



## Vancouver Energy Marine Mammal Monitoring Plan

Plan No. C.04 | Revision 00

**Approved by:**

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Designated Agent for EFSEC Application No. 2013-01

Date: 30 April 2015

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Vancouver Energy  
Marine Mammal Monitoring Plan  
EFSEC Application for Site Certification No. 2013-01  
Docket No. EF131590  
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# Vancouver Energy Marine Mammal Monitoring Plan

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# 1. Introduction

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following “area” groupings, as illustrated in Figure 1 and Figure 2.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week.

## 1.1 Purpose of Plan

This marine mammal monitoring plan (MMMP) describes procedures to identify the presence of marine mammals during construction activities, which may result in “take,” (“to hunt, harass, capture, or kill”) and establishes actions that will be taken to minimize impacts to such marine mammals. This plan will be implemented during the following construction activities.

- In-water work construction activities related to Area 400 Marine Terminal modifications, including removal of existing piles, temporary pile installation and removal, and pile strengthening.
- Upland work related to impact pile driving of shore-based mooring points.

The impact addressed by this plan is mammal exposure to elevated noise levels, both underwater and in-air, resulting from construction activities that could potentially result in “take.” Monitoring will be conducted prior to and during the work activities listed above with the potential to impact marine mammals. Work elements subject to this plan, described above, will be stopped when a marine mammal is detected within the monitoring area and will not restart until after the marine mammal has left the monitoring area.

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**Figure 1 - Vicinity Map**



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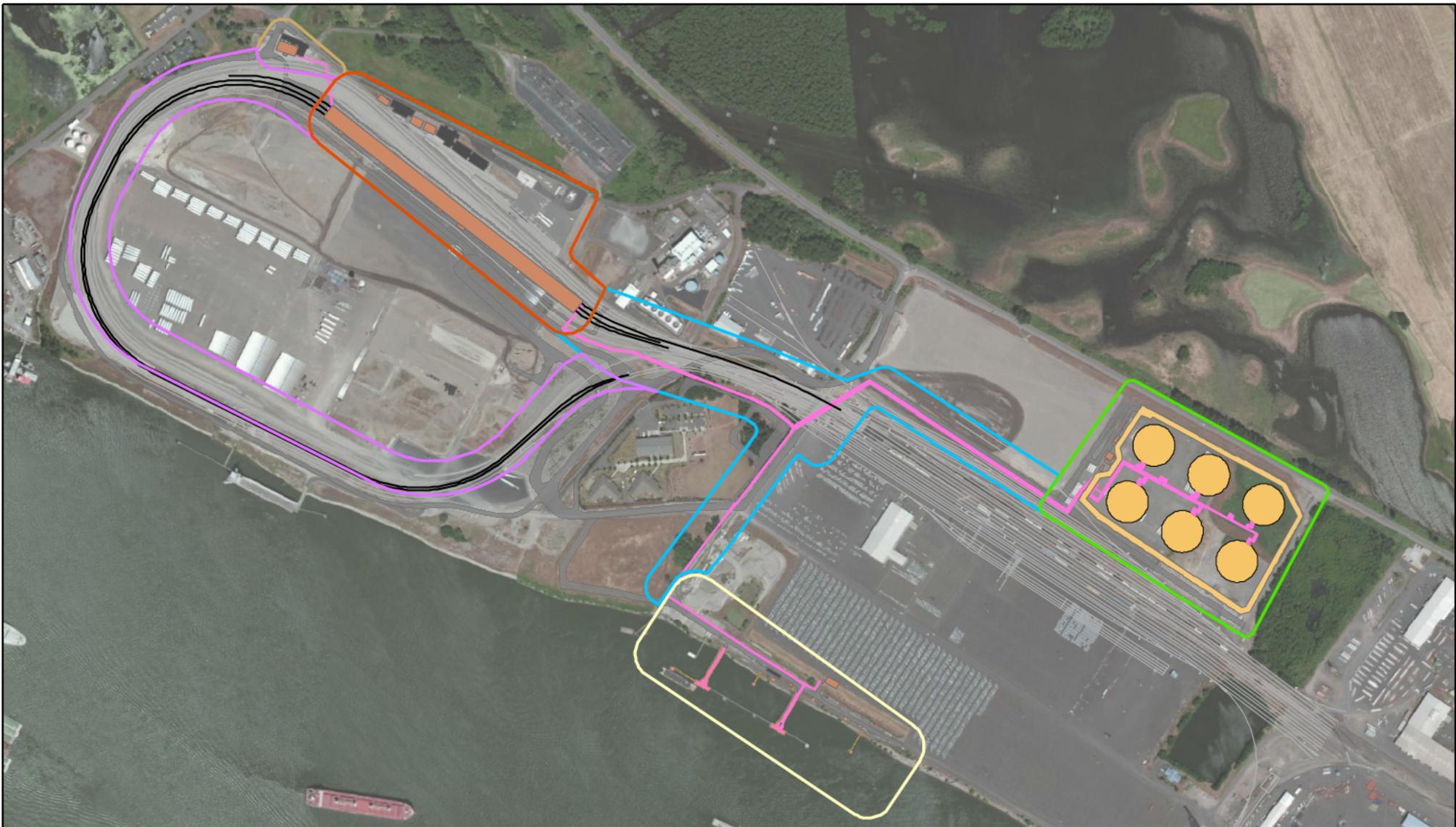
-  Project Boundary
-  Vancouver, WA
-  Portland, Oregon

