columbia River. Industrial land surrounded by scattered marshes, wildlife areas, and agricultural parcels characterize the Columbia River landscape in the vicinity. Vancouver Lake is approximately 0.6 mile to the northwest. Material dredged from the Columbia River blankets the rivershore (McGee 1972: Plate 56).

Topographically, the site is flat, although the parts closest to the Columbia River slope steeply from the top of the cut bank down to the shoreline. The steepest grades are near the shoreline, where slopes exceed 25 percent from the top of the bank to the riprapped shoreline. Elevation

ranges from about 11 feet above MSL at the shoreline to about 33 feet above MSL in the northern portions of the study area.

The present-day environmental setting has been altered substantially from the historic landscape. The site is generally covered with impervious surfaces related to industrial development and recent surface improvements by the Port. Most of the surface has been filled, paved, and/or capped in association with developments and remediation activities. Today, the study area is covered by gravel, asphalt, sand, or fill materials related to Port development. Vegetation is generally limited to grasses, non-native weedy herbaceous vegetation, and shrubs.

Prior to substantial alterations of the landscape, early maps and aerial photographs show the current site as a low-elevation wetland along the floodplain (~~U.S. Army Corps of Engineers [~~USACE~~]~~ 1940; U.S. Geological Survey [USGS] 1914, 1921). The 1860 General Land Office (GLO) map reveals small floodplain lakes slightly inland from the shoreline surrounded by marshy areas on either side of the current project area (GLO 1860). Higher elevation terraces were situated to the north of the riverbank.

The study area was formerly wetland prairies and scrub forest and was used historically for agriculture, dairying, pasture lands, and orchards. Over the years, significant landscape changes such as levee construction, dredge spoil deposition, and past and recent industrial developments have altered the original landscape. Based on an aerial photograph from 1935, the western end of the Port's facility was used for agricultural activity (USACE Photo 35-452). An aerial photograph from 1966 shows dredge deposits along the shoreline of the Columbia River (USACE Photo 66-294). A photograph from 1980 shows some agricultural activity, although the area was barren and sandy from the placement of dredge material. By 1991, the area was covered completely by dredge deposits. Aerial photographs from 1940 to the recent period show a change in the shoreline as well as the inland portion of the site (Figure 4.2-25~~23~~).

4.2.5.5 Cultural Setting

Native Peoples – Prehistoric Period

The archaeological record for the Columbia River bottomlands (also known as the Portland Basin) region is typically limited to sites dating to the last 3,000 years, probably owing to land subsidence coupled with rising sea levels. Sites are located along major waterways, including the Columbia and Willamette rivers and Vancouver Lake. Repeated flooding of waterways and rising Holocene sea levels have removed or deeply buried many low-lying archaeological sites within the Portland Basin (Ames 1994; Pettigrew 1990). Several large village sites dating to later periods have been well studied; these include the Cathlapotle site (45CL1) near Ridgefield, the Meier site (35CO5) near Scappoose, Oregon, and the Sunken Village site (35MU4), which is located on Sauvie Island (Ames et al. 1992, 1996; Croes et al. 2007). Older sites, those predating 3,000 to 3,500 years, tend to be found in uplands at higher elevations. In the County, older sites are found on terraces well above floodplains. Excavations at Sunset Ridge (45CL488) and Morasch Terrace (45CL428) in Camas and Gee Creek (45CL631, 45CL632, and 45CL810) southwest of Ridgefield have been dated to older than 5,500 years ago and some as early as the Late Pleistocene (Ozbun and Reese 2003; Punke et al. 2009; Woodward and Associates 1996). These sites demonstrate that older, datable archaeological deposits are located within the County; however, such sites are less common in the bottomlands.

Late Prehistoric native peoples of the lower Columbia region and the greater Northwest Coast area were considered to be complex hunter-gatherers (Ames and Maschner 1999). These complex hunter-gatherers maintained a hunter (including fishing) gatherer mode of subsistence rather than agricultural practices, and had sophisticated social structures and cultural traditions usually found in agricultural societies. Lower Columbia River groups were residentially sedentary and occupied large plankhouses, were socially stratified by wealth and ascribed status, and maintained some of the highest population densities in native North America (Ames and Maschner 1999).

Native Peoples – Contact Period

The Columbia River bottomlands region is within the traditional territory of Chinookan-speaking peoples, specifically those who spoke the Multnomah dialect (Silverstein 1990:534). Chinookan-speaking groups possessed cultural traditions bearing similarities to groups on the Pacific Northwest Coast as well as the Columbia Plateau (Silverstein 1990). Chinookan-speaking peoples were ethnohistorically documented as living in large villages comprising one or more plankhouses along major waterways (Moulton 1990).

The Cowlitz, an inland group, regularly traveled to the Columbia River bottomlands. The Cowlitz people were culturally distinct from neighboring tribes, including the Chinook (Hajda 1990). The Lower Cowlitz spoke a Salish dialect and occupied the lower reaches of the Cowlitz River and its tributaries.

Subsistence was based on seasonal availability and included seasonal fish runs of salmon, sturgeon, eulachon, and freshwater fishes; birds; aquatic mammals; and land mammals, primarily deer and elk. Plant foods were seasonal as well and included berries, nuts, and roots as well as bulbs and tubers, such as camas and wapato. Camas and wapato were especially important resources and were harvested in excess for trade (Hajda 1990). People maintained permanent winter villages along the major waterways and temporarily moved to hunting, fishing, and gathering locations for parts of the year (Silverstein 1990).

Euroamerican Settlement-Historical Overview

By the 1840s, most of the County, including the proposed Facility site, was claimed by the Hudson's Bay Company (HBC), a British fur-trading enterprise that established Fort Vancouver in 1825 east of the site. The HBC used the north shore of the Columbia River, in the vicinity of the study area, for farming, pasture land, and dairying (GLO 1854; Moore et al. 1997).

The GLO map from 1863 shows Parcel 1A within the former Donation Land Claim (DLC) of H. Van Allman (DLC No. 57). Henry Van Allman was born in Switzerland and immigrated to the Oregon Territory in 1847. In that same year, Van Allman settled his DLC of 311.37 acres (Clark County Genealogical Society 1989). In 1859, Joseph Petrain purchased the Van Allman DLC and used the land for grazing livestock and agriculture (Downing 1883 as cited in Moore et al. 1997). Petrain was born in Canada and arrived in the County in 1836 as an HBC employee (Clark County Genealogical Society 1989).

Terminal 5 is within the former DLC of J.H. Matthews (DLC No. 44) (GLO 1863). John Harvey Matthews emigrated on the Oregon Trail from Indiana and settled his DLC of 289.06 acres in 1852 (Clark County Genealogical Society 1989). The 1929 Metsker Map for Township 2 North, Range 1 East, Willamette Meridian depicts Parcel 1A as part of a larger property owned by the Grays Harbor Lumber Company, and Terminal 5 as owned by the Spokane Portland and Seattle

Railway (Metsker Maps 1929). The Grays Harbor Lumber Company acquired the property as a site for a sawmill (Van Arsdol 1964 as cited in Moore~~rris~~ et al. 1997).

The original course of Lower River Road (now NW Old Lower River Road) is shown on the early GLO maps and the 1897 USGS 15-minute quadrangle map for Portland, Oregon (USGS 1897). The road originally paralleled the Columbia River along the natural terrace above the shoreline, which passed through the current study area. By 1905, the road was shifted north in the current alignment of NW Old Lower River Road (USGS 1905, 1954).

The Port was established in 1912 and soon entered into a contract with G.M. Standifer Construction Corporation to build a shipyard (to the east of the current project area) to aid the World War I effort. Terminal 1 at Vancouver Landing was acquired in 1925, and a grain export facility was constructed in 1934 at Terminal 2. Harbor cranes were acquired at Terminal 2 for unloading large shipments in 1959. Terminals 3 and 4 were developed by 1963. The berths included in the study area were constructed in the 1980s. In 2009, the Port acquired acreage formerly owned by the Evergreen and ALCOA aluminum industries to develop the Port's marine Terminal 5. The rail loop at Terminal 5 was completed in 2010 (Port of Vancouver USA 2013).

4.2.5.6 Cultural Resource Assessment

Records Review

AINW reviewed records available online from the Washington Information System for Architectural and Archaeological Records Data and materials in the AINW library to determine whether archaeological or historic-period resources had been identified within or near the study area. The records search was also done to determine if surrounding areas had been previously surveyed for archaeological resources that might extend into the study area. The study area is located within the Level A, or high (80 to 100 percent) probability on the County archaeological predictive model, and is a "Survey Highly Advised: Very High Risk" area in DAHP's Washington Statewide Predictive Model. The records indicate that several cultural resource studies have been previously conducted within the study area and archaeological resources have been previously recorded in the vicinity of, but not within, the current study area. Table 4.2-8 summarizes the previous studies chronologically, and Figure 4.2-26~~24~~ shows their locations with respect to the study area.

Table 4.2-8~~4.2-8~~. Previously Recorded Cultural Resource Studies

Author	Date	Area Investigated	Findings
Thomas and Welch	1982	Parcel 1A	• 20th century dairy farm (outside the study area) • Section of original Lower River Road (outside the study area) • Dredge fill from shoreline to 800 feet inland
Forgeng and Reese	1993	Parcel 1A	• No cultural resources • Dredge fill up to 5.3 feet deep on the southern half
King	1995	Parcel 2	• 45CL408 (outside the study area)

Author	Date	Area Investigated	Findings
		(north of the study area)	
Thomas	1995	Cogentrix Power Plant (north of the study area)	• No cultural resources • Dredge fill up to 10 to 15 feet deep
Moore et al.	1997	Jail Work Center	• No cultural resources • Dredge fill up to 4 feet deep • Sterile native soils identified
Ellis and Mills	1998	Jail Work Center	• No cultural resources
Becker and Roulette	2003	Terminal 5	• No cultural resources • Dredge fill up to 20 feet deep on Columbia River bank and up to 4 to 9 feet thick further inland
Zehendner and Fagan	2008	Columbia River shoreline	• No cultural resources • Dredge fill deposition has substantially changed the shape and elevation of shoreline
Reese	2009a	Terminal 4 Parcel 1A	• No cultural resources • Dredge fill
Reese	2009b	Terminal 4 Pond Reconstruction	• No cultural resources • Dredge fill 3 to 6 m (10 to 20 ft)
Fagan and Zehendner	2009	Terminal 5	• No cultural resources • Dredge fill deposition has substantially changed the shape and elevation of shoreline
Hetzel et al.	2009	West Vancouver Freight Access Terminal 5 Jail Work Center	• No cultural resources • Dredge fill
Chapman and Blaser	2010	Terminal 5	• No cultural resources • Dredge fill
Davis and Ozbun	2011	Parcel 2 (north of the study area)	• No cultural resources • Sterile native soils identified
Jenkins and Davis	2012	Parcel 2 (north of the study area)	• No cultural resources • Sterile native soils identified
Fuld and Reese	2012	Jail Work Center	• No cultural resources • Dredge fill and disturbance

Vancouver Lakes Archeological District – The study area is within the boundary of the Vancouver Lakes Archaeological District (45DT101). This district included 125 sites when it was determined eligible for listing in the National Register of Historic Places (NRHP) in 1982 (Burd 1982). The district encompasses 3,706 acres of alluvial floodplain of the Columbia River, Vancouver Lake, Lake River, the Lewis River, and other associated water bodies. Prehistoric sites in the district range from small lithic scatters to the remains of large winter villages. Historic-period sites reflecting the early settlement of the County are common in the district as well. While several archaeological sites have been identified near Vancouver Lake, no recorded resources were identified within the present study area.

NW Old Lower River Road Area – Three cultural resource studies were conducted on the north side of NW Old Lower River Road in the Port's Parcel 2, approximately 50 feet north of the portion of the current study area located in Terminal 5 (Davis and Ozbun 2011; Jenkins and Davis 2012; King 1995). One was a cultural resource survey for a utility substation and access road and included a pedestrian survey and excavation of six shovel tests (Davis and Ozbun 2011). Shovel tests appeared to be in undisturbed native soils; however, no archaeological materials were observed. Another study was a predetermination survey for a tree mitigation project and consisted of a pedestrian survey and excavation of four shovel tests (Jenkins and Davis 2012). Shovel tests appeared to be in undisturbed native soils, but no archaeological materials were observed. These recent cultural resource investigations encountered undisturbed native soils but did not encounter archaeological deposits.

Another study was a cultural resource survey for the River Road project (formerly the Cogentrix Pipeline Lateral project) (King 1995). The survey consisted of a pedestrian survey, shovel testing, and auger probing to tests for deeply buried deposits. While no archaeological materials were observed immediately north of the present study area, one archaeological site, 45CL408, was identified during this project and is located approximately 0.6 mile northwest of the present study area (King 1995).

Another cultural resource study close to the study area was conducted for a power plant project within a portion of the old Alcoa facility, located immediately adjacent to the present study area (Thomas 1995). A pedestrian survey was conducted and dredge fill material was noted on the surface. No archaeological materials were observed (Thomas 1995).

Parcel 1A Area – Parcel 1A was first investigated in 1982 as part of a larger survey (Thomas and Welch 1982). This investigation included a pedestrian survey and excavation of 30 shovel tests and augers. Although no archaeological materials were identified in subsurface excavations, the ruins of a 20th-century dairy farm and a portion of the original alignment of Lower River Road were observed southeast of the present study area. Thomas and Welch (1982) state that dredge spoils covered the entire Columbia River beach from the shore to 800 feet inland. Monitoring was recommended in high probability areas and in the vicinity of the old dairy farm and no further work was recommended in the present Parcel 1A study area (Thomas and Welch 1982).

Parcel 1A was investigated again in 1993 for the Port's initial development of the larger Parcel 1 site. During the 1993 study, the area between the BNSF rail track and NW Lower River Road was described as a relatively undisturbed area with a series of ridges, swales, sloughs, and lakes formed by the changing course of the Columbia River over thousands of years (Forgeng and Reese 1993:1). A pedestrian survey was conducted and several backhoe trenches were excavated

south of the railroad tracks to explore for buried archaeological sites. Trench excavation revealed dredge fill up to 5.3 feet deep in some places. No archaeological materials were identified and Forgeng and Reese (1993) concluded the native surface of Parcel 1 had been greatly impacted when dredge materials were deposited.

The Parcel 1A and berths 13 and 14 portions of the study area were investigated in 2009 for the Port's Terminal 4 improvements project (Reese 2009a). The Terminal 4 improvements included the expansion and upgrades of the Subaru facility and creation of marine cargo laydown area within Parcel 1A. Background research and a records review revealed much of the site had been surveyed. A pedestrian survey was conducted in areas that were never surveyed for cultural materials. Sandy fill was observed throughout the survey area and no artifacts were identified. No further work was recommended (Reese 2009a).

Terminal 5 Area – The Terminal 5 portion of the study area was first investigated in 2003 for the Alcoa remediation project (Becker and Roulette 2003). The investigation included background research, analysis of bore log data, and a limited pedestrian survey. The pedestrian survey was conducted in areas where excavation will occur, south of the study area. The bank of the Columbia River was described as consisting of about 20 feet of dredge fill covered with riprap. An analysis of bore log data revealed that between 4 and 9 feet of dredge fill caps native soil. The pedestrian survey did not identify native soils or artifacts and monitoring was recommended for areas where deep excavation may encounter native soil (Becker and Roulette 2003).

Background research and a records review were conducted for the Terminal 5 portion of the study area in 2009 for the Alcoa/Evergreen development project (Fagan and Zehendner 2009). This investigation revealed that the shape and elevation of the north shore of the Columbia River had substantially changed when fill materials were added to facilitate construction of the Alcoa facility in the 1940s. Based on the historical evidence of extensive fill deposits on the parcel and because no archaeological deposits have been identified within or adjacent to the former Alcoa facility, no further archaeological work was recommended (Fagan and Zehendner 2009).

The ~~Jail Work Center~~ JWC property, which borders the study area, was archaeologically investigated in both 1997 and 2012 (Ellis and Mills 1998; Moore et al. 1997; Fuld and Reese 2012). The 1997 fieldwork included a pedestrian survey and excavation of 18 shovel tests and 8 shovel scrapes. Coarse sand and gravel dredge fill deposits were observed on the surface and up to 4 feet deep throughout most of the property. Native soils were identified; however, they consisted of sterile flood deposits. No artifacts were observed during the 1997 survey (Moore et al. 1997). The area Ellis and Mills (1998) examined overlapped with the Moore et al. 1997 survey area. The 2012 fieldwork consisted of a pedestrian survey of a portion of the property. Disturbance representing continual modification of the area and dredge fill deposits were identified, and no artifacts were observed (Fuld and Reese 2012).

Three archaeological studies were performed in the project area in association with the Port's WVFA project (Hetzel et al. 2009; Reese 2009a, 2009b). These studies found no evidence of prehistoric or historic-period archaeological sites. The rail siding was determined to be not eligible for listing in the NRHP (Hetzel et al. 2009). Numerous other archaeological studies have taken place in the immediate vicinity of the study area (Becker and Roulette 2003; Forgeng and Reese 1993; Thomas and Welch 1982).

A cultural resource study was conducted approximately 575 feet south of the present study area in Terminal 5 for a bulk potash handling facility (Chapman and Blaser 2010). A field inspection was conducted to identify archaeological or historic resources. The entire project area had been graded, resurfaced, and covered with gravel, asphalt, or loose sand. Fill materials were observed on the shoreline. No archaeological or historic resources were observed. Remnants of buildings and structures associated with the former Alcoa plant were observed, but none were older than 50 years in age. The remnants consisted of a foundation from a former concrete storage bunker that was built in the early 1970s, concrete silo foundations (late 1960s-early 1970s), a concrete block storage shed (circa 1970), and a log raft remnant on the shoreline (date unknown). The concrete foundations are no longer on-site. A dock that remains offshore was built circa 1967. Construction monitoring was recommended for areas of proposed excavation below the fill level and into native soils (Chapman and Blaser 2010).

A 1941 Alcoa aluminum smelting plant water tower was previously recorded (Hetzel et al. 2009) for another study and was determined not eligible for listing in the NRHP in 2011 by the DAHP. The water tower still stands but is not within the Facility study area footprint. It was not within the project APE for the Terminal 5 bulk potash handling facility, mentioned above.

Columbia River Shoreline Area – In 2008, background research and a records review were conducted for the Columbia River shoreline for a sediment remediation project at the former Alcoa facility (Zehendner and Fagan 2008). This study revealed the north shore of the Columbia River had undergone substantial changes in shape and elevation as dredge fill materials were gradually added during construction of the Alcoa facility. Aerial photographs from 1940 to recent times show the original Columbia River shoreline had been covered with fill and extended south well beyond the former shoreline (Zehendner and Fagan 2008).

Additional Surveys

As described above, several studies within the study area and in the vicinity have noted that dredge fill deposits from 4 to 20 feet thick cover the area. Based on the historical evidence of extensive fill deposits and the fact that several archaeological surveys and subsurface testing projects have found no evidence of intact archaeological deposits within or adjacent to the project area, an archaeological survey was not necessary for this project.

DAHP provided SEPA scoping comments noting the possibility that construction impacts may reach native soils and the potential for these soils to retain evidence of an archaeological site (Kaehler 2013). DAHP's recommendations included a subsurface sampling plan to observe the buried soils. AINW performed a geoarchaeological survey of the Facility APE study area in November 2014. A total of 39 geoprobe borings were collected using a Geoprobe direct-push hydraulic drill rig that collected continuous cores in intact 1.5-m segments. The borings were collected continuously to coarse Pleistocene gravels, or a depth of 1.5 m below the surface of river channel sands, or to the maximum depth of construction impact in the area, whichever was shallower. The depth of construction impacts include the use of stone columns to a maximum depth of 21.3 m (70 feet) below the surface.

No pre-contact or historic-period artifacts or archaeological features were found during the geoarchaeological investigation. Wetland, channel margin, and river channel sediments were present below the surface layer of sandy fill, and showed no signs of historic or modern disturbance, other than grading prior to filling. The sediments were dated using radiocarbon analysis of well-preserved plant and wood fragments, and tephra composition matching known

volcanic eruptions. These dates show that the initial shift from river channel to shallow floodplain wetland took place shortly before the Mount St Helens (MSH) set Ye tephra was deposited between 4,436 and 2,965 years before present (B.P.). Human occupation earlier than this would be precluded by the river channel setting. The river channel continued its gradual westward migration across the area through at least 1,290 cal years B.P., leaving behind a wetland landscape marked by low sandy ridges and numerous small ponds subject to seasonal flooding. The late Holocene wetland would have been a productive environment for hunting and gathering by Native peoples, but frequent flooding of the low-lying terrain would have prevented people from establishing enduring villages. The terrain documented in this study resembles that just to the north of the project APE, south of Vancouver Lake, where the only recorded traces of human settlement are the remnants of discarded tools and cooking fires on ridges near marshes and farmsteads on high ground. The best-preserved buried remnants of this type of sandy ridge were found in the Area 500 borings, although no indicators of human activity were present in the borings.

No monitoring of construction activities is needed in areas 200, 300, and 400 because the sediments show no evidence of stable soils, only of frequently flooded, low-lying land dominated by small ponds, marshes, and shallow floodplain channels. The dune ridge present in Area 500 north of the CalPortland facility may have been suitable for a seasonal camp. If the depth of impact will exceed 3.05 m (10 feet) below surface, which would be a change from the current plan, monitoring during construction in this portion of Area 500 would be appropriate.

Impacts

All of the study area and the surrounding area have been studied extensively for cultural resources through previous surveys~~.~~ and the project-specific survey completed in 2014.

Cultural resources includes both prehistoric and historic-period archaeological resources and historic resources of the built environment (buildings, structures, and districts). Cultural resources that are eligible for listing in the NRHP are referred to as historic properties. No archaeological or historic resources have been recorded in the Facility study area. No recorded historic buildings or structures from the 1940 Alcoa aluminum smelting plant or from previous industries remain in the Facility study area.

Although the study area is within the Vancouver Lakes Archaeological District (45DT101) and the area is mapped as Level A, or high (80 to 100 percent), probability on the County and the Washington archaeological predictive model, no archaeological sites have been identified within or adjacent to the study area. Many of the archaeological sites in the area between Vancouver Lake and the Columbia River are found near wetland environments. Prior to filling of the Facility study area, the land was a marshy floodplain. While buried features have been found in saturated soils, most archaeological sites are generally found on higher land than the study area. These sites are outside of the study area and will not be impacted.

Based on the results of the geoarcheological investigations, no monitoring of construction activities is needed in areas 200, 300, and 400 because the sediments show no evidence of stable soils, only of frequently flooded, low-lying land dominated by small ponds, marshes, and shallow floodplain channels. The dune ridge present in Area 500 north of the CalPortland facility may have been suitable for a seasonal camp. The current impacts will be no deeper than 3.05 m (10 feet) below surface for the placement of the pipelines, which will largely be above-ground, not buried. If the depth of impact will exceed 3.05 m (10 feet) below surface in the vicinity of the

dune ridge in Area 500, which would be a change from the current design plan, monitoring during construction in this portion of Area 500 would be appropriate.

4.2.5.7 Mitigation Measures

Construction

While findings from previous studies and the geoarchaeological investigation indicate a low likelihood for encountering cultural material during construction, the Applicant has submitted a preliminary Cultural Resources Inadvertent Discovery Plan (CRIDP) (Flint 2015) to EFSEC for review (Appendix A.3). ~~an inadvertent discovery plan will be prepared and implemented.~~ The inadvertent discovery plan describes the procedures to be implemented in the event of the discovery of previously unidentified archaeological resources during construction of the Facility, and in the event ground disturbing activities are required in response to an emergency event during operations. The plan also describes procedures to be implemented in the event of the discovery of human remains.

The protection measures described in the inadvertent discovery plan include the following elements:

- Should any archaeological resources be found, all work adjacent to the discovery will stop in accordance with RCW 27.53.060 (Archaeological Sites and Resources) and RCW 27.44.020 (Indian Graves and Records). Following the stop work, a professional archaeologist will be called to assess the significance of the find and the Port, EFSEC, USACE, DAHP, and the consulting tribes will be notified to define a course of action.
- If human remains are suspected, the Facility senior project manager will contact the Clark County coroner, EFSEC, and USACE. All work must stop in the area where human remains are found or suspected, and the area is to be safe-guarded; work may continue after all consultation regarding the human remains has been completed and required procedures have been completed.
- An archaeologist will prepare a summary report detailing any inadvertent discoveries and procedures that followed as a result of a discovery. The report will identify any artifacts or features found, describe the findings, and summarize the results of data analysis. The report will be provided to the Port, EFSEC, USACE, DAHP, and the affected tribes.
- ~~Because of the possibility of encountering intact soils beneath the fill in some areas of the study area, and because the study area has been included in previous surveys, if project construction reaches the depth of intact native soils, archaeological monitoring will be conducted if soils are excavated to the surface.~~
- ~~Should any archaeological resources be found, ground-disturbing activities will be halted in the area of the find in accordance with RCW 27.53.060 (Archaeological Sites and Resources) and RCW 27.44.020 (Indian Graves and Records). Following the stop work, a professional archaeologist will be called to assess the significance of the find and DAHP will be notified to define a course of action.~~
- Construction staging and laydown activities would only occur in areas that have been previously disturbed and developed. Although in some locations light surface levelling might be required to provide safe access to construction employees and equipment, deep surface disturbance in these areas is not anticipated. If the depth of impact will exceed 3.05 m (10 feet) below surface in the vicinity of the dune ridge in Area 500, which would be a

change from the current design plan, monitoring of soil disturbance activities during construction in this portion of Area 500 would be conducted.

Operations

The inadvertent discovery plan described above for construction will also be used in the event ground disturbing activities are required in response to an emergency event during operations.

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Figure 4.2-25. Historical Shoreline Configuration (Revised)

LEGEND

- Project APE
- Port of Vancouver's Terminal 4 Pond Reconstruction Project - Reese 2009b
- Port of Vancouver Terminal 4 Improvements Project - Reese 2009a
- Predetermination Clark Public Utilities Substation at Jail Work Center - Fuld and Reese 2012
- Clark County Jail Work Center - Moore et. al 1997; Ellis and Mills 1998
- Port of Vancouver Alcoa/Evergreen Development Project - Fagan and Zehendner 2009
- Alcoa Remediation Project - Becker and Roulette 2003
- West Vancouver Freight Access Project - Hetzel et al. 2009
- Aloca Vancouver Sediment Remediation Project - Zehendner and Fagan 2008
- Port of Vancouver Proposed WRI Coal Terminal - Thomas and Welch 1982
- Port of Vancouver Parcel 1 Project - Forgeng and Reese 1993
- Cogentrix Power's Proposed Gas-Fired Turbine Electric Generation Facility - Thomas 1995
- Port of Vancouver Parcel 2 Project - Davis and Ozbun 2011
- Predetermination 3101 NW Lower River Road - Jenkins and Davis 2012
- Port of Vancouver Terminal 5 Bulk Potash Project - Chapman and Blaser 2010
- Port of Vancouver Trail et al. 2014
- NWP River Road Relocation Project - Fuld and Tisdale 2015

Date: April 2015

Map Notes: Basemap -Aerial photo dated July 2010, courtesy of ESRI World Imagery service

N

0 250 500
Meters

0 500 1,000 2,000
Feet

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Figure 4.2-26. Previous Cultural Resource Studies (Revised)

4.2.6 Agricultural Crops/Animals

4.2.6.1 Existing Conditions

The proposed Facility is not currently used for agricultural purposes. Terminal 5 has been used for industrial purposes since the establishment of the Alcoa facility in the early 1940s (Anchor Environmental LLC 2008) and there is no indication of the previous use of the site for agricultural crops or for grazing. As described in section 4.2.5.4, land where Parcel 1A is located was identified as having been used for grazing and agriculture in the late 1800s and early 1900s and the Terminal 5 property would likely have been used for the same purpose. More recently, the Port has used the site as a cargo laydown area.

Agriculture in the vicinity of the proposed Facility began in the 1950s when the wetlands associated with the Shillapoo lakebed were drained to be used for farming (WDFW 2006). The Shillapoo Wildlife Area is now managed to restore wetland and wildlife habitat, although some farming still occurs on these properties. While there are lands near the project area that are still farmed, the lands are zoned agricultural/wildlife (AG-WL), which, according to the zoning code, are lands where agricultural and wildlife uses should be protected and preserved. The following agricultural land occurs within 1.5 miles of the site. The lands zoned AG-WL just to the northeast of NW Lower River Road across from the Facility are farmed, and farming also occurs approximately 0.5 mile just downriver on land also zoned AG-WL; farming and grazing occur on Sauvie Island located approximately 1.5 miles to the northwest across the Columbia River in Oregon (zoned multiple use agriculture [MUA20] and exclusive farm use [EFU]).

4.2.6.2 Impacts

The proposed Facility will be constructed primarily on previously developed areas located at the Port. The site does not contain any areas currently being used for agriculture. While there are agricultural lands within the vicinity of the project area, the Facility will not impact these areas because they fall outside of the boundary of the proposed project. The proposed Facility will not result in any impacts to agricultural crops or animals.

4.2.6.3 Mitigation Measures

~~Because n~~No impacts are anticipated and, therefore, no mitigation measures are proposed.

Section 4.3 – Transportation

WAC 463-60-372
Built environment – Transportation.

(1) Transportation systems. The application shall identify all permanent transportation facilities impacted by the construction and operation of the energy facilities, the nature of the impacts and the methods to mitigate impacts. Such impact identification, description, and mitigation shall, at least, take into account: (a) Expected traffic volumes during construction, based on where the work force is expected to reside; (b) Access routes for moving heavy loads, construction materials, or equipment; (c) Expected traffic volumes during normal operation of the facility; (d) For transmission facilities, anticipated maintenance access; and (e) Consistency with local comprehensive transportation plans.

(2) Vehicular traffic. The application shall describe existing roads, estimate volume, types, and routes of vehicular traffic which will arise from construction and operation of the facility. The applicant shall indicate the applicable standards to be utilized in improving existing roads and in constructing new permanent or temporary roads or access, and shall indicate the final disposition of new roads or access and identify who will maintain them.

(3) Waterborne, rail, and air traffic. The application shall describe existing railroads and other transportation facilities and indicate what additional access, if any, will be needed during planned construction and operation. The applicant shall indicate the applicable standards to be utilized in improving existing transportation facilities and in constructing new permanent or temporary access facilities, and shall indicate the final disposition of new access facilities and identify who will maintain them.

(4) Parking. The application shall identify existing and any additional parking areas or facilities which will be needed during construction and operation of the energy facility, and plans for maintenance and runoff control from the parking areas or facilities.

(5) Movement/circulation of people or goods. The application shall describe any change to the current movement or circulation of people or goods caused by construction or operation of the facility. The application shall indicate consideration of multipurpose utilization of rights of way and describe the measures to be employed to utilize, restore, or rehabilitate disturbed areas. The application shall describe the means proposed to ensure safe utilization of those areas under applicant's control where public access will be granted during project construction, operation, abandonment, termination, or when operations cease.

(6) Traffic hazards. The application shall identify all hazards to traffic caused by construction or operation of the facility. Except where security restrictions are imposed by the federal government the applicant shall indicate the manner in which fuels and waste products are to be transported to and from the facility, including a designation of the specific routes to be utilized.

(Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-372, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-372, filed 11/6/92, effective 12/7/92.)

Section 4.3 Transportation

Construction and operation of the Facility will result in additional motor vehicle, rail, and ship traffic. Activities include construction traffic (workers, equipment, and deliveries) on area roadways and operational traffic (employees, visitors, and deliveries of equipment supplies).

4.3.1 Existing Conditions

4.3.1.1 Regional and Site Area Transportation Facilities

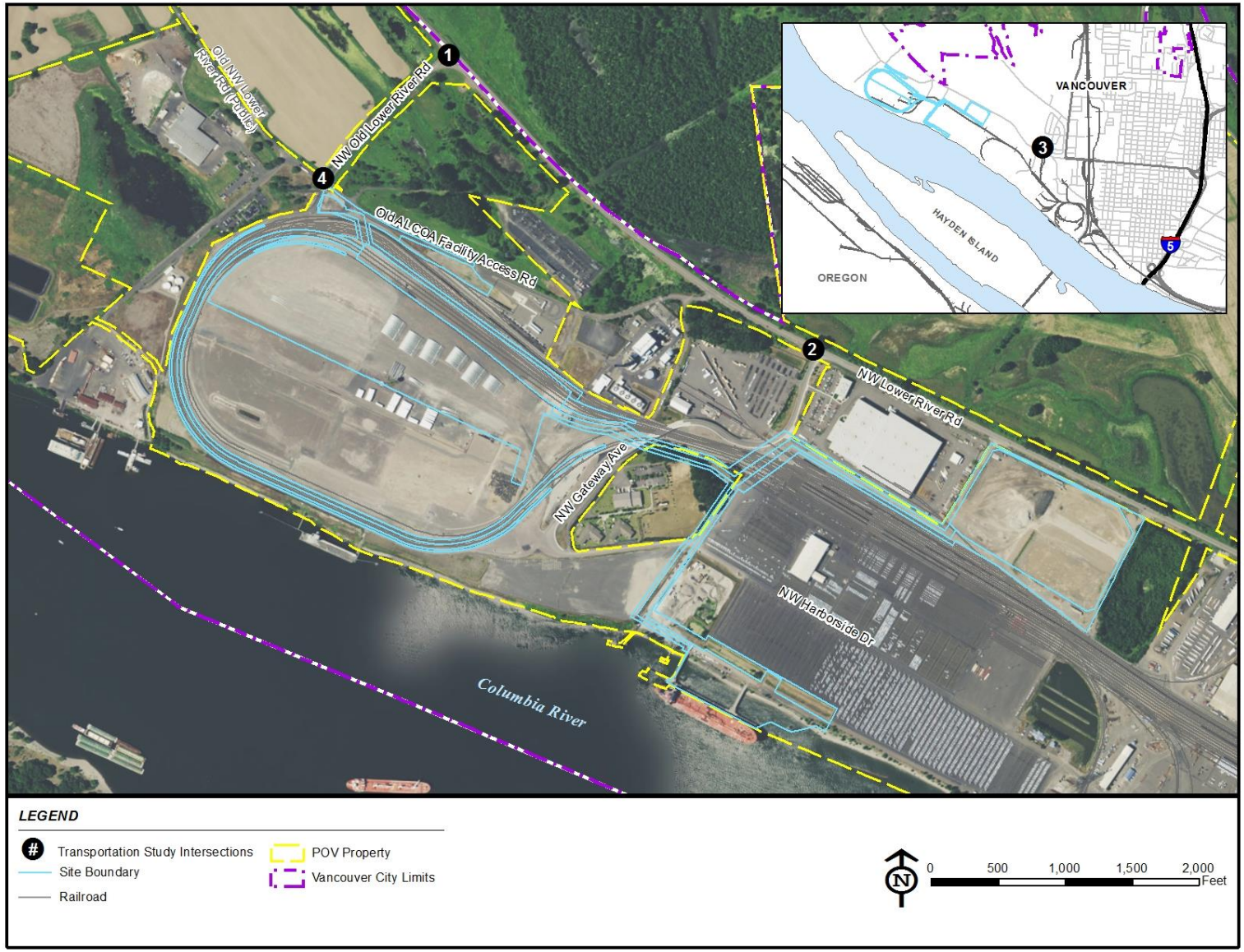
The Facility will be located within the Port, on the northern shore of the Columbia River, and will be accessible through roadway, rail, and river transportation networks.

Roadway Transportation

The existing roadway system in the area of the project is shown on Figure 4.3-1. The roadways that are within the vicinity of the project include:

- **Interstate 5** – The main interstate highway on the West Coast, I-5 generally runs parallel to the Pacific Ocean and U.S. Highway 101 from Mexico to Canada. I-5 serves some of the country's largest cities, including Seattle, Portland, Sacramento, Los Angeles, and San Diego. This significant interstate freeway generally provides four travel lanes, but expands to six lanes in the region of the Fourth Plain Boulevard exit. Other exits in the vicinity of the project site, from south to north, include SR 14, Mill Plain Boulevard, East 39th Street/ SR 500, and Main Street.
- **SR 501 (NW Lower River Road and Mill Plain Boulevard)** – This highway is co-managed by WSDOT and the City and is a major truck route with a 50-mph speed limit at the project site. West of I-5, the road leads 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 five 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, slimming down to two 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.
- **Fourth Plain Boulevard –** This is a principal arterial and state route with a 35-mph speed limit (City of Vancouver 2012) and primary access route for car and truck traffic from I-5 to the Port and the project site. West Mill Plain and West Fourth Plain boulevards connect to I-5 approximately 2.5 miles east of the site. Fourth Plain Boulevard extends west from I-5 through the northern section of downtown Vancouver, and merges into SR 501 (NW Lower River Road). Fourth Plain Boulevard is generally composed of two lanes and a turning lane. The bordering properties are both residential and commercial.
- **Old NW Lower River Road (public)** – This two-lane local access road extends south from NW 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. The road provides access to the west end of the Port's Terminal 5, Tidewater Barge Lines, Tidewater Terminal Company,

Hickey Marine, the West Van Material Recovery Center, and Old NW Lower River Road (private).



BergerABAM

Figure 4.3-1. Existing Roadway Transportation System (Revised)

- **Old Alcoa Facility Access Road (private)** – This is a private road that extends east from the public Old Lower River Road where the roadway turns from southbound to westbound. This private road has two lanes of travel, a 15-mph posted speed limit, and no sidewalks. The road, which is maintained by the Port, provides access into Port property, particularly to Area 200, the location of the proposed rail car unloading building and administrative and support buildings. The roadway continues past the project site and ends approximately 800 feet to the east at a gate and the ~~Keyera~~ NGL Supply Terminal Company facility. The roadway continues on to NW Lower River Road but is not open to general traffic.
- **NW Gateway Avenue** – Gateway Avenue is the main truck entrance to Terminal 5 at the Port. This private roadway is under Port jurisdiction, and it has two travel lanes, a posted speed of 25 mph, and a continuous sidewalk on the east side of the road from SR 501 linking to NW Harborside Drive. The Port recently completed a grade-separation project on NW Gateway Avenue that resulted in an elevated structure over the BNSF rail line that feeds into the loop track around Terminal 5. With this project complete, NW Gateway Avenue now operates independently from the Terminal 5 loop track operation and the BNSF rail line, except for minor at-grade crossing that still exists just north of the overpass structure. This at-grade crossing leads to a rail car loading area for the Tristar business~~.has two travel lanes with partial sidewalks, and on-street parking is allowed~~. ~~The roadway gives access to Terminal 4 and Terminal 5, the Jail Work Center, and CalPortland. The Port is constructing a new overpass for Gateway Avenue that will span Port rail lines with grade-separated access; September 2013 project completion is anticipated. An additional access will be provided into the Terminal 5 loop, with June 2015 completion anticipated.~~ It leads east to a propane facility run by NGL Supply Terminal Company. Further to the east is a locked security gate that prevents any public travel beyond. This roadway provides direct access to the administration and office support buildings of Area 200 and the boiler building of Area 600.
- Fruit Valley Road – This roadway is a two lane minor arterial with a center turn lane and a 25 and 35 mph speed limit. It is an east/west connection to Fourth Plain Boulevard and serves as an access point to both 39th street to I-5 and mid-town Vancouver, and connects to Lakeshore Drive/78th Street, which offers access to I-5 further north. The roadway is located through mixed zoning, including residential, school zone and industrial.
- 39th Street – This minor arterial connects Fruit Valley Road to I-5. It includes a grade separated crossing of the BNSF Railway and surface streets.

Table 4.3-1 summarizes the characteristics of the existing roadways within the project area.

Table 4.3-~~14.3-1~~. 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	Partial
Lower River Road (SR 501)[2]	Principal Arterial (State Highway Route)	2-5 lane[3]	45-50[4]	No[5]	No[6]	No	No

Roadway	Classification	Cross Section	Speed Limit	Side-walks?	Bicycle Lanes?	Median?	On-Street Parking?
Gateway Avenue	Private Street	2-lane	~~Not Posted~~~~Posted~~25 mph	Partial (east side)	No	No	Yes
Old NW Lower River Road	Local Street	2-lane	Not Posted	No	No	No	No
~~39th Street~~Old Alcoa Facility Access Road	~~Local~~ Private Street	2-lane	~~25~~15	~~Yes~~No	~~Yes~~No	No	~~Partial~~No

[1] TWLT = two-way left-turn lane with exclusive turn lanes at major street intersections.