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

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





**Figure 2 - Site Plan**

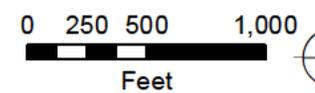
**Proposed Project Facilities**

- Containment Berm
- Storage Tank
- Roads
- Marine Terminal
- Rail
- Building
- Transfer Pipeline

**TSPT Improvement Areas**

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal

- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure



Tesoro Savage Petroleum Terminal LLC

Date: February 2015

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



## 1.2 Regulatory Requirements

Marine mammals potentially present in the vicinity of construction activities include the following.<sup>1</sup>

- Harbor seal (*Phoca vitulina ssp. richardsi*)
- California sea lion (*Zalophus californianus*)
- Steller sea lion (*Eumatopius jubatus*)

These marine mammals are protected from “take” under the Marine Mammal Protection Act. For purposes of the act, “take” is defined as “to hunt, harass, capture, or kill” (16 USC Chapter 31). Marine mammals are also considered priority species under the Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) program (WDFW 2008). However, WDFW does not provide any PHS management recommendations for marine mammals.

## 1.3 Related Plans and Documents

Other plans prepared for the Facility that address components related to wildlife monitoring during construction include the following.

- Water Quality Protection and Monitoring Plan (WQPMP) – This plan includes visual monitoring of surface water quality conditions; these monitoring activities include provisions for construction-related in-water work activities that could affect aquatic species.
- Wildlife Construction Monitoring Plan (WCMP) – This plan addresses monitoring protocols for WDFW amphibian and avian PHS-listed species to verify that construction activities do not have adverse impacts.

# 2. Monitoring Area

The monitoring area includes all areas that will be subject to elevated underwater noise levels predicted to exceed the published guidance for harassment and harm (NOAA 2015). This MMMP defines a maximum monitoring zone based on the Level B harassment criteria for non-impulsive noise. Any marine mammal detections within the monitoring area will result in work stoppage for any pile driving until the marine mammal leaves the zone.

## 2.1 Noise Analysis

### 2.1.1 Underwater Noise

The use of vibratory and impact pile drivers can result in increased underwater noise levels that can impact marine mammals that may be present. Noise effects are divided into two groups, Level A harassment and Level B harassment (NOAA 2015). The Level A harassment threshold represents the onset of physical injury or loss of hearing and occurs at 190 decibels (dB). The Level B harassment zone includes behavioral disruptions and occurs at 160 dB for impact driving and 120 dB for vibratory pile driving. Table 1 shows the underwater injury and disturbance thresholds that the National Marine Fisheries Service (NMFS) has established for marine mammals.

<sup>1</sup> Cetaceans are not known to travel the Columbia River up to the Port and are not included in this plan.

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**Table 1. Underwater Injury and Disturbance Threshold Decibel Levels for Marine Mammals**

Criterion	Criterion Definition	Threshold*
Level A harassment	PTS (injury) conservatively based on TTS**	190 dB RMS for pinnipeds
Level B harassment	Behavioral disruption for impulsive noise (e.g., impact pile driving)	160 dB RMS
Level B harassment	Behavioral disruption for non-pulse noise (e.g., vibratory pile driving, drilling)	120*** dB RMS

\*All decibel levels referenced to 1 micropascal (re: 1 μPa). Note all thresholds are based off of root mean square (RMS) levels.

\*\* PTS=Permanent Threshold Shift; TTS=Temporary Threshold Shift

\*\*\*The 120 dB threshold may be adjusted slightly if background noise levels are at or above this level.

The zone of influence for underwater noise has been determined using the practical spreading loss model. This model, currently recognized by both USFWS and NMFS as the best method to determine underwater noise attenuation rates, assumes a 4.5-dB reduction per doubling of distance (Washington State Department of Transportation [WSDOT] 2013). The baseline underwater noise level in the portion of the Columbia River that is within the monitoring area is conservatively assumed to be approximately 120 dB<sub>RMS</sub> (WSDOT 2013), although actual background underwater noise levels may be higher, given the amount of industrial shipping traffic.

For purposes of establishing the monitoring zone, a worst-case estimate of the underwater noise levels that could be generated during impact pile driving of upland mooring points is estimated at approximately 191 dB<sub>PEAK</sub>, 177 dB<sub>RMS</sub>, and 167 dB<sub>SEL</sub> for 24- and 36-inch steel piles<sup>2</sup>. Monitoring zones for Levels A and B criteria are shown below in Table 2. Monitoring zones were calculated using a standard equation for calculating underwater sound attenuation.

$$TL = 15 * \text{Log} \left( \frac{R1}{R2} \right)$$

Where TL is the transmission loss, represented as the difference between measured sound level and the threshold level, R1 is the distance where sound attenuates to the threshold level, and R2 is the distance of the measured sound level. Solving the equation for R1 results in

$$R1 = R2 * 10^{\left(\frac{\text{Measured Sound}-\text{Threshold Level}}{15}\right)}$$

**Table 2. Monitoring Zone Distances**

Criterion	Threshold Level	Distance (R1)
Level A harassment	190 dB RMS	15.6 feet
Level B harassment	160 dB RMS	1,560.5 feet
Level B harassment	120 dB RMS	137 miles

These distances present a worst-case, hypothetical model, and attenuation will likely occur over a shorter distance. Sound waves will travel only in straight lines and will not extend beyond the opposite shore of the Columbia River. An additional factor that will affect the attenuation of underwater noise is the proximity of the Facility to the busy Columbia River shipping channel. For purposes of this MAMP, the extent of impact due to temporarily elevated underwater noise has been estimated to extend throughout the water column of the Columbia River, in straight line distances from the proposed pile-driving activities, in all directions. Figure 3 on page 10 provides a graphical depiction of this zone of influence.

<sup>2</sup> Reference levels are measured at a distance of 35 meters (Caltrans 2012).



## 2.1.2 Terrestrial Noise

The area in which terrestrial noise levels can affect marine mammals is determined by threshold noise levels as shown in Table 3.

**Table 3. Terrestrial Injury and Disturbance Threshold Decibel Levels for Pinnipeds**

Criterion	Criterion Definition	Threshold*
Level A harassment	PTS (injury) conservatively based on TTS**	None established
Level B harassment	Behavioral disruption for harbor seals	90 dB RMS
Level B harassment	Behavioral disruption for non-harbor seal pinnipeds	100 dB RMS

\*All decibel levels referenced to 20 micropascal (re: 20 µPa). Note all thresholds are based off of root mean square (RMS) levels.