[2] NW Lower River Road (SR 501) is both a Principal Arterial and state highway 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 NW Lower River Road (SR 501) extending from Gateway Avenue east along the Farwest Steel property as well as the frontage of the proposed Facility in the area of the tank farm.

[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.

Existing Traffic Volumes and Level of Service

Existing traffic volumes are identified in detail in Appendix J.1. Traffic counts were obtained at the study intersections on mid-week days in May 2013 during the weekday morning (6 to 9 AM) and afternoon (4 to 6 PM) peak periods. The counts were compiled and reviewed to identify the peak hour periods for the street system, which occurred from 7 to 8 AM and 4 to 5 PM. All study intersections operate within the acceptable operations threshold. VMC Section 11.80.130B requires signalized intersections maintain LOS E based on the 2000 *Highway Capacity Manual* and a volume/capacity ratio less than 0.95. Unsignalized intersections must maintain a volume/capacity ratio less than 0.95 for the critical movement and/or approach. Because SR 501 is under WSDOT's jurisdiction, intersections along SR 501 are subject to its traffic operation standards, which require LOS D or better. Table 4.3-2 indicates the LOS criteria for signalized intersections.

Table 4.3-~~24.3-2~~. LOS Criteria

LOS	Average Delay (seconds)
A	≤10
B	>10 and ≤20~~>10-20~~
C	>20 and ≤35~~>20-35~~
D	>35 and ≤55~~>35-55~~
E	>55 and ≤80~~>55-80~~
F	>80

~~The City bases transportation concurrency on the average peak hour travel speeds on identified arterial corridors (VMC 11.70). The two identified corridors that will receive trips from the proposed Facility are Mill Plain Boulevard (Fourth Plain Boulevard to I-5) and Fourth Plain Boulevard. The current LOS for these corridors is 12 mph for Fourth Plain Boulevard and 10 mph for Mill Plain Boulevard. The 2010-2011 concurrency corridor summary table from the City indicates that Mill Plain Boulevard currently averages 27 mph and Fourth Plain Boulevard averages 23 mph.~~ In addition to applying LOS as a measure of effectiveness, the City prescribes

a volume-to-capacity (v/c) threshold for both signalized and unsignalized intersections. The v/c ratio represents the sufficiency of an intersection to accommodate the vehicular demand. As the v/c ratio approaches 1.0, traffic flow may become unstable, and delay and queuing conditions may occur. Once the demand exceeds the capacity (a v/c ratio greater than 1.0), traffic flow is unstable and excessive delay and queuing is expected.

The study intersections along SR 501 are subject to WSDOT operational standards that prescribe an LOS D or better for signalized and unsignalized intersections. All other study intersections are under the jurisdiction of the City and must maintain an LOS E or better and a v/c ratio less than 0.95 for signalized intersections and a v/c ratio less than 0.95 for the critical movement and/or approach for unsignalized intersections.

As Table 4.3-3 shows, all study intersections currently operate within acceptable operational thresholds during the weekday a.m. and p.m. peak hours.

Table 4.3-3~~4.3-3~~. ~~Table 4.3-3.~~ Existing Intersection Traffic Conditions Summary

Intersection	Peak Hour	LOS	V/C	Standard	Meets Standard?
Old Lower River Rd/NW Lower River Rd (SR 501)	AM	B	0.08	LOS D	Yes
	PM	A	0.08		Yes
NW Gateway Ave/NW 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

NA = Not available for this intersection.

Rail Transportation

The project site is located at a crossroads of Washington's major north-south (I-5 corridor) and east-west (Portland to Pasco) rail lines. BNSF, a Class 1 railroad, owns and operates these lines, although it shares operating rights with the Union Pacific Railway (UP) over a significant portion of the I-5 corridor (WSDOT 2009). Currently, the Port provides rail access that extends from the main rail lines and circulates through the Port. Through the multi-phase WVFA project, the Port ~~is constructing~~has constructed modifications to its rail system including a new rail entrance into the Port, expansion of the Port rail network, and loop tracks at Terminal 5.

River Transportation

The Port currently maintains five terminals and 13 berths that lie at the terminus of the Columbia River's shipping channel, creating an international transportation gateway. The Port handles a broad range of cargos for oceangoing and river vessels including wind energy, breakbulk, project and direct transfer cargoes, containers, automobiles, forest products, steel and aluminum products, dry bulk commodities such as bauxite, mineral ores, concentrates, fertilizers, clays, and grains, and liquid commodities such as fertilizer, jet fuel, biodiesel and wood preservatives. The Columbia River navigation channel is maintained by the USACE. The channel begins at the Columbia River bar and continues five miles upriver at a depth of 55 feet and a width of

2,640 feet. After this point, the channel maintains a depth of 43 feet and a width of 600 feet for 106.55 miles to the Ports of Vancouver and Portland. The river above the rail bridge is maintained at a depth suitable for barge traffic.

The number of deep draft vessels entering the Columbia River system has declined markedly over the past two decades. There were an average of 2,100 vessel transits[4] between 1995 and 2000; consisting of 1,930 cargo and passenger vessels (92 percent of total vessel entries) and 170 tanker vessels (8 percent of total vessel entries). Approximately 60 percent of these transits occurred at Oregon ports and 40 percent at Washington ports. During 2011 and 2012, there were an average of 1,414 vessel entries; consisting of consisting of 1,326 cargo and passenger vessels (94 percent of total vessel entries) and 88 tanker vessels (6 percent of total vessel entries). Approximately 51 percent of these transits occurred at Oregon ports and 49 percent at Washington ports.- Appendix P.2 provides a traffic analysis of the Columbia River from the bar to/from the Port for the calendar year 2014.

The number of transits declined from 2,100 (average 1995 to 2000) to 1,414 (average 2011 and 2012), which represented a decrease of 687 vessel entries. This included a decrease of 604 cargo and passenger vessels and 83 tanker vessels. The number of vessel entries decreased by 33 percent. This primarily occurred as a result of increased average vessel size. The average load per vessel increased from 16,658 tons (average load of vessels from 1995 to 2000) to 27,826 tons (average load of vessels for 2011 and 2012), which represents an increase of 67 percent. These changes reflect the increased loads that can be moved on the Lower Columbia River as a result of the channel deepening from -40 feet to -43 feet Columbia River Datum which was completed in November 2010.

With the proposed project, ship and barge loading will occur at existing berths 13 ~~and 14~~ on the Columbia River south of the current Subaru facility.

Berths 13 and 14 were permitted by the ~~U.S. Army Corps of Engineers~~ USACE in 1993 "to provide berthing for up to (2) ocean-going vessels for short and/or long-term moorage." See Permit No. 93-25 (Department of the Army Permit). The permit anticipated and expressly authorized use of these berths by both governmental and commercial (cargo-handling) vessels.

Air Transportation

The nearest international airport is Portland International Airport (PDX), which is about 25 minutes away by automobile via SR 501 and I-5, then to SR 14 east to I-205, south across the I-205 Bridge, and along Airport Way to the airport. PDX has scheduled commercial passenger and freight service.

The City owns and operates Pearson Airfield for general aviation purposes (City of Vancouver 201~~2~~3). This historic airport is located approximately 3 miles east of the project site. The project site is not located within the regulated airport approach services per VMC 20.570-1.

[4] A transit is a single trip on the river. One ship-call requires two transits.

Public Transit
Public transit does not serve the site. C-TRAN (the area's public transit provider) Route #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 (C-TRAN 2013). The Port is currently developing a multi-modal path that would provide access from the proposed Facility site to the existing terminus of this transit route.

Parking
No parking is located within the areas proposed for construction on the project site.

4.3.2 Proposed Transportation Project Elements

The Facility will employ road, pedestrian, rail and marine vessel modes of transportation to access and serve the various areas of the Facility. Road access will be provided to all upland Facility areas. Rail access will be provided to Area 200 – Unloading, through the addition of new rail infrastructure. Marine vessel access will be provided to Area 400 – Marine Terminal through upgrades to the existing berths 13 and 14.

4.3.2.1 Transportation Elements by Project Area

Area 200 – Unloading and Office
The proposed project requires an office building and two support buildings, proposed for location in Area 200. These facilities will be located on the north side of the Terminal 5 loop adjacent to Old Alcoa Facility Access Road. Access driveways to NW Old Lower River Road will be constructed for two parking lots – one with 20 stalls and another with 78 stalls. Bicycle parking will be considered for incorporation into the site design. No improvements are anticipated to NW Old Lower River Road. The Applicant will construct, operate and maintain Facility driveways in compliance with City and Port standards; the City will maintain ownership and operation of NW Old Lower River Road.

The rail car unloading building will be located on the north side of the Terminal 5 loop. The building will be approximately 1,850 feet long by 91 feet wide, and will enclose the unloading equipment and tank cars during the unloading process. Pedestrian bridges 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. The Applicant will construct and maintain the pedestrian bridges. The bridges will be designed in accordance with applicable building codes and industry and standards for egress.

Rail lines on both sides of the proposed building will prevent direct vehicular access to the building due to the likely presence of trains. However, a surface level crossing will allow access for maintenance vehicles. The Port will construct and maintain this surface level crossing as part of the WVFA project.

Area 300 – Storage
The storage area is approximately 20.84 acres on Parcel 1A, approximately 1,600 feet north of the Columbia River, and located adjacent to NW Lower River Road. Access to this storage area will be from an existing Port owned and maintained shared driveway from NW Lower River Road located at the northwest corner of the site. This driveway currently provides access to Farwest Steel. As proposed, this driveway will be extended along the fenced entrance to the site,

and five parking spaces will be provided for maintenance vehicles. Modifications to NW Lower River Road and the existing driveway are not proposed. The Applicant will construct the extension of the driveway for access to the Facility storage area.

Frontage improvements along the border of the tank farm area and NW Lower River Road are not anticipated. NW Lower River Road is improved with a 12-foot-wide separated shared-use path.

Area 400 – Marine Terminal

Area 400 includes ship or barge loading and support uses on approximately 7.63 acres at existing berths 13 and 14 on the Columbia River south of the current Subaru facility. This area will be accessed via Port-owned and maintained roadways, including Gateway Avenue. Workers will use an existing paved area at the berths for parking and deliveries. The parking will be restriped as necessary.

Some modifications to the existing berths will be required to improve safety and to strengthen structures to meet current seismic design criteria and mooring loads. Modifications will be made to the Berth 13 trestle and platform, access catwalks, and mooring structures. Piping, cranes, support structures, and other equipment necessary to load the vessels (see section 2.3.~~5~~7) will be added. In the waterfront design community, it is generally recognized that the International Building Code (IBC) does not sufficiently address the unique design characteristics of waterfront structures like berths 13 and 14 that are not intended for public access and use. For this reason, the project will adopt the applicable provisions of the Oil Companies International Marine Forum (OCIMF) Mooring Equipment Guidelines, 3rd edition, and will supplement mooring and berthing design, seismic design, and structural load combinations requirements with applicable industry standards.

The Applicant will construct these modifications, and will exclusively maintain and operate the berths for the duration of the lease with the Port. However, the Port will continue to be responsible for maintenance of berth bathymetry, and will conduct maintenance dredging in accordance with its existing and future dredging permits.

The improvements will be constructed to state building code, and other safety and spill control related standards and requirements discussed in sections 2.10, 4.1.2, and 4.1.4.

Area 600 ~~– West~~ Boiler

A boiler building of approximately 6,600 square feet will be located adjacent to Old NW Lower River Road, just northwest of the administrative and support buildings area. An access driveway from Old NW Lower River Road will be added by the Applicant to provide access and parking for approximately five spaces. The driveway will be constructed to meet city code. The Applicant will maintain this access driveway.

Rail Infrastructure

As described in section 2.3, t~~T~~he project will require the construction of ~~two~~ one additional rail loop by Vancouver Energy ~~s consisting of approximately 18,000 linear feet of new track located on approximately 5.45 acres~~ at Terminal 5. The additional line~~s~~, which will begin and end near the Gateway Avenue overcrossing, will form ~~two~~ one complete loop~~s~~ ~~inside~~ outside the existing rail loops. Figure 2.3-5, illustrates the location of the new loop~~s~~. ~~The Applicant will work with the Port to construct these loops; the Applicant will maintain these two loops for the life of the~~

~~Facility. The design and implementation of these loops fall within the criteria established and evaluated as part of the WVFA project (see section 4.2)~~. As part of Facility construction, the Applicant will also relocate approximately 1,500 feet of tracks 4106 and 4107 to allow for track tie-ins into the Area 200 unloading structure.

As described in section 2.3, the Port will construct an additional rail loop as part of the WVFA project that will transfer in the future to exclusive use of the Applicant (based on the lease term for transfer). Once transferred to the Applicant, the Applicant will control operation and maintenance of the loop. At the end of the Facility's lifetime, operation and maintenance of the loop will transfer back to the Port.

All rail facilities will be constructed to meet BNSF's standard criteria for rail facilities (BNSF, 2011), and the AREMA 2013 Manual for Railway Engineering.

4.3.2.2 Estimated Future Traffic Volumes

The analysis of baseline traffic conditions estimates operating conditions for the year 2020, when the Facility 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 traffic impact analysis requirements, to identify how the transportation system in the study area will operate 5 years after completion of the proposed development.

This baseline analysis includes the growth in general traffic in the region and the vehicle trips generated by in-process developments in the vicinity of the site, but does not include traffic from the proposed development. The analysis also accounts for planned transportation improvement projects not associated with the proposed development

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 AM and PM peak hours. This growth rate was applied to major traffic movements at the study intersections along SR 501, but not at minor connections related to Port properties such as Gateway Avenue and Old Lower River Road. 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 at study intersections along SR 501. No additional in-process developments or planned roadway improvements were identified at the study intersections for the 2025 horizon year.

One ~~in-process~~ development was identified and included in the 2020 baseline traffic volumes – the Terminal 5 bulk potash handling facility, which has since been cancelled.~~.~~ That facility~~, which has undergone the required approval processes,~~ is permitted to be located west/southwest of the proposed site. While the bulk potash handling facility is no longer proposed, the Port is maintaining the approved permits for potential future development. The vehicle trips generated by this ~~in-process~~ development were assigned to the study intersections based on the trip generation and assignment contained in the transportation impact analysis completed for that project ~~by Parametrix~~ (Parametrix, 2011). At this time, it is assumed the trip generation for a similar project would be similar to that of the bulk potash handling facility.

4.3.2.3 Estimated Future Level of Service

Tables 4.3-~~3~~4 and 4.3-~~4~~5 illustrates the build out year 2020 and year 2025 baseline traffic conditions for the respective weekday AM and PM peak hour periods. These results reflect the

assumed annual traffic growth pattern and in-process development trips. The study intersections are forecast to continue to operate acceptably under these scenarios during the weekday AM and PM peak hours.

Table 4.3-~~44.3-~~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

Table 4.3-~~54.3-5~~. 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

4.3.3 Impacts

4.3.3.1 Traffic

Trip generation estimates of daily and weekday AM and PM 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 (ITE). 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 similar industrial developments. Table 4.3-~~5~~6 shows the estimated trip generation for the proposed industrial use.

Table 4.3-64.3-6. Estimated Trip Generation

Land Use	ITE Code	Size	Daily Trips	Weekday AM peak hour trips			Weekday AM peak hour trips		
				Total	In	Out	Total	In	Out
Light Industrial	110	110 176 Employees	332532	4877	4064	813	4674	1016	3658

Truck Traffic

Because the primary function of the proposed Facility is to transfer petroleum from rail cars onto nearby vessels, 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.

Site Trip Distribution and Assignment

The estimated vehicle trip distribution pattern was based on a review of the existing weekday AM and PM 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. All site trips were assigned to points east along SR 501, reflecting the location of the Port and major destinations to the east such as the downtown area of Vancouver and I-5.

2020 Year of Opening with Project Traffic Conditions

This analysis of traffic conditions in year 2020 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.

Table 4.3-67 summarizes the year 2020 total traffic conditions. As shown, all study intersections are forecast to continue operating adequately during the weekday AM and PM peak hours.

Table 4.3-74.3-7. 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	0.110	LOS "D"	Yes
	PM	A	0.152		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	0.720	LOS "D"	Yes
	PM	B	0.376		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	B	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	A	NA		Yes

Future Year 2025 5-Year Buildout Traffic Conditions

This analysis of traffic conditions in year 2025 identifies how the study area's transportation system will operate 5 years after the proposed development reaches its peak capacity and full

employment. Table 4.3-~~7~~8 summarizes total traffic conditions in future year 2025 and show that the study intersections are forecasted to continue to operate acceptably during the weekday AM and PM peak hours.

Table 4.3-8~~4.3-8~~. 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	0.11~~0~~	LOS "D"	Yes
	PM	A	0.15~~3~~		Yes
Gateway Ave/Lower River Rd (SR 501)	AM	A	0.08	LOS "D"	Yes
	PM	B~~A~~	0.24~~0~~ ~~7~~		Yes
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	C~~B~~	0.69~~7~~ ~~5~~	LOS "D"	Yes
	PM	B	0.42~~3~~ ~~8~~		Yes
Old Lower River Rd/Old Alcoa Facility Access Rd	AM	B	NA	LOS "E" & V/C ≤ 0.95	Yes
	PM	A	NA		Yes

Vehicle Queuing Analyses

Vehicle queuing analyses were prepared for the study intersections as shown in Appendix J.1. Based on the analysis, forecast queues can be accommodated within the available storage area at the identified study intersections during the AM and PM peak periods.

Concurrency Corridor Trip Assignment

The transportation impact analysis included an evaluation of the number of trips assigned to the two corridors affected by the development: Mill Plain Boulevard (Fourth Plain Boulevard to I-5) and Fourth Plain Boulevard (Mill Plain Boulevard to I-5)**.** Under the City's "Transportation Concurrency Management: Administrative Manual," both corridors are classified as Category 1 corridors. Between periodic measurements of corridor LOS, Category 1 transportation concurrency corridors are presumed to operate within acceptable LOS and are not evaluated with each development application. However, the City tracks trips distributed to each corridor from approved developments. Where there is a dramatic increase in approved trips in a Category 1 corridor LOS measurement, the City may review the corridor's designation as a Category 1 corridor. As shown by Table 4.3~~.8~~-9, the project will not result in a significant increase in the total number of weekday PM peak hour trips entering the City's concurrency corridors. Assigned trips were recorded by counting trips only once along each section.

Table 4.3-9~~4.3-9~~. Concurrency Corridor Weekday PM Peak Hour Trip Assignment

Corridor	Corridor Limits	PM Peak Hour Trips to Corridor
Mill Plain Boulevard	Fourth Plain to I-5	20
	I-5 to Andresen	0
	Andresen to I-205	0

Corridor	Corridor Limits	PM Peak Hour Trips to Corridor
	I-205 to 136th Avenue	0
	136th Avenue to 164th Avenue	0
	164th Avenue to 192nd Avenue	0
St. Johns/Fort Vancouver Way	Mill Plain to 63rd Street	0
Fourth Plain Boulevard	Mill Plain to I-5	26
	I-5 to Andresen	0
	Andresen to I-205	0
	I-205 to 162nd Avenue	0
Andresen Road	Mill Plain to SR 500	0
	SR 500 to 78th Street	0
112th Avenue	Mill Plain to 28th Street	0
	28th St. to 51st Street	0
164th/162nd Avenue	SR 14 to SE 1st Street	0
	SE 1st Street to Fourth Plain	0
Burton Road/28th Street	18th Street to 112th Avenue	0
	112th Avenue to 138th Avenue	0
	138th Avenue to 162nd Avenue	0
18th Street	112th Avenue to 138th Avenue	0
	138th Avenue to 164th Avenue	0
136th/137th Avenue	Mill Plain to 28th Street	0
	28th Street to Fourth Plain	0
192nd Avenue	SR 14 to NE 18th Street	0

4.3.3.2 Rail

At startup, the operations of the Facility will accommodate approximately 1-2 train arrivals per day and 331-661 train arrivals per year; at full capacity, operations will accommodate an average of 4 train arrivals per day and 1,713 train arrivals per year.