\*\* PTS=Permanent Threshold Shift, TTS=Temporary Threshold Shift

Peak terrestrial noise generated during impact installation of upland piles has been estimated to be approximately 110 dBA, measured at 50 feet (FTA 2006). In-air noise attenuation calculations generally show a 6-dB loss for a doubling of distance from the source as shown in Table 4.

**Table 4. Project-Related Terrestrial Noise Attenuation**

Distance from Source (ft)	Construction Noise in dBA (Point Source, Hard Site) (-6 dBA reduction per doubling of distance)
50	110
100	104
200	98
400	92
800	86

Terrestrial noise would fall below Level B harassment for non-harbor seal pinnipeds between 100 and 200 feet, and below Level B harassment for harbor seals between 400 and 800 feet. There are no pinniped haulout sites or suitable haulout habitat within 800 feet of the project area; therefore, no pinnipeds are expected to haul out within the monitoring area that will be affected by terrestrial noise. As a result, any marine mammals that enter the monitoring area will be in an aquatic environment and subject to underwater noise before reaching the zone of terrestrial noise impacts. As such, the terrestrial noise limits are not taken into account in this MMMP.

## 2.2 Monitoring Zones

Based on the results of the noise attenuation analysis conducted for the project, it has been determined that the Level A harassment (injury) threshold for underwater noise for pinniped species could be exceeded at a distance of up to 15.6 feet during impact pile-driving activities. Additionally, the Level B harassment (behavioral disruption) for impulsive underwater noise for pinniped species could be exceeded at a distance of up to 1,560 feet during impact pile driving. Non-impulsive underwater noise could exceed the threshold for up to 137 miles. The actual zone of impact is smaller due to the geographic constraints of the Columbia River. Because this project strives to avoid any impact to marine mammals during construction, the monitoring zone includes all areas of the Columbia River that could exceed the non-impulsive noise disturbance threshold as identified in Figure 3 on page 10.



Two monitoring zones will be used depending on the construction activity. Zone 1 includes the entire area where underwater noise levels may exceed the Level B harassment non-impulsive threshold for pinnipeds (the 120 dB isopleth) and will be monitored during in-water vibratory pile-driving activities only. Zone 2 includes the area where underwater noise levels exceed the Level B harassment for impulsive noise for pinnipeds (the 160 dB isopleth) and will be monitored during upland impact pile driving only. These zones will be maintained as an injury protection zone. To prevent Level A or B harassment, any pile driving will be shut down immediately if any marine mammals are observed entering the monitoring zone, effectively reducing the possibility of any marine mammals being exposed to Level A or B harassment; for this reason, the project will not result in any Level A or B “takes.”

## 2.3 Observer Locations

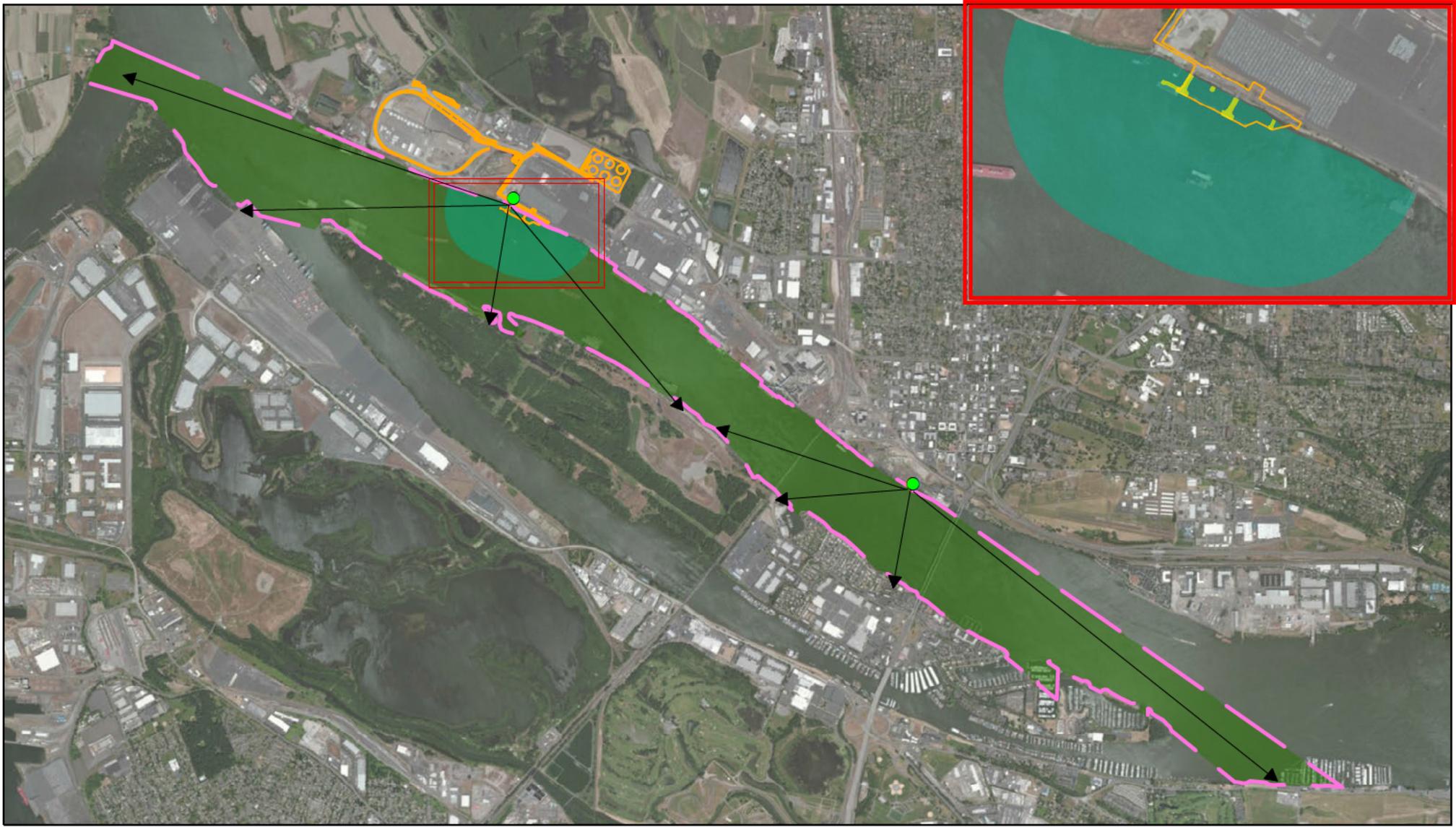
Monitoring will be completed by two qualified individuals in locations sufficient to conduct monitoring consistent with Section 3. One individual will be stationed either on the pile-driving rig or in the immediate vicinity and will have clear line of sight views of the monitoring area (Figure 3 on page 10). The second individual will be stationed in the upstream portion of the monitoring area, in the vicinity of the Interstate 5 bridge, and will monitor the zone in the upstream portion of the monitoring area.

## 3. Monitoring Protocol

Marine mammal monitoring during the project will consist of the following procedure.

1. Individuals meeting the minimum qualifications identified below (section 3.1) will be present on site (on land or dock) at all times during in-water pile driving and shore-based mooring point pile-driving activities conducted during November to February.
2. The area will be monitored by two qualified individuals during pile driving (see section 3.1). The monitoring staff will record any presence of marine mammals by species, document any behavioral responses noted, and record Level B “takes” when sightings overlap with pile installation activities. Observations will be recorded on data sheets (Appendix A).
3. The individuals will scan the waters within each monitoring zone using binoculars (10X42 or equivalent), spotting scopes (20 to 60 zoom or equivalent) (Washington Department of Fish and Wildlife 2000), and unaided visual observation.
4. The monitoring zone will be maintained as an injury protection zone, in which pile driving will be shut down immediately if any marine mammal is observed within the monitoring area. Zone 1 will be monitored during all vibratory pile driving and Zone 2 will be monitored during all upland impact pile driving. Monitoring zones will be confirmed daily with the Facility construction manager and will depend on scheduled activities. For example, if only upland impact pile driving occurs, then only Zone 2 will be monitored.
5. If waters exceed a sea-state that restricts the observers’ ability to make observations within the monitoring zone (e.g., excessive wind or fog), pile driving will cease until conditions allow the resumption of monitoring.
6. The waters will be scanned 20 minutes prior to commencing impact pile driving and during all pile driving. If marine mammals enter or are observed within the designated monitoring zone during or 20 minutes prior to impact pile driving, the monitors will notify the on-site construction manager to not begin or to cease work until the animal has moved outside the designated radius.