Most trains will arrive from the east on the BNSF Pasco to Vancouver line, entering Washington near Spokane. Control of the trains arriving at the Facility will be handed off from BNSF to the Applicant. After unloading is complete, empty trains will be returned to BNSF control upon leaving the F~~f~~acility, and BNSF will route them to their future use. BNSF states that rail traffic is highly variable and that the railroad can serve the proposed use (~~F.E. "Skip"~~ Kalb~~,~~ Jr.~~, Director of Strategic Development, BNSF, July 8,~~, S. 2013).

The Port is completing the WVFA project, a multi-phase project that will increase rail capacity at the Port and construct new rail access into it. The new access has been completed and is expected to reduce delays in rail traffic by as much as 40 percent (see section 4.2). In addition, the City ~~is~~ has completed~~ing~~ a number of improvements associated with the street and rail system in downtown Vancouver; these changes ~~will~~ closed two at-grade rail crossings permanently thus improving the efficiency of train operations in the area. WVFA operations are anticipated to accommodate up to 10 trains per day (resulting in 10 trains inbound and 10 trains outbound on

average) on the section of the BNSF rail lines that serve the Port (~~Monty~~ Edberg, ~~Port of Vancouver, Personal Communications, August 12,~~M. 2013).

4.3.3.3 Ship

As described in section 2.3.7.1, t~~T~~he Facility is designed to accommodate ships from 46,000 to 165~~0~~,000 Deadweight Tonnage[5]. The Facility will also be able to accommodate articulated tug barges (ATBs) of up to 27,500 DWT. ATBs are expected to only be used during the initial start-up of the Facility before sufficient Area 300 tankage is available to stage a full load for a Handymax-size vessel. On a regular basis, once the Facility is fully operational and storage tanks have been constructed as proposed, ATBs will not likely be used, and an estimated 365 vessel ~~calls~~trips per year occur, primarily of the Veteran class (i.e., 45 MDWT) size.~~, but use of the ATBs is not expected to be frequent. and . The majority of the ships anticipated to use the facility will be 46,000 DWT as ships of this size are readily available and the largest component of the fleet. If larger vessels are used, the number of ship calls will be reduced as individual vessels will carry larger volumes. Table 4.3-8i identifies typical ATB and tanker vessel dimensions that are expected to dock at the terminal.~~

The operations of the Facility will accommodate up to 365 ship calls per year at full operations. This results in additional ship traffic of 730 transits to and from the Facility berth per year. Information from the Columbia River Pilots indicates that the total number of inbound vessels on the Columbia River (1 transit) varied from as low as 1,404 vessels in 2009 to 2,086 vessels in 2000. 2012 data indicated a total of 1,474 vessels. In addition, Table 4.3~~.8ii-11~~10 summarizes historical vessel calls (each call includes 2 transits) to the Port from 2000 to 2012.

At maximum capacity, the Facility could increase this number by 365 vessels per year, a lower volume than the recent peak year of 2000 for overall river traffic; no impacts to river traffic are anticipated. For vessel traffic, the increase in vessels associated with the Facility are within the historic range of vessel traffic on the Columbia River and are part of the typical fluctuation in vessel traffic on the river (see for example Appendix P.2). Both the Applicant's Preliminary Draft Environmental Statement (DEIS) and EFSEC's DEIS quantified the vessel calls anticipated at the Facility in the context of existing vessel traffic on the Columbia River (BergerABAM 2014, EFSEC, 2015). See also Appendix C to Appendix P.3. All of these analyses also attempted to quantify future levels of vessel calls based on proposals pending at the time which had the potential to increase vessel traffic. However vessel traffic fluctuates based on market conditions (Flint 2016). For example container service at the Port of Portland has been entirely discontinued as of May 2016 (Phillips 2016). Since January 2016 several additional proposals have also been cancelled, for example Oregon LNG and Haven Energy (House 2016, Luck et al 2016).

In the context of this historical transit data, current and historical practices to handle vessel traffic in the Lower Columbia River reach will continue to be sufficient to manage the additional transits due to Facility operations.

[5] Deadweight Tonnage represents the number of metric tons (1 metric ton equaling 2,240 pounds) that a vessel can transport of cargo, stores, and bunker fuel.

~~Table 4.3.8i4.3-10: Dimensions of ATBs and Tanker Vessels Anticipated to Dock at TSVEDT~~

~~VESSEL CLASS~~	~~27.5 MDWT~~	~~46 MDWT~~	~~75 MDWT~~	~~115 MDWT~~	~~125 MDWT~~	~~142 MDWT~~	~~160 MDWT~~
~~TYPE~~	~~ATB~~	~~OIL TANKER~~	~~OIL TANKER~~	~~OIL TANKER~~	~~OIL TANKER~~	~~OIL TANKER~~	~~OIL TANKER~~
~~LENGTH OVERALL (LOA) [ft]~~	~~587.4~~	~~601.1~~	~~748.0~~	~~816.8~~	~~869.0~~	~~894.7~~	~~899.0~~
~~LENGTH BETWEEN PERPENDICULARS (LBP) [ft]~~	~~583.1~~	~~570.9~~	~~718.5~~	~~784.1~~	~~825.0~~	~~847.0~~	~~866.1~~
~~BEAM [ft]~~	~~74.0~~	~~105.6~~	~~105.64~~	~~143.7~~	~~136~~	~~151.6~~	~~157.5~~
~~MOULDED DEPTH [ft]~~	~~40.0~~	~~61.7~~	~~65.0~~	~~68.9~~	~~71.5~~	~~86.3~~	~~77.8~~
~~**BALLAST CONDITION** *(for upriver transit)*~~							
~~FREEBOARD [ft]~~		~~42.7~~	~~44.5~~	~~48.4~~	~~50.0~~	~~54.3~~	~~49.8~~
~~DRAFT [ft]~~		~~19.0~~	~~20.5~~	~~20.5~~	~~21.5~~	~~32.0~~	~~28.0~~
~~DISPLACEMENT (MT)~~		~~23,900~~	~~35,325~~	~~50,472~~	~~47,850~~	~~76,300~~	~~78,671~~
~~**LOADED CONDITION** *(for downriver transit)*~~							
~~FREEBOARD [ft]~~	~~9.8~~	~~20.7~~	~~22.0~~	~~25.9~~	~~28.5~~	~~43.3~~	~~34.8~~
~~DRAFT [ft]~~	~~30.2~~	~~41.0~~	~~43.0~~	~~43.0~~	~~43.0~~	~~43.0~~	~~43.0~~
~~DEADWEIGHT [MT]~~	~~27,181~~	~~46,172~~	~~64,100~~	~~94,200~~	~~86,821~~	~~90,700~~	~~103,000~~
~~DISPLACEMENT [MT]~~	~~32,885~~	~~56,368~~	~~77,996~~	~~112,872~~	~~111,299~~	~~122,469~~	~~125,751~~
~~CARGO CAPACITY @ MAX DRAFT INCL. FWA (BBL)~~		~~319,925~~	~~449,772~~	~~667,777~~	~~614,337~~	~~642,428~~	~~731,513~~

Table 4.3-10. ~~Table 4.3-8ii:~~ 2000-2012 Summary of Vessel Calls at the Port of Vancouver

VESSELS CALLS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
VANC LANDING/TERMINAL 1	2	1		3	0	0	0						
TERMINALS 2, 3, & 4	159	227	183										
BERTH 1				24	14	29	26	26	19	13	5	2	
BERTH 2				26	36	39	29	29	26	23	16	24	19
BERTH 3				1	4	14	23	23	25	25	39	83	33
BERTH 4				5	6	48	12	15	22	11	11	2	1
BERTH 5	43	76	153	152	151	122	126	111	102	91	96	79	73
BERTH 7				29	33	44	52	53	52	37	38	41	42
BERTH 8				40	48	40	47	44	47	30	28	27	32
BERTH 9				9	18	27	39	43	17	29	14	31	14
BERTH 10				25	38	66	42	68	61	37	42	54	64
BERTH 13				4	8	14	20	33	15	1	1	2	1
BERTH 14				10	8	2							0
ELEVATOR	148	171	146	122	138	82	110	123	117	107	115	111	72
TOTAL VESSEL CALLS	352	475	482	450	502	527	526	568	503	404	405	456	351

Source: Port of Vancouver, 2013

4.3.3.4 Parking

The project will provide parking for employees, visitors, deliveries, and maintenance for all project elements as indicated in section 2.~~2~~3. All parking areas will be paved and stormwater will be collected and treated in accordance with City and other applicable regulatory requirements as described in section 2.11. The total of approximately 119 parking spaces that will be provided exceeds the minimum number of spaces required by VMC 20.945 and no impacts or unmet parking needs are anticipated to result from the project.

4.3.3.5 Construction

Construction is expected to require about one year. Because construction increases the numbers of workers and deliveries in the area of the proposed project temporarily, construction activity can increase traffic and cause occasional delays. Approximately ~~125~~ 149 construction workers could be working at a single time in the various areas that are part of the project site are expected to be on the site~~.~~ on a typical workday (i.e., half of the 298 estimated total workers).~~.~~ In addition, approximately ~~83~~ 172 daily round trip truck deliveries are estimated expected to be made over during the peak construction period. Using these metrics and conservative assumptions for construction staging schedule, peak construction activities are estimated to result in 642 daily trips (321 in, 321 out), 181 weekday a.m. peak hour trips (165 in, 16 out), and 181 weekday p.m. peak hour trips (16 in, 165 out). Almost all construction worker traffic is expected to use NW Old Lower River Road from SR 501 to travel to and from the administration and office support buildings in the northwest corner of Area 200. Truck deliveries to all Facility areas will occur from several intersecting roads along SR 501, including NW Old Lower River Road, NW Gateway Avenue-, and the two private access roads fronting Parcel 1A.

~~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. Based on trip distribution pattern estimates, all construction worker traffic will use the Old Lower River Road entrance from Lower River Road (SR 501). Truck deliveries will be made on a daily basis and are assumed to be spread out evenly over the 10-hour construction period. This resulted in an estimate of 16 truck trips during the a.m. and p.m. peak hours, with an assumed 50% in/50% out distribution (8 in, 8 out). Tesoro Savage also estimates that 11 percent of trucks will use Old Lower River Road entrance from Lower River Road (SR 501), 3 percent will use Gateway Avenue, and 86 percent will use the private access drive east of Farwest Steel.~~

The typical access route for construction workers and deliveries will be from I-5 to Mill Plain Boulevard and the Mill Plain Extension and then to NW Lower River Road and Old NW Lower River Road. Because this route is accustomed to Port traffic, difficulties with the additional construction traffic along this route are not expected. The impact of construction site generated trips on intersection operations are shown in Table 4.3-~~9~~11 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 4.3-114~~.3-12~~. Full Facility Construction Traffic Conditions Summary (Scenario 1)~~Impact of Construction Traffic~~

~~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~~

Intersection	Peak Hour	2014 Traffic Conditions				Standard
		Without Project		With Project		
		LOS	V/C	LOS	V/C	
Old Lower River Rd/NW Lower River Road (SR 501)	AM	B	0.09	B	0.10	LOS D
	PM	B	0.31	B	0.32	
NW Gateway Ave/NW Lower River Road (SR 501)	AM	A	0.06	A	0.06	LOS D
	PM	B	0.09	B	0.40	
Fourth Plain Blvd/Mill Plain Blvd (SR 501)	AM	B	0.65	B	0.72	LOS D
	PM	B	0.32	B	0.39	
Old Lower River Road/Old Alcoa Facility Access Road	AM	C	NA	C	NA	LOS E and V/C ≤ 0.95
	PM	B	NA	B	NA	

Construction workers and vehicles making deliveries can park adjacent to the construction areas. In the area of the tank farm, construction workers can park along the existing driveway and gravel roadway that extend along the southwest border. Construction workers and deliveries bound for the area of the rail car unloading building and administration building can park adjacent to NW Lower River Road and to the proposed permanent parking areas. Parking for the ~~west~~ Area 600 boiler area can occur adjacent to the driveway and outside the rail loop, with overflow parking near the area of the administration building. Temporary construction parking for berths 13 and 14 can occur along the Port-owned access roads coming up to the berth areas.

The Port expects to commission a traffic study for Terminal 5 if construction of a project at the formerly proposed~~the~~ BHP Billiton project site and the Facility occur concurrently (~~Monty~~ Edberg, M. ~~Port of Vancouver, Personal Communications, August 13,~~ 2013). The Applicant will participate in jointly implementing any traffic mitigation measures identified by such a study to ensure safe access conditions to the Terminal 5 location.

Transfer Pipeline Corridor – Crude oil will be transported between the rail car unloading building, the tank farm, and berths 13 and 14. The piping will be a combination of above and below-ground installation of either one or two 36-inch-diameter pipelines. Per the current alignments, construction of these pipelines is not expected to affect traffic significantly (see Figure 2.3-9). Some interior Port roadways could be blocked temporarily as the pipeline is constructed.

Temporary traffic control and construction signage will be provided along the alignment so that any impacts are properly managed. A traffic management plan will be required from the Contractor so as to ensure any impacts are mitigated.

Marine Terminal – With respect to the berth modifications at Area 400, some of the work may be performed from the waterside. A small number of tugs or barges will be positioned to conduct this work for a temporary period of time. These construction-related vessels will not be positioned in the main Columbia River navigation channel and will therefore not create any impacts to other river users.

4.3.4 Movement/Circulation of People and Goods

The Facility is being proposed at a location that has been developed specifically for the circulation of bulk goods by train with the capability to transfer goods to marine vessel shipping. Through its development of the WVFA project and the various environmental and permit reviews conducted as described in section 4.2 above, the Port has addressed changes to how tenants will use its facilities for their activities (many of which include the transportation of goods), as well as the impacts to road and river transportation systems serving the Terminal 5 area. The Port has designed and implemented the WVFA project as a means to improve the capacity of its operations, thereby improving access to the movement of goods in general. Members of the public are generally not allowed access to the tenant controlled areas in vicinity of the site. Members of the public can access the ~~Jail Work Center~~ JWC using Gateway Avenue. Impacts to the current movement or circulation of the general public have been addressed through the traffic analysis above and in Appendix J.1. Impacts to the circulation of goods have been addressed through the analysis of impacts to road, rail, and vessel traffic systems, also addressed above.

~~Construction~~ Completion of the WVFA Gateway Avenue Grade Separation ("Gateway overpass") in 2013~~is~~ address~~ing~~ed~~is addressing~~ conflicts between rail activities and road transportation at Terminal 5, by building a bridge that separates vehicle traffic from train traffic below. The new bridge~~, expected complete in late 2013, will~~ allows cars and trucks to travel over the Port's internal rail corridor while accessing two of the Port's five marine terminals, as well as the ~~Jail Work Center~~JWC.

The Applicant has carefully sited Facility elements to minimize disruption to the activities conducted by current tenants, and to accommodate future activities as directed by the Port. For example, the transfer pipeline corridor has been carefully routes to avoid conflicts with existing easements; portions of the transfer pipeline will also be located underground to avoid conflict with existing road and rail uses.

The public will not be allowed admittance to any construction or operation areas established as part of the Facility, unless in accordance with the Facility's construction or operations site safety plan and applicable federal security requirements (see ~~S~~section 2.19).

The Facility will only receive crude oil by rail; crude oil will not be delivered to the Facility by truck. Small amounts of hazardous materials (greases, cleaners, diesel fuel for fire pumps, etc.~~…),~~ .), necessary for use during construction and operation, will be received by truck. These materials will be shipped by others in compliance with state and federal requirements for the safe transport of hazardous materials. As identified in sections 4.1.3.2 and 4.1.3.3, any wastes produced at the Facility that classify as hazardous will be collected, handled, stored and disposed of in accordance with applicable federal, state, and local regulations, including regulations relating to its transportation on surface roads.

4.3.5 Mitigation

Based on the results of the transportation impact analysis, the proposed Facility can be developed while maintaining acceptable levels of service and safety on the surrounding transportation system. The analysis developed the following findings:

- All study intersections currently operate acceptably during the weekday AM and PM 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 AM peak hour trips (40 in, 8 out), and 46 weekday PM peak hour trips (10 in, 36 out). Concurrency corridors receiving trips from the proposed development are operating within the established standards.

The study concluded that specific mitigation was not necessary to address project impacts. However, the study developed the following recommendations to address existing safety or operational issues within the project vicinity.

Construction

The Applicant has prepared a preliminary Construction Transportation Management Plan (Appendix J.2). The Applicant will prepare a final version of this plan based on final construction design drawings and anticipated construction schedule. The Applicant will coordinate preparation of the final plan with the City, the Port, and WSDOT.

During construction the use of construction-related barges will be coordinated to have barge movements at the berths conducted outside of the Columbia River navigation channel.

Operation

- The Applicant ~~should~~ will work with the Port and City 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.~~ Based on a review of existing turn movement patterns, existing intersection configuration, and the Manual on Uniform Traffic Control Devices, the Applicant will coordinate 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~~ will work with the Port and City to reconfigure traffic control devices at the Old Lower River Road/Old Alcoa Facility Access Road intersection.
- The Applicant ~~should~~ will 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 property and the proposed Storage area. This treatment is intended to enhance the safety of bicyclists and pedestrians using this crosswalk as part of the adjacent multi-use path.
- The Applicant will coordinate Facility design activities with the Port and future Terminal 5 tenants to ensure that the location of Facility-related tracks does not interfere with the rail operations of other Terminal 5 users.

Section 4.4 – Socioeconomic Impact

WAC 463-60-535
Built environment – Socioeconomic impact.

The application shall include a detailed socioeconomic impact analysis which identifies primary, secondary, positive as well as negative impacts on the socioeconomic environment in the area potentially affected by the project, with particular attention to the impact of the proposed facility on population, work force, property values, housing, health facilities and services, education facilities, governmental services, and local economy. The study area shall include the area that may be affected by employment within a one-hour commute distance of the project site. The analysis shall use the most recent data as published by the U.S. Census or state of Washington sources.

(1) The analysis shall include: (a) Population and growth rate data for the most current ten-year period for the county or counties and incorporated cities in the study area; (b) Published forecast population figures for the study area for both the construction and operations periods; (c) Numbers and percentages describing the race/ethnic composition of the cities and counties in the study area; (d) Average per capita and household incomes, including the number and percentage of the population below the poverty level for the cities and counties within the study area; (e) A description of whether or not any minority or low-income populations would be displaced by this project or disproportionately impacted; (f) The average annual work force size, total number of employed workers, and the number and percentage of unemployed workers including the year that data are most recently available. Employment numbers and percentage of the total work force should be provided for the primary employment sectors; (g) An estimate by month of the average size of the project construction, operational work force by trade, and work force peak periods; (h) An analysis of whether or not the locally available work force would be sufficient to meet the anticipated demand for direct workers and an estimate of the number of construction and operation workers that would be hired from outside of the study area if the locally available work force would not meet the demand; (i) A list of the required trades for the proposed project construction; (j) An estimate of how many direct or indirect operation and maintenance workers (including family members and/or dependents) would temporarily relocate; (k) An estimate of how many workers would potentially commute on a daily basis and where they would originate.

(2) The application shall describe the potential impact on housing needs, costs, or availability due to the influx of workers for construction and operation of the facility and include the following: (a) Housing data from the most recent ten-year period that data are available, including the total number of housing units in the study area, number of units occupied, number and percentage of units vacant, median home value, and median gross rent. A description of the available hotels, motels, bed and breakfasts, campgrounds or other recreational facilities; (b) How and where the direct construction and indirect work force would likely be housed. A description of the potential impacts

on area hotels, motels, bed and breakfasts, campgrounds and recreational facilities; (c) Whether or not meeting the direct construction and indirect work force's housing needs might constrain the housing market for existing residents and whether or not increased demand could lead to increased median housing values or median gross rents and/or new housing construction. Describe mitigation plans, if needed, to meet shortfalls in housing needs for these direct and indirect work forces.

(3) The application shall have an analysis of the economic factors including the following: (a) The approximate average hourly wage that would likely be paid to construction and operational workers, how these wage levels vary from existing wage levels in the study area, and estimate the expendable income that direct workers would likely spend within the study area; (b) How much, and what types of direct and indirect taxes would be paid during construction and operation of the project and which jurisdictions would receive those tax revenues; (c) The other overall economic benefits (including mitigation measures) and costs of the project on the economies of the county, the study area and the state, as appropriate, during both the construction and operational periods.