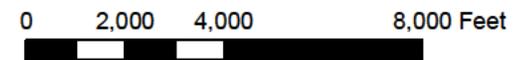
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**Figure 3 - Mammal Monitoring Area**

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- Monitoring Location
- Mammal Monitoring Area
- Project Site Boundary
- Monitoring Zone 1 *137 Miles*
- Monitoring Zone 2 *1,560.5 Feet*





### 3.1 Minimum Qualifications for Marine Mammal Observers

1. Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with the ability to estimate target size and distance. Use of binoculars or spotting scope may be necessary to correctly identify the target.
2. Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
3. Experience or training in the field identification of marine mammals (i.e., pinnipeds).
4. Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations.
5. Writing skills sufficient to prepare a report of observations that will include such information as the number and types of marine mammals observed; the behavior of marine mammals in the project area during construction; the dates and times when observations were conducted; the dates and times when in-water construction activities were conducted; the dates and times when marine mammals were present at or within the defined disturbance zone; the dates and times when in-water construction activities were suspended to avoid incidental harassment by disturbance from construction noise; etc.
6. Ability to communicate orally, by radio or in person, with project personnel to provide real time information on marine mammals observed in the area.

## 4. Best Management Practices

In-water work is restricted to the approved in-water work window for the Facility. A portion of the in-water work period overlaps with the beginning of the time that marine mammals typically begin entering the Columbia River, during January and February. When marine mammals are observed within the monitoring area during activities subject to this MMMP per the monitoring procedures described above, pile driving will not be initiated, or, if initiated, will cease temporarily until the animal leaves the monitoring area.

## 5. References

California Department of Transportation (Caltrans). 2012. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Updated October 2012.

Federal Transit Administration (FTA). 2006. Construction Noise Methodology.

National Oceanic and Atmospheric Administration (NOAA). 2015. Interim Sound Threshold Guidance. [http://www.westcoast.fisheries.noaa.gov/protected\\_species/marine\\_mammals/threshold\\_guidance.html](http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html). Last accessed 2 March 2015.

Washington Department of Fish and Wildlife. 2000. Final Report. Monitoring Incidental Harassment of Harbor Seals (*Phoca vitulina richardsi*) at Gertrude Island during the McNeil Island Corrections Center Still Harbor Dock Renovation Project. 1 December 1998 to 15 August 1999. Dyanna Lambourn and Steven Jeffries. Washington Department of Fish and Wildlife Marine Mammal Investigations. Tacoma, WA. January 10, 2000.

Washington State Department of Transportation (WSDOT). 2013. Biological Assessment Preparation – Advanced Training Manual Version 02-2013. February 2013.

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## 6. List of Acronyms and Abbreviations

bb: barrel or barrels

dB: decibel or decibels

ESA: Environmental Species Act

Facility: Vancouver Energy

FTA: Federal Transit Administration

MMPA: Marine Mammal Protection Act

NMFS: National Marine Fisheries Service

NOAA: National Oceanic and Atmospheric Administration

Port: Port of Vancouver USA

PTS: Permanent Threshold Shift

RMS: root mean square

TTS: Temporary Threshold Shift

USFWS: U.S. Fish and Wildlife Services

WDFW: Washington Department of Fish and Wildlife

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Appendix A  
Marine Mammal Observation Sheet – Example

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