(4) The application shall describe the impacts, relationships, and plans for utilizing or mitigating impacts caused by construction or operation of the facility to the following public facilities and services: (a) Fire; (b) Police; (c) Schools; (d) Parks or other recreational facilities; (e) Utilities; (f) Maintenance; (g) Communications; (h) Water/storm water; (i) Sewer/solid waste; (j) Other governmental services.

(5) The application shall compare local government revenues generated by the project (e.g., property tax, sales tax, business and occupation tax, payroll taxes) with their additional service expenditures resulting from the project; and identify any potential gaps in expenditures and revenues during both construction and operation of the project. This discussion should also address potential temporal gaps in revenues and expenditures.

(6) To the degree that a project will have a primary or secondary negative impact on any element of the socioeconomic environment, the applicant is encouraged to work with local governments to avoid, minimize, or compensate for the negative impact. The term "local government" is defined to include cities, counties, school districts, fire districts, sewer districts, water districts, irrigation districts, or other special purpose districts

(Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-535, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-535, filed 11/6/92, effective 12/7/92. Statutory Authority: RCW 80.50.040(1) and Chapter 80.50 RCW. 81-21-006 (Order 81-5), § 463-42-535, filed 10/8/81. Formerly WAC 463-42-620.)

Section 4.4 Socioeconomic Impact

4.4.1 Existing Conditions

The proposed Facility is located adjacent to the Columbia River in Vancouver, which is the largest city in the County. The County is also within the reach of the larger Portland, Oregon, metropolitan area. Most immediate services, such as police, fire, and ambulance, will be supplied by City of Vancouver providers, but the larger metropolitan area and other surrounding counties are likely to supply a portion of workers and construction material.

For this socioeconomic analysis, the study area is defined as those counties within a 1-hour commute of the Facility. These include Clark, Skamania, and Cowlitz counties in Washington, and Multnomah, Clackamas, Columbia, Hood River, Marion, Yamhill, and Washington counties in Oregon. Small portions three other counties (Wahkiakum County in Washington and Clatsop and Tillamook counties in Oregon) may fall within a 1-hour commute of the Facility (depending on traffic conditions), but these small areas are sparsely populated and workers associated with the Facility are unlikely to live there .

The following analysis provides county-level detail for each county in the study area and city-level detail for municipalities in the County. The complete socioeconomic report is attached as Appendix K.

4.4.1.1 Population Trends

According to data from the Washington Office of Financial Management (OFM) and the Oregon Office of Economic Analysis (OEA), 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 percent over the period. Growth was faster between 1992 and 2002 (i.e., 450,000 new residents, or 22.4 percent than it was between 2002 and 2012 (i.e., 330,000 new residents, or 13.4 percent).

During the same periods, the County experienced faster growth than the study area as a whole. Between 1992 and 2012, the population of the County grew from approximately 257,000 to 431,000, or 68.1 percent. Between 1992 and 2002, the population grew by 98,000, or 38.2 percent, and between 2002 and 2012, by nearly 77,000, or 21.6 percent.

Neighboring counties within the study area experienced varying levels of growth between 1992 and 2012. The two Washington counties (i.e., Cowlitz and Skamania) are mostly rural and saw relatively limited population growth. The combined population of these two counties is approximately one-quarter that 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 percent of the study area population growth over that period occurred in Oregon.

~~Construction of the Facility is anticipated to be completed during 2016~~Based on population projections from the Washington OFM and Oregon OEA, the population of the study area is projected to grow by 6.3 percent between 2012 and 2016, or by more than 176,000. Growth in the County is anticipated to be slightly faster, with the population rising by 28,000, or 6.5 percent.

The long-term forecast projects growth in the total study area population by an additional 789,000 between 2016 and 2036, or a total of 26.6 percent. In the County, the population is projected to grow by a total of nearly 113,500, or 24.7 percent.

Table 4.4-~~14.4-1~~. Total Population and Forecast Growth by County in Project Vicinity

	(Thousands)					Growth Rate			
						Actual		Forecast	
County Name	**1992**	**2002**	**2012**	**2016**	**2036**	**1992-2002**	**2002-2012**	**2012-2016**	**2016-2036**
Washington	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	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 OFM, Oregon OEA

According to data from OFM, 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 areas remained near 48 percent.

Vancouver is the largest incorporated municipality in the County, and was home to 37.9 percent 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 percent.

Table 4.4-~~24.4-2~~. Total Population by County and City in Study Area

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010 Census	2011	2012
Clark County	363,400	372,300	383,300	391,500	403,500	415,000	424,200	431,200	425,363	428,000	431,250
Unincorporated Clark County	175,710	179,825	184,650	188,955	196,090	201,135	206,830	210,415	203,339	204,610	205,885
Incorporated Clark County	187,690	192,475	198,650	202,545	207,410	213,865	217,370	220,785	222,024	223,390	225,365
Battle Ground	11,110	12,560	14,220	14,960	15,810	16,240	16,710	17,150	17,571	17,780	17,920
Camas	13,540	14,200	15,360	15,460	15,880	16,280	16,700	16,950	19,355	19,620	20,020

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010 Census	2011	2012
La Center	1,805	1,855	1,990	2,095	2,315	2,440	2,510	2,545	2,800	2,835	2,985
Ridgefield	2,145	2,185	2,195	2,630	3,225	3,680	4,015	4,215	4,763	4,975	5,210
Vancouver	148,800	150,700	152,900	154,800	156,600	160,800	162,400	164,500	161,791	162,300	163,200
Washougal	9,100	9,775	10,770	11,350	12,270	12,980	13,480	13,870	14,095	14,210	14,340
Woodland (part)	85	85	80	90	90	75	85	85	83	85	85
Yacolt	1,105	1,115	1,135	1,160	1,220	1,370	1,470	1,470	1,566	1,585	1,605
Cowlitz County	94,400	94,900	95,300	95,900	96,800	97,800	99,000	99,600	102,410	102,700	103,050
Unincorporated Cowlitz County	39,485	39,745	40,000	40,290	40,590	41,125	41,550	41,990	44,085	44,225	44,180
Incorporated Cowlitz County	54,915	55,155	55,300	55,610	56,210	56,675	57,450	57,610	58,325	58,475	58,870
Castle Rock	2,120	2,140	2,150	2,140	2,135	2,135	2,145	2,145	1,982	1,995	2,135
Kalama	1,870	1,935	1,950	1,980	2,025	2,105	2,475	2,505	2,344	2,365	2,390
Kelso	11,770	11,830	11,800	11,820	11,840	11,840	11,900	11,840	11,925	11,920	11,930
Longview	35,310	35,290	35,340	35,430	35,570	35,710	35,880	36,010	36,648	36,730	36,910
Woodland (part)	3,845	3,960	4,060	4,240	4,640	4,885	5,050	5,110	5,426	5,465	5,505
Skamania County	9,900	9,900	10,100	10,300	10,600	10,700	10,700	10,800	11,066	11,150	11,275
Unincorporated Skamania County	8,063	8,075	8,205	8,299	8,457	8,448	8,383	8,465	8,645	8,685	8,755
Incorporated Skamania County	1,837	1,825	1,895	2,001	2,143	2,252	2,317	2,335	2,421	2,465	2,520
North Bonneville	627	615	685	741	828	882	877	880	956	965	1,000
Stevenson	1,210	1,210	1,210	1,260	1,315	1,370	1,440	1,455	1,465	1,500	1,520
Oregon Cities											
Clackamas County	381,775	379,845	376,660	372,270	367,040	361,300	356,250	353,450	345,150	340,000	338,391
Barlow	140	140	140	140	140	140	140	140	140	140	140
Canby	15,230	15,230	15,165	15,140	14,705	14,385	14,110	13,910	12,790	12,910	12,790
Damascus	9,990	9,985	9,975	9,775	9,670	9,670	0	0	0	0	0
Estacada	2,880	2,865	2,820	2,695	2,580	2,480	2,450	2,440	2,460	2,380	2,371
Gladstone	12,215	12,215	12,215	12,200	12,210	12,170	12,140	11,790	11,450	11,470	11,438
Happy Valley	11,865	11,465	11,455	10,380	9,210	7,275	6,640	6,370	4,930	4,650	4,519
Johnson City	680	680	675	675	675	630	630	630	630	635	634
Lake Oswego (part)*	34,496	34,412	34,255	34,010	34,015	33,740	33,595	33,530	33,270	33,115	32,989
Milwaukie	20,930	20,920	20,915	20,920	20,835	20,655	20,590	20,580	20,550	20,540	20,490
Molalla	7,935	7,800	7,590	7,195	6,830	6,395	5,930	5,800	5,690	5,710	5,647
Oregon City	30,995	30,710	30,405	30,060	29,540	28,965	28,370	28,100	26,680	26,200	25,754
Portland (part)*	822	820	804	793	785	785	780	770	760	750	747
Rivergrove (part)*	315	315	315	315	315	315	310	290	290	290	287
Sandy	8,420	8,205	8,005	7,595	7,070	6,680	6,360	6,200	5,380	5,425	5,385

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010 Census	2011	2012
Tualatin (part)*	3,061	3,065	3,065	3,065	3,065	3,065	2,895	2,820	2,725	2,695	2,664
West Linn	24,455	24,400	24,400	24,180	24,180	24,075	23,970	23,820	23,090	22,440	22,261
Wilsonville (part)*	16,433	16,365	16,285	15,750	15,230	14,855	14,595	14,225	14,165	14,360	13,987
Unincorporated	180,912	180,253	178,176	177,382	175,985	175,020	182,745	182,035	180,150	176,290	176,288
Columbia County	44,600	45,000	45,650	46,220	46,965	47,565	48,095	48,410	49,351	49,625	49,680
Clatskanie	1,610	1,650	1,650	1,660	1,675	1,710	1,740	1,735	1,737	1,740	1,740
Columbia City	1,650	1,720	1,760	1,785	1,890	1,955	1,975	1,990	1,946	1,950	1,950
Prescott	60	60	60	60	60	60	60	60	55	55	55
Rainier	1,690	1,750	1,750	1,760	1,705	1,775	1,810	1,825	1,895	1,895	1,895
St. Helens	10,780	11,250	11,370	11,795	11,940	12,075	12,325	12,380	12,883	12,890	12,920
Scappoose	5,260	5,480	5,590	5,700	5,840	6,090	6,580	6,605	6,592	6,665	6,685
Vernonia	2,260	2,260	2,260	2,275	2,340	2,365	2,365	2,370	2,151	2,110	2,080
Unincorporated	21,290	20,830	21,210	21,185	21,515	21,535	21,240	21,445	22,092	22,320	22,355
Hood River County	20,450	20,500	21,050	21,180	21,335	21,470	21,625	21,725	22,346	22,625	22,875
Cascade Locks	1,140	1,140	1,150	1,155	1,155	1,075	1,050	1,055	1,144	1,165	1,190
Hood River	6,210	6,230	6,230	6,450	6,580	6,710	6,850	6,925	7,167	7,320	7,375
Unincorporated	13,100	13,130	13,670	13,575	13,600	13,685	13,725	13,745	14,035	14,140	14,310
Marion County	291,000	295,900	298,450	302,135	306,665	311,070	314,865	318,170	315,335	318,150	320,495
Aumsville	2,980	3,050	3,080	3,130	3,205	3,300	3,535	3,560	3,584	3,680	3,700
Aurora	660	660	660	785	920	955	970	980	918	920	930
Detroit	250	250	250	255	260	265	265	275	202	205	205
Donald	630	640	660	750	895	995	1,025	1,030	979	980	980
Gates (part)*	435	445	445	450	455	460	455	455	431	433	442
Gervais	2,070	2,110	2,130	2,240	2,250	2,250	2,260	2,260	2,464	2,520	2,520
Hubbard	2,560	2,700	2,750	2,855	2,960	3,095	3,125	3,140	3,173	3,180	3,185
Idanha (part)*	145	145	145	145	145	145	145	145	77	78	78
Jefferson	2,470	2,480	2,490	2,515	2,590	2,590	2,655	2,655	3,098	3,135	3,140
Keizer	33,100	34,010	34,380	34,735	34,880	35,435	36,150	36,220	36,478	36,715	36,735
Mill City (part)*	295	310	310	315	325	328	329	330	324	326	327
Mt. Angel	3,660	3,700	3,600	3,630	3,665	3,755	3,785	3,790	3,286	3,285	3,285
St. Paul	380	390	400	415	420	410	415	415	421	420	420
Salem (part)*	122,290	123,410	123,890	126,525	127,720	129,830	132,033	133,477	130,398	131,306	131,989
Scotts Mills	300	300	300	300	300	300	300	300	357	360	365
Silverton	7,680	7,980	8,060	8,230	8,915	9,205	9,540	9,585	9,222	9,265	9,290
Stayton	7,200	7,300	7,360	7,505	7,700	7,765	7,815	7,820	7,644	7,660	7,660
Sublimity	2,120	2,160	2,160	2,225	2,225	2,255	2,285	2,255	2,681	2,680	2,680

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010 Census	2011	2012
Turner	1,400	1,480	1,480	1,570	1,645	1,690	1,730	1,750	1,854	1,860	1,865
Woodburn	20,860	21,560	21,790	22,110	22,615	22,875	23,355	23,350	24,080	24,090	24,090
Unincorporated	79,515	80,820	82,110	81,450	82,575	83,168	82,693	84,378	83,664	85,053	86,609
Multnomah County	670,250	677,850	685,950	692,825	701,545	710,025	717,880	724,680	735,334	741,925	748,445
Fairview	8,400	8,590	9,250	9,425	9,585	9,695	9,735	9,740	8,920	8,920	8,920
Gresham	92,620	93,660	94,250	95,900	97,745	99,225	100,655	101,015	105,594	105,795	105,970
Lake Oswego (part)*	2,305	2,310	2,315	2,315	2,315	2,315	2,315	2,323	2,544	2,551	2,554
Maywood Park	750	750	750	750	750	750	750	750	752	750	750
Portland (part)*	536,010	542,940	548,340	554,130	560,405	566,072	573,592	579,745	581,485	583,546	585,558
Troutdale	14,240	14,300	14,380	14,880	15,110	15,430	15,465	15,535	15,962	16,000	16,005
Wood Village	2,850	2,870	2,870	2,880	2,965	3,100	3,100	3,130	3,878	3,885	3,890
Unincorporated	13,075	12,430	13,795	12,545	12,670	13,438	12,268	12,442	16,199	20,478	24,798
Polk County	63,450	64,000	64,950	65,670	66,670	67,505	68,235	68,785	75,403	75,965	76,625
Dallas	12,850	13,270	13,500	14,040	14,585	15,065	15,360	15,445	14,583	14,620	14,670
Falls City	960	960	960	980	965	965	965	965	947	945	945
Independence	6,580	6,850	7,170	7,515	7,715	7,905	8,030	8,240	8,590	8,600	8,585
Monmouth	8,110	8,080	8,590	8,795	9,125	9,335	9,565	9,630	9,534	9,720	9,755
Salem (part)*	18,860	19,530	19,810	20,725	21,585	22,460	22,477	23,478	24,239	24,404	24,466
Willamina (part)*	710	710	710	710	720	720	720	720	845	845	845
Unincorporated	16,090	15,310	14,920	12,905	11,975	11,055	11,118	10,307	16,665	16,831	17,359
Washington County	463,050	472,600	480,200	489,785	500,585	511,075	519,925	527,140	529,710	536,370	542,845
Banks	1,420	1,430	1,430	1,430	1,435	1,435	1,435	1,435	1,777	1,775	1,775
Beaverton	77,990	79,010	79,350	83,095	84,270	85,560	86,205	86,860	89,803	90,835	91,205
Cornelius	9,930	10,150	10,150	10,585	10,785	10,895	10,955	10,985	11,869	11,915	11,915
Durham	1,390	1,400	1,400	1,390	1,400	1,395	1,395	1,400	1,351	1,360	1,365
Forest Grove	18,750	19,130	19,200	19,565	20,380	20,775	21,465	21,500	21,083	21,275	21,460
Gaston	610	620	620	630	630	650	660	665	637	640	640
Hillsboro	74,840	79,340	79,940	82,025	84,445	88,300	89,285	90,380	91,611	92,350	92,550
King City	2,110	2,100	2,100	2,130	2,350	2,700	2,775	2,785	3,111	3,135	3,225
Lake Oswego (part)*	17	20	20	20	20	20	20	20	9	9	9
North Plains	1,660	1,640	1,650	1,700	1,755	1,890	1,905	1,910	1,947	1,990	1,990
Portland (part)*	1,411	1,430	1,440	1,455	1,500	1,515	1,535	1,565	1,547	1,552	1,558
Rivergrove (part)*	30	30	30	35	35	35	35	35	32	31	34
Sherwood	13,680	14,050	14,190	14,940	16,115	16,365	16,420	16,640	18,194	18,255	18,265
Tigard	44,070	45,130	44,650	45,500	46,300	46,715	47,150	47,460	48,035	48,415	48,695
Tualatin (part)*	21,360	21,970	22,045	22,400	22,585	22,960	22,975	23,065	23,192	23,251	23,215

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010 Census	2011	2012
Wilsonville (part)*	5	1,655	1,655	1,655	1,655	1,655	1,655	1,655	2,138	2,144	2,248
Unincorporated	193,778	193,495	200,330	201,230	204,925	208,210	214,055	218,780	213,374	217,437	222,696
Yamhill County	87,500	88,150	89,200	90,310	91,675	93,085	94,325	95,250	99,193	99,850	100,550
Amity	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,670	1,614	1,615	1,610
Carlton	1,520	1,550	1,560	1,585	1,670	1,755	1,755	1,790	2,007	2,035	2,035
Dayton	2,210	2,230	2,230	2,280	2,305	2,495	2,500	2,495	2,534	2,530	2,535
Dundee	2,770	2,860	2,900	2,965	3,010	3,040	3,050	3,060	3,162	3,175	3,175
Lafayette	2,820	3,010	3,060	3,105	3,440	3,730	3,925	3,925	3,742	3,740	3,735
McMinnville	28,200	28,890	29,200	30,020	30,950	31,665	32,400	32,760	32,187	32,270	32,435
Newberg	18,750	19,530	19,910	20,565	20,570	21,675	22,645	23,150	22,068	22,230	22,300
Sheridan	5,580	5,620	5,620	5,785	5,785	5,865	6,020	6,020	6,127	6,125	6,180
Willamina (part)*	1,130	1,130	1,140	1,150	1,165	1,165	1,165	1,165	1,180	1,180	1,180
Yamhill	820	820	820	820	820	820	855	860	1,024	1,020	1,020
Unincorporated	22,220	21,030	21,280	20,555	20,480	19,395	18,530	18,355	23,548	23,930	24,345

Source: Washington Office of Financial Management, Portland State University Population Research Center

Nearly one-quarter of the study area population is under 18 years of age, and 15 percent are 62 years old or older. The remaining 61 percent are 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 percent under 18 years of age and less than 15 percent aged 62 years or more. The working-age adult population in the County is approximately 248,000.

Females outnumber males in the study area, with 0.978 males for each female. The male-female ratio in the County is nearly identical, with 0.976 males for each female.

Table 4.4-~~34.4-3~~. Population Age Distribution in Project Vicinity

County Name	Total		Under 18 Years		18 Years to 61 Years		62 Years and Older	
	Pop.	M/F Ratio	Pop.	% of Total	Pop.	% of Total	Pop.	% of Total
Washington	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	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

County Name	Total		Under 18 Years		18 Years to 61 Years		62 Years and Older	
	Pop.	M/F Ratio	Pop.	% of Total	Pop.	% of Total	Pop.	% of Total
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 the 2007-2011 American Community Survey, the ethnic mix of the study area population is primarily white, with white residents accounting for 86.6 percent of the total. Residents of Asian ethnicity accounted for 5.1 percent of the population, African-American accounted for 2.6 percent, American Indian and Alaska Natives accounted for 1.3 percent, Hawaiian and other Pacific Islanders accounted for 0.5 percent, and two or more races accounted for 3.9 percent of the population. Residents of Hispanic origin (of all races) accounted for 12.8 percent of the study area population.

In Clark County, non-white residents account for a smaller share of the population, although the shares of Native Hawaiian/Pacific Islander and two or more races are slightly higher than in the study area as a whole. Hispanic residents (of all races) account for 7.5 percent of Clark County's population.

Table 4.4-~~44.4-~~4. Race Composition by County and City in Study Area

County / City	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								
Clark County	88.6%	2.0%	0.7%	4.0%	0.6%	4.2%	100.0%	7.5%
Battle Ground	92.7%	1.9%	0.3%	3.3%	0.3%	1.6%	100.0%	6.5%
Camas	89.5%	1.3%	0.3%	6.0%	0.1%	2.8%	100.0%	3.9%
La Center	90.0%	0.0%	6.7%	0.0%	1.3%	2.0%	100.0%	9.2%
Ridgefield	92.8%	0.0%	0.2%	2.6%	0.0%	4.4%	100.0%	4.1%
Vancouver	84.9%	3.3%	1.0%	5.1%	0.6%	5.1%	100.0%	9.9%
Washougal	93.6%	0.5%	0.5%	2.8%	0.4%	2.3%	100.0%	5.0%
Yacolt	97.8%	0.0%	0.3%	0.0%	0.0%	1.9%	100.0%	4.0%
Cowlitz County	92.4%	0.5%	1.6%	1.4%	0.2%	4.0%	100.0%	7.7%
Castle Rock	86.2%	1.5%	2.8%	1.4%	0.0%	8.0%	100.0%	3.5%
Kalama	94.4%	0.3%	0.1%	2.3%	0.4%	2.5%	100.0%	3.2%
Kelso	91.9%	0.7%	1.4%	1.4%	0.1%	4.5%	100.0%	11.8%
Longview	90.4%	0.7%	1.4%	2.0%	0.0%	5.5%	100.0%	9.6%
Woodland (part)	94.9%	0.2%	0.0%	1.4%	1.0%	2.6%	100.0%	13.4%
Skamania County	94.7%	0.1%	2.3%	1.0%	0.3%	1.6%	100.0%	5.5%

County / City	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)
North Bonneville	94.0%	0.0%	0.0%	1.2%	2.5%	2.3%	100.0%	5.9%
Stevenson	93.2%	0.4%	1.1%	1.9%	0.0%	3.4%	100.0%	12.4%
Oregon								
Clackamas County	91.3%	0.9%	0.5%	3.5%	0.2%	3.6%	100.0%	7.6%
Barlow	91.6%	0.0%	0.0%	0.0%	8.4%	0.0%	100.0%	29.5%
Canby	93.0%	0.1%	0.3%	2.4%	0.2%	4.0%	100.0%	24.7%
Damascus	91.7%	0.4%	0.5%	5.1%	0.0%	2.3%	100.0%	3.8%
Estacada	89.7%	1.9%	0.7%	1.6%	0.0%	6.0%	100.0%	9.6%
Gladstone	91.3%	1.5%	1.5%	2.6%	0.0%	3.1%	100.0%	9.8%
Happy Valley	79.0%	2.0%	0.3%	13.2%	0.0%	5.5%	100.0%	3.7%
Johnson City	93.3%	0.4%	0.0%	4.2%	0.0%	2.0%	100.0%	35.4%
Milwaukie	89.9%	2.6%	0.3%	2.8%	0.6%	3.8%	100.0%	3.7%
Molalla	94.3%	3.0%	0.9%	0.0%	0.0%	1.8%	100.0%	11.8%
Oregon City	91.5%	0.7%	0.7%	2.4%	0.1%	4.6%	100.0%	6.5%
Rivergrove (part)*	92.8%	0.0%	0.0%	6.0%	0.0%	1.2%	100.0%	0.0%
Sandy	94.6%	0.1%	0.0%	1.6%	0.3%	3.4%	100.0%	5.8%
West Linn	92.7%	0.4%	0.1%	3.6%	0.2%	3.0%	100.0%	3.7%
Wilsonville (part)*	90.5%	1.1%	1.1%	2.5%	0.6%	4.1%	100.0%	12.1%
Columbia County	94.3%	0.3%	1.7%	1.0%	0.1%	2.6%	100.0%	4.1%
Clatskanie	95.9%	0.0%	3.3%	0.0%	0.0%	0.9%	100.0%	4.3%
Columbia City	97.3%	0.3%	0.1%	1.4%	0.0%	0.9%	100.0%	1.9%
Prescott	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	15.6%
Rainier	88.8%	1.8%	5.7%	0.0%	0.0%	3.7%	100.0%	1.9%
St. Helens	92.7%	0.8%	2.2%	0.4%	0.1%	3.9%	100.0%	7.1%
Scappoose	90.5%	0.0%	3.1%	2.8%	0.0%	3.6%	100.0%	5.9%
Vernonia	98.8%	0.0%	0.0%	0.0%	0.2%	0.9%	100.0%	3.0%
Hood River County	93.5%	0.6%	2.1%	1.4%	0.7%	1.8%	100.0%	29.8%
Cascade Locks	86.8%	6.0%	3.5%	0.4%	0.0%	3.2%	100.0%	3.4%
Hood River	93.5%	0.6%	2.1%	1.4%	0.7%	1.8%	100.0%	29.8%
Marion County	89.9%	1.1%	2.2%	2.0%	0.6%	4.2%	100.0%	26.4%
Aumsville	93.4%	0.0%	2.0%	0.2%	0.0%	4.4%	100.0%	12.9%
Aurora	93.4%	3.5%	0.9%	0.0%	0.0%	2.3%	100.0%	6.9%
Detroit	96.1%	0.0%	3.9%	0.0%	0.0%	0.0%	100.0%	16.3%
Donald	95.1%	0.0%	0.0%	0.0%	0.0%	4.9%	100.0%	14.3%
Gates (part)*	93.1%	0.0%	3.1%	0.3%	2.7%	0.8%	100.0%	9.3%

County / City	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)
Gervais	92.4%	0.0%	6.0%	0.3%	0.0%	1.3%	100.0%	99.6%
Hubbard	88.9%	0.0%	5.3%	0.2%	0.0%	5.6%	100.0%	70.2%
Idanha (part)*	91.4%	0.0%	0.0%	0.0%	0.0%	8.6%	100.0%	7.7%
Jefferson	88.3%	0.0%	6.2%	1.0%	0.0%	4.5%	100.0%	14.3%
Keizer	91.5%	1.0%	1.3%	1.6%	0.3%	4.4%	100.0%	20.2%
Mill City (part)*	89.0%	0.0%	7.8%	0.7%	0.5%	1.9%	100.0%	16.2%
Mt. Angel	94.5%	0.4%	1.1%	0.5%	0.0%	3.4%	100.0%	31.2%
St. Paul	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	15.2%
Salem (part)*	88.9%	1.4%	1.9%	2.8%	0.9%	4.1%	100.0%	21.1%
Scotts Mills	96.4%	0.0%	0.0%	0.0%	0.0%	3.6%	100.0%	13.2%
Silverton	95.5%	0.1%	0.9%	1.1%	0.0%	2.4%	100.0%	10.8%
Stayton	93.8%	0.7%	0.9%	0.7%	0.0%	3.8%	100.0%	18.4%
Sublimity	98.3%	0.0%	0.3%	0.3%	0.0%	1.1%	100.0%	2.4%
Turner	94.0%	0.0%	1.3%	0.2%	2.0%	2.5%	100.0%	7.2%
Woodburn	88.4%	0.7%	4.8%	1.8%	0.0%	4.3%	100.0%	83.3%
Multnomah County	81.3%	5.9%	1.2%	6.8%	0.6%	4.2%	100.0%	11.1%
Fairview	77.1%	6.9%	1.3%	6.9%	1.7%	6.0%	100.0%	14.7%
Gresham	85.3%	3.4%	2.4%	4.8%	1.1%	3.0%	100.0%	20.0%
Lake Oswego (part)*	90.6%	0.6%	0.1%	6.3%	0.1%	2.3%	100.0%	4.0%
Maywood Park	83.0%	7.2%	0.0%	8.0%	0.5%	1.3%	100.0%	2.8%
Portland (part)*	80.0%	6.6%	1.1%	7.4%	0.5%	4.5%	100.0%	9.5%
Troutdale	88.2%	3.6%	0.2%	5.2%	0.0%	2.7%	100.0%	10.7%
Wood Village	86.5%	0.6%	0.5%	4.0%	1.2%	7.3%	100.0%	27.6%
Polk County	91.2%	0.5%	2.2%	2.2%	0.3%	3.4%	100.0%	12.3%
Dallas	93.3%	0.2%	1.6%	1.1%	0.2%	3.6%	100.0%	4.2%
Falls City	95.1%	0.3%	1.3%	0.0%	0.0%	3.4%	100.0%	0.8%
Independence	90.1%	0.4%	2.2%	2.4%	0.7%	4.1%	100.0%	42.6%
Monmouth	90.2%	0.9%	0.8%	2.1%	1.6%	4.3%	100.0%	13.4%
Washington County	82.7%	1.9%	1.7%	9.3%	0.5%	3.9%	100.0%	16.5%
Banks	94.8%	0.0%	1.6%	0.3%	0.0%	3.3%	100.0%	6.1%
Beaverton	79.1%	2.1%	1.6%	13.3%	0.4%	3.6%	100.0%	17.2%
Cornelius	84.4%	0.6%	8.7%	1.6%	0.0%	4.6%	100.0%	63.1%
Durham	92.9%	2.5%	0.9%	0.8%	0.0%	2.7%	100.0%	8.8%
Forest Grove	91.4%	0.0%	2.9%	1.2%	0.2%	4.2%	100.0%	29.6%
Gaston	97.7%	0.0%	0.0%	0.0%	0.0%	2.3%	100.0%	1.0%
Hillsboro	80.2%	2.3%	3.1%	8.9%	1.0%	4.6%	100.0%	26.6%

County / City	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)
King City	95.7%	0.0%	0.0%	4.2%	0.0%	0.0%	100.0%	0.8%
North Plains	89.5%	0.0%	5.6%	1.5%	0.0%	3.4%	100.0%	8.9%
Sherwood	89.9%	1.2%	0.3%	4.8%	1.1%	2.7%	100.0%	7.9%
Tigard	87.8%	1.4%	0.4%	6.1%	0.9%	3.4%	100.0%	13.1%
Tualatin (part)*	90.1%	2.3%	0.8%	3.3%	0.4%	3.2%	100.0%	18.8%
Yamhill County	92.2%	0.9%	1.6%	1.3%	0.2%	3.9%	100.0%	15.5%
Amity	91.6%	0.7%	0.1%	0.3%	0.0%	7.3%	100.0%	9.8%
Carlton	94.1%	0.2%	0.5%	0.8%	0.0%	4.4%	100.0%	3.4%
Dayton	88.3%	2.7%	0.7%	0.6%	0.0%	7.8%	100.0%	51.7%
Dundee	93.7%	0.0%	1.8%	1.8%	0.0%	2.6%	100.0%	5.2%
Lafayette	95.4%	0.0%	0.4%	0.0%	0.0%	4.2%	100.0%	26.6%
McMinnville	91.2%	1.0%	1.8%	1.9%	0.5%	3.6%	100.0%	24.1%
Newberg	91.9%	0.7%	1.1%	1.4%	0.0%	4.8%	100.0%	12.7%
Sheridan	83.1%	5.3%	4.7%	0.9%	0.4%	5.7%	100.0%	15.7%
Willamina (part)*	84.4%	0.0%	5.8%	0.0%	0.3%	9.5%	100.0%	3.7%
Yamhill	92.2%	0.9%	1.6%	1.3%	0.2%	3.9%	100.0%	15.5%
Study Area	86.6%	2.6%	1.3%	5.1%	0.5%	3.9%	100.0%	12.8%

2007-2011 American Community Survey 5-Year Estimates

4.4.1.2 Income and Poverty

According to data from the U.S. Census Bureau, per capita income averages $29,447 across the entire study area, but varies substantially by county. In three counties (Cowlitz, Marion, and Polk) per capital income is less than $25,000 per year. In contrast per capita income in Yamhill County is $43,543, and in Hood River County it is $50,761. In Clark County, the per capita income of $27,916 is lower than the average for the study area.

Approximately one out of eight residents in the study area has income that puts them below the poverty level. For the study area, the share of residents below the poverty level is 13.1 percent. As with per capita income, the poverty rate varies substantially from county to county. The counties in the study area with the highest poverty rates are: Cowlitz County (17.3 percent), Marion County (16.8 percent), and Multnomah County (16.2 percent). The counties with the lowest poverty rates are: Hood River County (9.3 percent), and Clackamas County (9.4 percent). Clark County has a poverty rate that is lower than the study area average, with a rate of 11.6 percent.

Table 4.4-~~54.4-5~~. Income and Poverty by City and County

Areas	Median household income (dollars)	Mean household income (dollars)	Median family income (dollars)	Mean family income (dollars)	Per capita income (dollars)	Population below poverty level	Share below poverty level	Population
Clark County	59,051	73,656	68,447	82,447	27,916	48,751	11.6%	421,154
Battle Ground	59,723	66,941	63,324	71,292	21,073	1,859	11.0%	16,925
Camas	77,967	102,549	86,386	112,340	34,808	1,358	7.2%	18,845
La Center	38,984	46,813	71,250	66,455	24,082	127	13.6%	935
Ridgefield	82,528	86,744	85,221	88,850	27,849	677	14.9%	4,551
Vancouver	50,387	61,863	57,867	69,842	25,821	24,668	15.3%	161,606
Washougal	63,537	80,739	74,184	89,996	30,613	1,751	12.8%	13,674
Yacolt	59,271	58,933	58,958	58,784	18,791	110	7.5%	1,459
Cowlitz County	46,461	59,111	57,133	68,294	23,575	17,620	17.3%	101,901
Castle Rock	33,424	43,648	43,036	48,903	19,286	410	20.2%	2,025
Kalama	39,856	51,495	48,359	55,249	21,497	194	8.1%	2,385
Kelso	34,391	43,112	35,850	45,995	18,411	3,231	27.0%	11,974
Longview	40,226	54,599	50,219	66,431	23,159	8,007	21.8%	36,695
Woodland	58,413	62,916	60,684	66,997	20,288	891	16.7%	5,347
Skamania County	52,884	65,770	68,229	77,538	26,624	1,202	10.9%	10,979
North Bonneville	39,958	57,422	44,545	62,947	21,137	69	7.1%	966
Stevenson	48,021	57,927	68,750	72,109	24,620	285	17.4%	1,640
Oregon Cities								
Clackamas County	63,790	82,892	75,850	95,110	32,382	35,312	9.4%	373,832
Barlow	55,972	61,051	56,528	60,314	16,671	-	0.0%	227
Canby	59,873	71,823	64,804	80,995	24,774	1,539	9.9%	15,613
Damascus	83,772	96,206	87,978	101,523	32,969	524	5.0%	10,412
Estacada	37,560	46,287	57,692	59,155	19,513	588	22.0%	2,676
Gladstone	48,876	63,910	58,393	65,568	26,121	2,063	17.9%	11,542
Happy Valley	100,647	122,923	107,069	128,136	36,164	394	3.0%	13,170
Johnson City	35,313	39,137	45,000	48,505	16,787	179	25.8%	693
Milwaukie	52,625	61,152	64,099	72,392	26,844	2,578	12.6%	20,414
Molalla	50,942	56,701	52,741	56,225	21,134	999	12.7%	7,887
Oregon City	57,618	66,948	66,848	74,409	25,905	3,944	12.5%	31,430
Rivergrove	106,250	130,883	125,833	158,171	58,862	4	1.6%	249
Sandy	56,182	60,899	60,898	65,375	25,320	832	9.1%	9,188
West Linn	92,342	110,869	111,534	129,662	43,350	1,007	4.0%	24,917
Wilsonville	55,316	73,965	76,597	92,602	30,187	2,011	10.7%	18,845
Columbia County	56,270	64,488	63,415	72,351	25,440	5,783	11.7%	49,247

Areas	Median household income (dollars)	Mean household income (dollars)	Median family income (dollars)	Mean family income (dollars)	Per capita income (dollars)	Population below poverty level	Share below poverty level	Population
Clatskanie	40,000	51,932	55,852	67,882	22,279	311	17.6%	1,765
Columbia City	63,359	68,427	68,654	74,573	27,263	130	6.7%	1,947
Prescott	32,500	31,894	42,500	39,717	16,413	5	15.6%	32
Rainier	58,500	66,194	66,863	71,222	29,610	217	11.3%	1,919
St. Helens	52,923	55,933	58,440	61,650	21,307	1,687	13.3%	12,706
Scappoose	61,094	70,221	71,125	78,240	27,668	711	11.0%	6,492
Vernonia	50,568	59,723	57,292	66,981	23,371	189	8.5%	2,220
Hood River County	107,101	130,360	125,248	152,450	50,761	2,689	9.3%	28,947
Cascade Locks	40,893	45,398	45,250	47,150	18,355	141	14.2%	990
Hood River	107,101	130,360	125,248	152,450	50,761	2,689	9.3%	28,947
Marion County	46,191	59,672	54,618	67,788	22,192	52,506	16.8%	313,020
Aumsville	43,819	54,165	44,383	55,001	17,381	472	13.3%	3,546
Aurora	77,768	83,457	82,059	92,914	32,805	75	9.5%	793
Detroit	40,714	43,969	41,250	47,014	19,469	38	21.3%	178
Donald	54,402	62,944	56,250	65,293	23,539	87	8.6%	1,010
Gates	40,109	46,775	52,813	57,584	20,100	158	25.4%	621
Gervais	41,406	47,616	37,632	42,423	11,835	465	23.9%	1,945
Hubbard	44,730	53,262	46,830	56,038	15,567	483	15.6%	3,105
Idanha	47,500	47,839	51,806	53,392	14,346	21	9.5%	221
Jefferson	40,288	52,125	43,125	56,113	16,747	481	15.9%	3,028
Keizer	50,902	62,225	56,126	66,031	23,857	5,251	14.5%	36,119
Mill City	36,667	47,176	56,458	55,028	17,780	165	10.9%	1,513
Mt. Angel	37,990	47,435	54,063	60,365	19,129	478	14.6%	3,266
St. Paul	60,250	64,544	62,500	69,588	26,945	9	2.8%	319
Salem	44,226	59,100	56,833	70,346	23,162	25,477	16.6%	153,481
Scotts Mills	48,636	52,318	62,625	61,219	17,226	45	13.6%	331
Silverton	50,302	58,765	57,355	69,626	23,599	1,556	17.1%	9,091
Stayton	48,036	67,561	57,630	79,492	25,129	941	12.4%	7,570
Sublimity	62,500	68,098	70,083	81,848	28,130	132	5.0%	2,633
Turner	43,317	51,223	50,991	56,146	18,981	371	16.4%	2,256
Woodburn	42,717	50,909	46,489	56,250	16,864	4,699	19.9%	23,665
Multnomah County	50,726	68,930	64,071	84,189	29,544	117,466	16.2%	724,803
Fairview	51,579	65,936	55,897	70,579	26,779	1,186	13.6%	8,716
Gresham	47,852	57,895	56,844	66,021	21,748	17,440	16.8%	103,637
Lake Oswego	81,669	117,847	108,924	143,808	50,572	2,327	6.3%	36,704
Maywood Park	63,462	72,849	73,750	84,803	30,839	77	9.1%	849

Areas	Median household income (dollars)	Mean household income (dollars)	Median family income (dollars)	Mean family income (dollars)	Per capita income (dollars)	Population below poverty level	Share below poverty level	Population
Portland	50,177	69,269	64,617	86,462	30,631	94,763	16.4%	576,543
Troutdale	62,429	69,681	69,466	75,952	24,861	1,984	12.7%	15,674
Wood Village	47,617	60,412	50,185	57,557	20,898	1,018	26.9%	3,780
Polk County	52,865	64,864	63,907	75,908	24,794	9,250	12.4%	74,734
Dallas	49,209	54,756	55,909	62,516	21,604	1,838	12.7%	14,496
Falls City	41,528	44,054	47,292	47,840	15,203	239	22.3%	1,073
Independence	48,816	57,388	52,500	61,519	18,780	1,625	19.3%	8,405
Monmouth	40,154	49,479	64,911	72,594	17,899	1,843	19.5%	9,430
Washington County	63,814	80,980	77,028	93,375	31,165	53,851	10.3%	524,275
Banks	65,417	72,851	73,043	76,727	22,363	127	6.4%	1,971
Beaverton	55,115	72,534	70,361	86,552	30,225	10,672	12.0%	89,160
Cornelius	48,778	57,816	50,475	58,491	16,473	2,030	17.3%	11,706
Durham	66,563	92,584	107,917	122,172	44,974	111	10.0%	1,105
Forest Grove	49,034	59,408	58,519	68,393	21,118	4,203	20.1%	20,908
Gaston	58,958	74,532	69,583	77,271	31,775	72	10.1%	710
Hillsboro	64,197	74,139	72,206	82,837	27,034	10,520	11.7%	89,946
King City	37,833	49,881	58,438	65,144	31,943	267	8.7%	3,070
North Plains	71,346	74,187	74,107	82,972	31,597	103	5.6%	1,854
Sherwood	79,209	91,683	91,396	100,060	31,375	778	4.4%	17,636
Tigard	62,521	83,000	79,219	95,247	33,749	4,091	8.6%	47,759
Tualatin	60,818	77,744	75,122	85,362	29,987	3,124	12.1%	25,893
Yamhill County	123,304	134,381	139,819	148,112	43,543	12,080	12.1%	99,584
Amity	47,440	52,406	52,500	55,320	18,561	271	17.8%	1,520
Carlton	54,044	57,094	62,900	63,139	20,656	157	8.6%	1,829
Dayton	49,934	52,673	56,726	57,544	16,840	361	14.4%	2,510
Dundee	69,142	83,770	73,438	89,933	31,077	89	2.8%	3,128
Lafayette	53,750	60,925	52,870	63,564	17,510	532	14.6%	3,644
McMinnville	41,782	58,792	55,194	71,435	22,505	5,332	16.8%	31,769
Newberg	53,057	60,706	63,784	68,141	22,254	2,519	11.6%	21,786
Sheridan	46,867	54,843	46,800	57,378	14,556	588	9.8%	6,023
Willamina	37,379	43,806	42,935	49,564	15,916	292	15.6%	1,874
Yamhill	123,304	134,381	139,819	148,112	43,543	12,080	12.1%	99,584
Study Area					$29,447	356,510	13.1%	2,722,476

2007-2011 American Community Survey 5-Year Estimates

As illustrated in Table 4.4-6, between 2002 and 2011, the share of the population living below the poverty level grew from 10.1 to 15.6 percent in the study area. County residents fared somewhat better during this time, but the share of residents living below the poverty level grew from 9.6 percent in 2002 to 13.7 percent in 2011. Directly north of Clark County, the poverty rate in Cowlitz County grew from 12.5 to 19.5 percent, and directly to the south, the poverty rate in Multnomah County grew from 11.8 to 19.4 percent.

Table 4.4-6~~4.4-6~~. 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
Study Area	10.1	11.0	11.8	13.0	12.1	11.7	11.9	12.7	14.3	15.6	5.5

4.4.1.3 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. Results from the most recent American Community Survey indicate that there are more than 9,000 vacant housing units in the County, and that the vacancy rate for rental housing in the County is 5.2 percent. Within the larger study area, there are an estimated 73,000 vacant housing units, and vacancy rates for rental housing range between 4.1 and 8.1 percent.

Table 4.4-7~~4.4-7~~. Housing Units and Vacancy by County in Study Area

	Housing Units			% Vacancy	
County	Total	Occupied	Vacant	Homeowner	Rental
Washington					
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
Oregon					
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

County	Housing Units			% Vacancy	
	Total	Occupied	Vacant	Homeowner	Rental
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 the 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.

Table 4.4-~~8~~4.4-8. 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)
Washington									
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
Oregon									
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 OFM, which provides detail at the municipality level. As shown in the tables on the following two pages, approximately 55 percent of the housing in the County is located in incorporated parts of the County and 45 percent 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 percent. Battle Ground, Camas, and Washougal account for most of the other housing in incorporated areas.

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 percent of this total, adding more than 7,800 new housing units. Battle Ground, Camas, and Washougal each added more than 2,000 new housing 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 the County, ranging between 5.2 and 5.8 percent. In Vancouver, the vacancy rate has generally ranged between 6.2 and 6.7 percent and, in 2012, it was estimated that there were 45,316 unoccupied housing units in Vancouver.

Table 4.4-94.4-9. 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
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

City Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011*	2012*
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

Median gross rent varies by county in the study area. In Clark County, median gross rent is $895 per month. Within the study area, median gross rent ranges between $684 per month (in Skamania County) to $1,822 per month (in Yamhill County).

In Clark County, nearly one-third of the 50,000 rental units have gross rent of less than $750 per month, one third have gross rent ranging between $750 and $999 per month, and the remainder rent for $1,000 or more. Clark County has approximately 14,100 housing units that rent for less than $750 per month.

In the study area, approximately 30 percent of rental units have monthly rent of $750 or less, and there are approximately 361,500 of these units. The study area contains a total of nearly 1.2 million rental housing units.

Table 4.4-104.4-10~~Table 4.4-9i~~. Gross Rent by County

Areas	Less than $200	$200 to $299	$300 to $499	$500 to $749	$750 to $999	$1,000 to $1,499	$1,500 or more	Total	Median (dollars)
Clark County	649	823	1,774	11,488	16,314	14,936	4,183	50,167	$895
Cowlitz County	353	309	1,512	4,946	2,821	2,068	448	12,457	$705
Skamania County	117	28	48	373	191	135	44	936	$684
Clackamas County	506	753	1,327	7,174	15,703	10,402	5,238	41,103	$913
Columbia County	124	179	457	1,428	1,021	820	214	4,243	$739
Hood River County	48	101	505	1,387	515	788	191	3,535	$1,408
Marion County	649	690	3,301	15,847	11,908	7,723	2,497	42,615	$761
Multnomah County	2,707	3,244	5,954	32,205	42,450	31,570	13,250	131,380	$858
Polk County	178	339	876	3,050	2,101	1,800	497	8,841	$749
Washington County	16,442	21,459	55,997	180,116	240,027	253,959	122,108	890,108	$923
Yamhill County	104	207	557	3,071	2,669	2,271	763	9,642	$1,822
Study Area	21,877	28,132	72,308	261,085	335,720	326,472	149,433	1,195,027	

2007-2011 American Community Survey 5-Year Estimates

4.4.1.4 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 percent. In the County, the number of workers increased from approximately 187,000 to 211,000, an increase of approximately 24,000 workers or 12.9 percent.

During the same period, the number of workers employed grew by 7.4 percent 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 workers. In the 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 percent.

Because the size of the workforce grew faster than the number of workers employed, the number of unemployed workers in the study area grew by nearly 17,000 between 2002 and 2012. However, this is a significant improvement over the situation of the period between 2010 and 2012, which saw the number of unemployed jump to nearly 155,000 before slowly declining in subsequent years.

In the 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 the 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 during what is referred to as the Great Recession.

The unemployment rate in the study area declined from 7.8 percent in 2002 to 5.0 percent in 2007, but the impact of the recent recession was a doubling of that rate, to 10.8 percent in 2009 and 10.6 percent in 2010. By 2012, the unemployment rate had dropped to 8.4 percent, an improvement over the situation during the height of the recession but substantially higher than in 2007.

In the County the unemployment rate fell from 9.2 percent in 2002 to a low of 5.6 percent in 2007, before the recession. During the recession, the County unemployment rate grew for three consecutive years, to a high of 14.0 percent in 2010. The rate dropped in both of the most recent two years, but was still 10.2 percent in 2012.

Table 4.4-114.4-11. Employment by County in Study Area

Change	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change 2002-2012	% Change
Washington	2,877,022	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	12.10%
Clark	170,096	170,968	180,700	188,730	192,679	196,119	198,829	188,747	186,527	187,179	189,421	24,123	12.90%
Cowlitz	38,218	38,553	39,051	39,637	39,843	40,581	40,493	38,659	38,590	37,912	38,380	284	0.70%
Skamania	4,293	4,295	4,510	4,624	4,688	4,666	4,687	4,415	4,501	4,461	4,515	292	6.10%
Oregon	1,704,131	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	6.50%
Clackamas	176,583	175,118	177,506	180,656	185,938	187,337	188,717	181,268	178,777	181,905	183,824	9,838	5.20%
Columbia	20,899	20,823	21,102	21,619	22,409	22,380	22,476	21,357	21,526	21,683	21,912	1,143	5.00%
Hood River	11,095	11,155	11,441	11,538	11,922	12,296	12,632	12,815	13,196	13,304	13,487	2,406	19.90%
Marion	136,577	136,976	137,804	138,962	142,018	143,510	145,044	140,510	141,020	140,720	140,106	7,600	5.20%
Multnomah	348,945	342,767	338,901	340,275	349,215	360,495	365,458	351,922	360,613	369,121	373,015	24,841	6.50%
Polk	31,647	31,996	32,680	33,733	35,249	36,560	37,458	36,391	35,548	35,352	35,198	4,660	13.80%
Washington	247,008	245,736	249,121	255,825	266,761	271,610	273,971	263,334	262,950	269,929	272,777	28,109	10.60%
Yamhill	40,511	40,330	40,790	41,581	43,273	44,232	44,778	42,767	43,386	44,010	44,475	4,866	11.10%
Study Area	1,225,872	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	8.10%

Source: Bureau of Labor Statistics

Table 4.4-12~~4.4-12~~. Labor Force by County in Study Area

Change	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change 2002-2012	% Change
Washington	3,104,698	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	376,765	12.1%
Clark	187,319	189,109	195,202	201,564	204,406	207,853	214,101	217,536	216,991	213,635	211,442	24,123	12.9%
Cowlitz	42,783	42,820	42,663	42,724	42,607	43,327	44,119	44,627	44,376	43,072	43,067	284	0.7%
Skamania	4,768	4,779	4,928	5,002	5,042	5,001	5,126	5,075	5,188	5,103	5,060	292	6.1%
Oregon	1,843,740	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	119,168	6.5%
Clackamas	189,738	189,349	190,199	191,232	195,283	196,328	200,108	201,930	198,863	199,654	199,576	9,838	5.2%
Columbia	23,078	23,233	23,207	23,340	23,771	23,737	24,188	24,586	24,484	24,265	24,221	1,143	5.0%
Hood River	12,091	12,200	12,353	12,321	12,612	12,878	13,346	13,936	14,384	14,438	14,497	2,406	19.9%
Marion	147,299	148,851	149,066	148,651	150,558	151,714	155,295	157,808	158,598	156,976	154,899	7,600	5.2%
Multnomah	379,516	374,435	366,118	362,362	368,171	379,016	388,198	392,741	400,065	404,114	404,357	24,841	6.5%
Polk	33,782	34,348	34,993	35,752	37,090	38,455	39,688	40,136	39,198	38,834	38,442	4,660	13.8%
Washington	265,363	265,300	265,583	269,807	279,060	283,871	289,259	290,455	288,873	292,843	293,472	28,109	10.6%
Yamhill	43,745	43,915	43,969	44,285	45,617	46,566	47,868	48,294	48,538	48,604	48,611	4,866	11.1%
Study Area	1,329,482	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	108,162	8.1%

Source: Bureau of Labor Statistics

Table 4.4-134.4-13. Unemployment by County in Project Vicinity

County Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change 2002-2012	% Change
Washington	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	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.
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: Bureau of Labor Statistics

Table 4.4-14~~4.4-14~~. Unemployment Rate by County in Project Vicinity

County Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Washington	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	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: Bureau of Labor Statistics

According to data from the U.S. Census Bureau 2011 County Business Patterns, health care and social assistance are the largest sources 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).

The Facility 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 the County, it is $39,200. This information is shown in greater detail by the tables on the following pages.

Table 4.4-154.4-15. 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 (U.S. Census Bureau)

Table 4.4-164.4-16. Average Annual Payroll per Worker 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 (U.S. Census Bureau)

Construction of the Facility is expected to pay wages higher than the study area average. Because the Facility is located on public property, this analysis assumes that it is subject to the Davis-Bacon act and must pay local prevailing wages. Average hourly wages were based on 2013 Occupational Employment and Wage Estimates for Clark County, for each of the trades expected to be used on the Facility. The analysis also assumes that a share of the jobs in each trade will be filled by apprentices who make lower wages than journeymen, and the wages were adjusted to account for this.

The hourly wage was converted into a fully-loaded hourly rate (including wages and benefits), and then the annual compensation per job was calculated assuming 2,080 hours per year per worker. Because construction of the Facility will last less than one year, and the number of workers from each trade needed will vary through the Facility, the actual amount earned will vary substantially among the individual workers. Overall, a total of 250 workers are expected to be employed during construction, with total compensation of $8,961,986.

When the Facility is in operation, the total compensation earned by workers is likely to be relatively high, when compared with the study area. At start-up in 2016, the Facility is estimated to generate a total of 151 jobs, and this is projected to grow to 295 jobs at full operation in 2036. Total compensation (including wages and benefits) is estimated to be $112,880 at start-up, and to grow to $118,710 in 2036.

The majority of the jobs at start-up will be terminal workers. Based on the 2013 Occupational Employment and Wage Estimates, workers in industry 537121 (Car, Truck, & Ship Loaders) in Washington State earn an average of $64,461 per year. With benefits added in, the total compensation per worker is $96,691 per year.

In addition to the terminal workers, the Facility will directly create the need for various transportation-related jobs, including ships pilots, longshore workers, ship assist tugboats, and railroad crews. The need for railroad transportation will increase as the volume of product handled through the F~~f~~acility grows, and the number of railroad jobs associated with the Facility is projected to grow from 58 at start-up to 151 at full operating capacity. According to data from the Association of American Railroads, average total compensation for rail workers is $118,790 per year.

Table 4.4-174.4-17~~Table 4.4-15i~~. Estimated Employment and Compensation from Operations

	Start-up – (2016)			Full Capacity (2036)		
Type of Worker	Number	Compensation	Average Income	Number	Compensation	Average Income e
Terminal workers	80	$7,735,320	$96,692	110	$10,636,065	$96,692
Longshore	2	$368,134	$189,077	5	$959,778	$189,077
Pilots - Bar	1	$427,406	$299,998	4	$1,114,307	$299,998
Pilots - River	4	$1,234,020	$302,151	11	$3,217,267	$302,151
Tug ship assist	6	$406,713	$71,369	15	$1,060,360	$71,369
Rail Transportation	58	$6,909,625	$118,790	151	$17,900,012	$118,790
Total	151	$6,909,625	$112,880	295	$34,887,789	$118,710

Table 4.4-~~184.4-18~~. 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

Most of the largest employers in the County fall into one of four sectors: medical services, education, manufacturing, and government. The medical sector includes the largest employer in 2012, PeaceHealth Southwest Washington; other medical providers in the top 28 employers include the Vancouver Clinic, Legacy Salmon Creek Medical Center, Veterans' Administration Medical Center, and Kaiser Permanente Northwest. These five providers account for more than 22 percent of the jobs generated by the top employers

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 Washington State University Vancouver.

Manufacturing accounts for nearly 15 percent of the jobs provided by the top 28 employers in the County. Top manufacturers 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 percent of the jobs.

Table 4.4-19~~4.4-19~~. 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	CPU	340

Source: Columbia River Economic Development Council

A recent study completed for the Port included an analysis of where workers live, as illustrated in Table 4.4-~~18~~20. Excluding rail crew and rail headquarters employment, more than 75 percent of the workers with jobs directly related to the Port (and its tenants) are residents of the County. This includes 45.8 percent who are residents of Vancouver, and 29.9 percent who live elsewhere in the County. Nearly 20 percent of Port-related workers commute from Oregon, including 12.1 percent from Multnomah County.

Because the Facility is located at the Port of Vancouver, it is assumed that the distribution of county of residence of the Facility's workers will be similar to that of existing Port-related workers.

Table 4.4-204.4-20. Distribution of Port of Vancouver Direct Jobs by Place of Residence

Location	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

4.4.1.5 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 percent are in the County.

Two-thirds of the hotel rooms in the County are at hotels rated as upper economy, midscale, or upper midscale. The two least-expensive hotel types, economy and midscale, each account for approximately 20 to 23 percent of the available rooms in the 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 percent of the total rooms available. Nearly 11,000 available rooms in the Portland market are in economy or midscale hotels.

Table 4.4-214.4-21. 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 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 percent 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.

The Airport/Vancouver sub-market is the least expensive of the four tracked by PKF. Average occupancy is also relatively low.

Table 4.4-2~~24.4-22~~. Hotel/Motel Occupancy & Revenue in Portland Market

Year	Downtown		Airport/ Vancouver		Beaverton/ Sunset Hwy West		Lake Oswego/ I-5 South	
	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

4.4.1.6 Taxes

~~The proposed Facility is located on land owned by the Port. 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 Facility will be subject to property taxes.~~ The project would be subject to a variety of taxes. Taxes on the construction would be assessed on a one-time basis, while taxes on operations would be ongoing. Businesses in Washington State are subject to the B&O tax, which is levied on the value of products, gross proceeds of sale, or gross income of a business. Construction of the terminal would be subject to the state B&O tax rate of 0.00471 (Schatzki and Strombom 2014, see Appendix K). There is no local B&O tax in the City. However, construction activities would be subject to retail sales tax, which partially accrues to the City. Retail sales tax is assessed against the value of the construction project. In Vancouver, the total sales tax rate is 8.4 percent, of which 6.5 percent goes to the State and 1.9 percent to local government.

The Port is not subject to property taxes; however, privately owned improvements located on land leased from the Port are subject to leasehold excise tax, which is a tax collected in lieu of property tax for the use of public property by a private party. Therefore, the proposed Facility would be subject to leasehold excise taxes throughout its operating life. Leasehold excise tax for the project would be assessed at 12.84 percent of the rent paid for the property. Approximately 53 percent of the tax goes into the state's General Fund, and 47 percent of the tax is returned to the county and city in which the leased property is located (Washington Department of Revenue 2014). Additional sources of county revenue include sales taxes, real estate excise taxes, and fuel taxes; other taxes such as the gambling tax and timber tax; state and federal government grants; and private sources, including permit fees, court fines, payments for licenses, and other goods and services (Clark County 2013).

The total property tax at the Facility 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.

Table 4.4-~~234.4-23~~. Breakdown of Taxing District Millage Rate

Taxing District	Tax Rate
Port Vancouver General Adref	0.000449
County General Adref	0.003626
Veterans Asst	0.009925
City Vancouver General Adref	0.010346
Dev Disability	0.012500
Mental Health	0.012500
Vancouver Library Capital Facilities	0.256084
Sd37 Vancouver M&O Adref	0.016503
Conservation Futures	0.062500
Port Vancouver Bonds	0.223412
Port Vancouver General	0.211683
County General	1.537209
Sd37 Vancouver Debt Svc	1.851094
Sd37 Vancouver M&O	3.758351
State Schools	2.489687
City Vancouver General	3.161863
Ft. Vancouver Regional Library	0.500000
Totals	**14.11773**

Source: Clark County Assessor

4.4.1.7 Fire, Police, and Medical Services

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. The Fire Department consists of 198 personnel. The Fire Department 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 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 by ten fire stations.

The 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 one 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 4.4-2~~44.4-24~~. Fire Departments in Clark County

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

Police Services

The Vancouver Police Department covers approximately 49 square miles and provides 24-hour response for public safety and services within the City. The Facility is located approximately 5.5 miles west of the nearest police station, located at 2800 NE Stapleton Road. The VPD currently employs 185 sworn staff, with 62 Police Officers, 10 Corporals and 18 Sergeants assigned to patrol. VPD provides police services and respond to 911 calls for service.

The VPD provides a range of public safety and police services including patrol, investigations division, and special operations division. The VPD currently has on staff 3 EMT-Paramedics and 2 EMT-IV Technicians that provide medical support as part of the region's SWAT Team.

Medical Services

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. Southwest 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 Facility, respectively.

Table 4.4-2~~54.4-25~~. 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

4.4.1.8 School Enrollment

School enrollment in the study area has grown slowly over the past 6 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 percent.

Within the study area, enrollment in the County grew at one of the fastest rates. Schools in the County saw an increase of nearly 2,000 students between the 2007–2008 and 2012–2013 school years, with growth of 0.51 percent.

Table 4.4-26~~4.4-26~~. Enrollment Trends in Project Vicinity

County	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	Avg. Annual Growth
Washington							
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							
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, Oregon Department of Education

4.4.2 Impacts

4.4.2.1 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 Facility, depending on the Facility phase. The total number of each category of worker is presented in Table 4.4-25.~~

~~Table 4.4-27. Impact on Local Workforce~~

~~Trade~~	~~Regional Employment~~	~~Facility 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%~~

~~The Facility 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 4.4-2628, for most of the trades required, peak construction employment will account less than 3 percent of the available local workforce. The exceptions are ironworkers (10.7 percent of local workforce) and boilermakers (5.9 percent); a portion of these workers in these trades may need to travel from outside of the Portland-Vancouver region.~~

~~Table 4.4-28. Economic Impacts in Construction on Study Area~~

~~Trade~~	~~Employment~~	~~Labor Income ($ millions)~~
~~Direct~~	~~250~~	~~$21.2~~
~~Indirect and Induced~~	~~517~~	~~$26.7~~
~~Total~~	~~767~~	~~$47.9~~

~~Note: Compensation and labor income are reported in 2013 dollars~~
~~Source: Tesoro Savage, BST Associates using IMPLAN model~~

~~Over the nine months of the Facility, 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 Applicant estimates that the total capital cost of the Facility is estimated to be $110 million, of which an estimated $10 million will be supplies purchased from out of state.~~

~~The results of the IMPLAN analysis for construction are presented in Table 4.4-26. Direct employment of 250 is projected to support an additional 517 indirect and induced jobs in the study area. The total number of jobs supported by the construction is estimated to be 767 in the study area. Direct labor income of $21.2 million is projected to support an additional $26.7 million in labor income. Total labor income supported by the Facility is projected to be $47.9 million. Labor income includes both employee compensation (wages, benefits, and taxes) and proprietor's income.~~During the estimated 12-month construction period for Phase I construction, direct on-site and off-site employment associated with the Facility is projected to be 239 jobs (see section 2.15.2). During the estimated six-month construction period for Phase II construction, direct on-site and off-site employment associated with the Facility is projected to be 81 jobs. The estimated direct labor income associated with the Facility (including employee compensation and proprietor's income) during construction is estimated at $31 million. While the annual wage in the study area averages $45,700 across all sectors, construction jobs associated with the Facility are likely to generate direct income that is substantially higher than the study area average wage; an average annual compensation of $95,595 was assumed for on-site construction workers. Including both indirect and induced benefits, construction of the proposed Facility is projected to support a total of 1,429 jobs, with associated total income of $87 million (Appendix K) (Table 4.4-27).

Table 4.4-27. Economic Impacts of Construction on Study Area

Impact Type	Employment	Labor Income ($millions)
Direct	320	$31
Indirect and Induced	1,109	$55
Total	1,429	$87

Source: Schatzki and Strombom (2014) using the IMPLAN model.
Note: Labor income is reported in nominal dollars. Employment reflects job-years.

As detailed above, construction of the Facility would be subject to the state B&O tax rate of 0.00471 and a retail sales tax rate of 8.4 percent, of which 6.5 percent goes to the state and 1.9 percent goes to local government. With a total construction value for both Phase I and Phase II of $210 million, the total state B&O tax associated with construction would be $989,100. Construction is projected to generate a total of $17.64 million in retail sales tax, of which the state would receive $13.65 million and local government would receive $3.99 million.

Overall, it is anticipated that construction of the proposed Facility would result in a positive economic impact to Clark County and Washington due to increased employment, employment income, tax revenues, and local expenditures.

The Facility will not result in the displacement of minority or low-income populations. The developed area will occur on land owned by the Port and therefore no land use displacements or relocations will occur. The potential impacts from construction and/or operation of the proposed Facility will be from additional traffic (including rail traffic), noise, air quality, visual quality and aesthetics, and safety or security. As described in Parts 2.0, 3.0, and 4.0 of this application, these potential impacts will be mitigated through design features and construction techniques to ensure that they are reduced to less than significant levels. See the discussion at section 1.4.2.

4.4.2.2 Operations

The proposed terminal will directly employ an estimated ~~120~~ 176 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 4.4-28. In addition to the ~~120~~ 176 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 4.4-28~~4.4-28~~. Direct Employment from Operation at Startup and Full Build-Out ~~and Operating~~ Capacity

~~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 Petroleum Terminal LLC~~

Trade	Number of Operations Staff	
	Start-up	Full Build-out
Marine (dock, vessel securement, etc.)	16	19
Rail (engineers, switchmen, inspectors, etc.)	20	40
Trans-load (trans-loaders, tanks farm, trainers, etc.)	30	79
Safety, health, environment & maintenance (mechanics, maintenance, EHS, etc.)	9	13
Office/management (managers, coordinators, supervisors, etc.)	16	25
Total	91	176

~~The results of the IMPLAN analysis for operations are presented in Table 4.4-28~~30~~. In the first year of operation (2016), direct employment of 151 at the Facility is estimated to support 265 additional jobs in the study area, or a total of 416 jobs. At full operation (in 2036), direct employment of 296 is projected to support an additional 375 jobs in the study area, or a total of 672.~~

~~Direct income of $16.9 million at start-up is projected to support an additional $13.2 million of income in the study area, or a total of $30.0 million. At full operating capacity, direct income of $33.8 million is projected to support an additional $18.0 million in the study area, or a total of $51.8 million.~~

~~Table 4.4-30. Economic Impacts in Study Area from Operations~~

	~~Start-up (2016)~~		~~Full Build Out/Capacity (2036)~~	
~~Impact Type~~	~~Employment~~	~~Labor Income ($millions)~~	~~Employment~~	~~Labor Income ($millions)~~
~~Direct~~	~~151~~	~~$16.9~~	~~296~~	~~$33.8~~
~~Indirect & Induced~~	~~265~~	~~$13.2~~	~~375~~	~~$18.0~~
~~Total~~	~~416~~	~~$30.0~~	~~672~~	~~$51.8~~

~~Note: Compensation and labor income are reported in 2013 dollars~~
~~Source: Tesoro Savage, BST Associates~~

At start-up[6], the Facility is estimated to generate direct employment of 302 total jobs, projected to grow to 616 jobs at full operation in the subsequent years. The direct labor income associated with the full operation is estimated to be $67 million, rising annually to $88 million in 2030. Including both indirect and induced impacts with direct impacts, the operation of the Facility at full build-out is projected to support 1,081 jobs annually, with associated total income of $90 million in 2017, rising to $118 million in 2030 (Appendix K) (Table 4.4-29).

Table 4.4-29. Economic Impacts in Study Area from Operations

Impact Type	Start-up (2016)		Full Build-out (2036)	
	Employment	Labor Income ($millions)	Employment	Labor Income ($millions)
Direct	302	$33	616	$88
Indirect & Induced	217	$11	465	$30
Total	519	$44	1,081	$118

Source: Schatzki and Strombom (2014) using IMPLAN model

Note: Labor income is reported in nominal dollars. Employment reflects job-years.

The total annual property tax revenue associated with operation of the Facility is expected to be $2.32 million in 2014 dollars.

Additional taxes that would be received by state and local government during Facility operations, such as non-Facility related property taxes resulting from expanded business activity, payments for temporary disability insurance, and business license fees, are estimated at $1.07 million during the first (start-up) year of operations and $2.32 million annually during full operations (Appendix K).

It is, therefore, anticipated that operation of the proposed Facility would result in an overall positive economic impact to the county and the state due to increased employment, employment income, tax revenues, and local expenditures.

4.4.2.3 Housing Impact

~~With maximum daily employment of 125 construction workers and total rental housing inventory of nearly 1.2 million rental units in the study area, construction of the Facility should have no noticeable impact one housing in the study area. In Clark County there are more than 9,600 vacant housing units and an occupancy rate of 94.3%. If each of the 125 workers rented on vacant unit in Clark County, the housing occupancy rate would grow from 94.30% to 94.37%, an increase of less than 0.1%. This small an increase in occupancy rate should also have no noticeable impact on median gross rent, median housing values, or new housing construction.~~During the construction period, approximately 298 construction workers would be employed at the site. Levels would vary over the construction period with a maximum daily workforce of 149 construction workers. Development of the Facility would occur on land owned by the Port and located about 0.6 mile from the closest residential neighborhood. Therefore, no land use displacements or relocations, or related adverse housing impacts, would occur. Because

[6] The economic analysis conducted in 2014 anticipated a start date in 2016.The actual date to begin construction depends on the timing of the Governor's decision on the Application. See the construction schedule presented at section 2.15.1.

the majority of construction workers are expected to come from within the local study area, and with employment of 298 construction workers on site during the Phase I and total rental housing inventory of approximately 9,000 vacant units in Clark County and 73,000 vacant units in the study area, construction of the proposed Facility should have no noticeable impact on housing in the study area. This small increase in occupancy rate associated with housing 298 construction workers within the study area would also have no noticeable impact on median gross rent, median housing values, or new housing construction.

The impact of construction workers on hotel occupancy in the study area is also likely to be limited. As described in section 4.4.1.5 Lodging, the Portland lodging market has nearly 26,000 hotel/motel rooms, with occupancy of less than 60 percent. Of this total, more than 5,300 are classified as "Economy" rooms and more than 4,300 are classified as mid-scale. Assuming that construction workers rent rooms in one of these two categories, the ~~125~~ 149 workers on site would increase demand for these room by 1.~~3~~6~~%~~percent. This magnitude of demand increase is not likely to impact pricing.

~~With direct employment of 120 workers, operation of the Facility should also have no noticeable impact on housing in the study area. This number is essentially the same as the number of construction workers on site daily, and this number is very small relative to the inventory of housing in the study area. Further reducing the impact on housing is the plan to recruit most of the operational workforce from the local area. In this case, the majority of the workforce does not represent an increase in demand for housing in the study area. The operational workforces should have no noticeable impact on median gross rent, median housing values, or new housing construction.~~With direct employment of 616 workers, operation of the proposed Facility should have no noticeable impact on housing in the study area. This number is very small relative to the inventory of housing in the study area. The plan is to recruit most of the operational workforce from the local area thereby reducing the impact on local housing. In this case, the majority of the workforce does not represent an increase in demand for housing in the study area. The operational workforce should have no noticeable impact on median gross rent, median housing values, or new housing construction.

Likewise, because the closest residential neighborhood is located about 0.6 mile from the Port and existing Port operations, adverse impacts to residential property values from operation of the proposed Facility are not anticipated.

4.4.3 Taxes

The Facility 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.

4.4.3.1 Construction-related Taxes

Businesses in Washington are subject to the B & O tax, which is levied on gross sales. Construction of the terminal will be subject to the state B & O tax rate of 0.00471. With a construction value of $~~110~~ 210 million, the total state B & O tax associated with construction would be $~~518~~989,100~~.~~ (Appendix K).

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 of the Facility. In Vancouver total sales tax rate is 8.4 percent, of which 6.5 percent goes to the State and 1.9 percent to local government. The $~~110~~ 210 million in construction is projected to generate a total of $~~9.24~~ 17.64 million, of which the State would receive $~~7.15~~13.65 million and local government $~~2.09~~3.99 million.

Property taxes include taxes on the Facility itself, as well as increased property taxes due to expanded business activity in support of the Facility's construction and operation. Property taxes from expanded (indirect and induced) business activity are expected to be about $2.6 million during construction.

Other taxes, such as payments for temporary disability insurance, business license fees, payments for fines and donations, are also calculated by IMPLAN. Construction of the Facility will generate approximately $0.9 million in other one-time taxes and fees to state and local government.

In total, construction of the terminal is expected to generate $~~9.76~~22 million in non-recurring taxes~~, of which Washington State can be expected to receive $7.67 million and local government $2.09 million.~~, as summarized in Table 4.4-30 below.

~~Table -. Summary of Construction-related Tax~~
~~($ millions)~~

~~Trade~~	~~State~~	~~Local~~	~~Total~~
~~Business and 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~~

Table 4.4-30. Construction and Operation Taxes
($ millions)

Tax	Construction (Phases I and II)	Annual Operations (Start-Up)	Annual Operations (Full Build-Out)
Retail Sales	$17.64	$1.50	$3.23
Business and Occupation	$0.99	See Note 2	See Note 2
Property (Facility)	Not applicable	$2.32	$2.32
Property (Non Facility)	$2.57	$0.75	$1.64
Other	$0.95	$0.31	$0.68
Total	$22.15	$4.88	$7.86

Source: Schatzki and Strombom, 2014 (Appendix K)

Notes:
[1] Retail sales tax includes a state and local portion, and is calculated on the full construction costs for Phases I and II of $210 million. The state tax rate is 6.5% and the local tax rate is 1.9%, for a total tax rate of 8.4%. Sales tax for annual operations comes from the IMPLAN results. IMPLAN estimates of sales tax from indirect and induced activities are not included for the construction phase. For more information, see http://dor.wa.gov/content/FindTaxesAndRates/SalesAndUseTaxRates/.
[2] Business & Occupation tax is based on the classification of activity, and is calculated on gross business income. The rate for construction is based on the retailing classification, and is 0.00471. The B&O tax for annual operations is not reported independently in IMPLAN, but is accounted for in the sales tax and other taxes categories reported. For more information, see http://dor.wa.gov/content/FindTaxesAndRates/BAndOTax/.
[3] The Project's property tax for annual operations was estimated by Tesoro Savage.
[4] The non-Project property tax for annual operations is based on IMPLAN results, and represents property taxes on production and imports only (i.e., it does not include household property taxes).
[5] Other taxes include a variety of other taxes and fees, such as payments for temporary disability insurance and business license fees.

4.4.3.2 Operations-related Tax

The operation of the Facility will generate about $1.5 million in state and local sales taxes in the initial start-up year, and then produce approximately $3 million in annual sales tax revenues thereafter.

The Facility 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 Facility will be subject to property taxes.

Property tax on the Project itself is expected to be $2.3 million annually. Additional property taxes from expanded (indirect and induced) business activity are expected to be about $0.75 million in the first year of operation start-up, and about $1.6 million annually during the remainder of the Project's operation.

Based on the taxing millage rate of an adjacent parcel, -the property tax rate at the Facility 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. Table 4.4-31 summarizes how Facility property taxes would be approximately distributed.

~~The value of the Facility 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 4.4-31. Property Tax

Taxing District	Tax Rate	Est Property Tax
Port Vancouver General Adref	0.000449	~~$49~~74
County General Adref	0.003626	~~$399~~595
Veterans Asst	0.009925	~~$1,092~~1, 630
City Vancouver General Adref	0.010346	~~$1,138~~1,699
Dev Disability	0.012500	~~$1,375~~2,052
Mental Health	0.012500	~~$1,375~~2,052
Vanc Library Capital Facilities	0.256084	~~$28,169~~42,045
SD37 Vancouver M&O Adref	0.016503	~~$1,815~~2,710
Conservation Futures	0.062500	~~$6,875~~10,261
Port Vancouver Bonds	0.223412	~~$24,575~~36,681
Port Vancouver General	0.211683	~~$23,285~~34,755
County General	1.537209	~~$169,093~~252,384
SD37 Vancouver Debt Svc	1.851094	~~$203,620~~303,919
SD37 Vancouver M&O	3.758351	~~$413,419~~617,059
State Schools	2.489687	~~$273,866~~,408,765
City Vancouver General	3.161863	~~$347,805~~519,126
Ft Vancouver Reg Library	0.500000	~~$55,000~~82,092
Totals	14.11773	~~$1,552,951~~2,317,898

Source: Clark County Assessor~~, BST Associates~~

Operation of the Project will generate an additional $0.31 million in other tax revenues the first year of operations start-up, and $0.68 million annually thereafter.

As summarized in Table 4.4-30 above, the total annual operation of the Project is expected to have a recurring annual impact of approximately $7.8 million once the Facility is operating at full capacity.~~The IMPLAN model estimates other taxes associated with construction and operations. According to the IMPLAN results, total state and local taxes associated with construction are projected to be approximately $4.9 million. Total state and local taxes related to operations are estimated to grow from approximately 4.0 million in 2016 (in 2013 dollars) to $5.2 million in 2036.~~

~~Table -. State and Local Taxes from Construction and Operations~~

~~Description~~	~~Employee Compensation~~	~~Tax on Production and Imports~~	~~Households~~	~~Corporations~~	~~Total~~
~~Construction~~	~~$35,467~~	~~$4,037,019~~	~~$818,392~~	~~$54,158~~	~~$4,945,036~~
~~Start-up in 2016~~	~~$30,950~~	~~$3,469,550~~	~~$501,435~~	~~$42,881~~	~~$4,044,816~~
~~Full Build Out/ Operating Capacity in 2036~~	~~$54,996~~	~~$4,244,765~~	~~$863,543~~	~~$52,557~~	~~$5,215,861~~

~~Note: all dollar figures are reported in 2013 dollars~~
~~Source: BST Associates using IMPLAN model~~

4.4.3.3 Impact on Clark County Public Service Costs

The potential for gaps in County expenditures on additional Facility-related county-provided public services versus tax revenue from the Facility was also estimated. County services provided within City jurisdiction are primarily related to providing direct assistance to residents (community services, public health), funding county operations and debt (General Government, Internal Support, Capital and Debt, Fiscal Entities), funding a portion of the County Public Works budget, and providing Law and Justice services (for example, the City of Vancouver does not maintain a municipal court). The cost of the services provided within the boundaries of the City of Vancouver are primarily a function of the number of city residents. Table 4.4-32 summarizes the estimated cost of County services required as a result of the addition of new residents resulting from operation of the Facility. The additional service cost to the County, estimated at $42, 862, is approximately one quarter the value of taxes to be collected by the County ($169,492; see Table 4.4-~~30~~32, "County General Adref" plus "County General").

Table 4.4-32. Estimated Cost of Additional Clark County Services

	County Budget (1)	County Population (2)	Budget per capita	Additional Residents (3)	Additional Cost
General Government	$98,054,506	441,572	$ 222.06	22	$ 4,955
Law & Justice	220,523,379	441,572	$ 499.41	22	$ 11,143
Public Works	225,982,039	441,572	$ 511.77	22	$ 11,418
Community Development	17,136,446	441,572	$ 38.81	22	$ 866
Community Services	85,943,279	441,572	$ 194.63	22	$ 4,343
Public Health	24,106,507	441,572	$ 54.59	22	$ 1,218
Internal Support	43,899,519	441,572	$ 99.42	22	$ 2,218

	County Budget (1)	County Population (2)	Budget per capita	Additional Residents (3)	Additional Cost
Capital & Debt	74,707,315	441,572	$ 169.19	22	$ 3,775
Fiscal Entities	57,931,532	441,572	$ 131.19	22	$ 2,927
Total	$848,284,522				$ 42,862

(1) http://www.clark.wa.gov/budget/2013-2014/5%20-%20Financial/13-14%20Financial.pdf#page=46
(2) Interpolated to FY 2013/2014, based on Table 4.4-1
(3) Calculated based on page 4-445 bottom paragraph (origin of employees), Table 4.4-3 (population), and Table 4.4-7 (occupied housing units)

Clark Regional Emergency Services Agency (CRESA) is a regional public safety agency that provides 9-1-1 call taking and dispatch, technology support services, emergency management coordination, and ambulance contract oversight for EMS District #2. CRESA's service area includes Clark County and each of its seven cities, and Woodland in Cowlitz County. CRESA also hosts the Region IV Homeland Security Office which coordinates Homeland Security efforts within four southwest Washington counties: Clark, Cowlitz, Skamania and Wahkiakum. CRESA 911 activities are funded through excise taxes and stakeholder agencies' user fees. In 2012, the City of Vancouver's contribution amounted to 25 percent of the CRESA 911 budget (CRESA, 2012). The Region IV Homeland Security Coordinating Council's program is funded 100 percent by federal grants related to Homeland Security. The County provides Emergency Medical Services (e.g., ambulance service) to the City of Vancouver; these services are funded 100 percent by the ambulance contractor through a contract administration fee. Increases in CRESA 911 service-use as a result of the Facility would be funded through the City of Vancouver's user fee, which will in turn be funded through City of Vancouver taxes collected from the Facility construction and operations. Any negative impact from the Facility on CRESA 911 service costs is therefore likely to be mitigated by the Facility's payment of taxes to the City of Vancouver.

4.4.4 Mitigation

The socioeconomic conditions will not be negatively affected; therefore, no mitigation measures will be required.