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July 27, 2020

Jolie Harrison, Division Chief
Permits and Conservation Division
NOAA Fisheries Office of Protected Resources
1315 East-West Highway F/PR1 Room 13805
Silver Spring, Maryland 20910

RE: State Route 302 Purdy Bridge Rehabilitation Project
Pierce County, Washington
Incidental Take Authorization Request

Dear Ms. Harrison:

Please find the attached request for an incidental take authorization under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of marine mammals incidental to conducting vibratory pile driving and removal associated with State Route 302 Purdy Bridge rehabilitation by the Washington State Department of Transportation (WSDOT).

WSDOT plans to conduct vibratory pile driving and removal in the upper reaches of Henderson Bay in south Puget Sound to install and remove steel H piles and sheet piles in summer 2021. Because WSDOT's activities have the potential to cause acoustic disturbance to marine mammals, we are requesting an Incidental Harassment Authorization.

We look forward to working with you and your staff to answer any questions you may have about this application. We would appreciate contact information for the individual responsible for processing this request. This would expedite confirmation of a complete application, and the preparation of the associated environmental assessment. If you have any questions about our request, please contact Jeff Dreier at dreierj@wsdot.wa.gov.

Sincerely,

Jeff Dreier
Fish and Wildlife Program Manager
WSDOT Environmental Services Office

CW:jsd
Enclosure

e-cc: Michael MacDonald, NMFS
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Tara Stone, WSDOT ESO
Dave Molenaar, WSDOT Olympic Region

Request for an Incidental Harassment Authorization Under the Marine Mammal Protection Act

State Route 302 Purdy Bridge-Pier Rehabilitation Washington State Department of Transportation

August 2020

Submitted to:

Jolie Harrison, Division Chief
Permits and Conservation Division
NOAA Fisheries Office of Protected Resources
1315 East-West Highway, F/PR1 Room 13805
Silver Spring, Maryland 20910

Prepared by:

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Appendix A Plan Sheets

Appendix B National Marine Fisheries Service Marine Mammal Acoustic Threshold Spreadsheets

Appendix C Marine Mammal Monitoring Plan

Abbreviations and Acronyms

BMP	best management practices
CA-OR-WA	California-Oregon-Washington
CFR	Code of Federal Regulations
dB	decibels
DPS	Distinct Population Segment
DPS	dynamic positioning system
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
FR	Federal Register
HPA	Hydraulic Project Approval
Hz	hertz
IHA	Incidental Harassment Authorization
IWC	International Whaling Commission
kHz	kilohertz
kJ	kilojoules(s)
km	kilometer(s)
m	meters
MLLW	Mean Low-Low Water
MHHW	Mean High-High Water
MM	mitigation measure
MMPA	Marine Mammal Protection Act of 1972
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Laboratory
NOAA	National Oceanographic Atmospheric Administration
NOAA Fisheries	National Oceanic Atmospheric Administration/National Marine Fisheries Service
NTU	nephelometric turbidity units
OHW	ordinary high water
PBR	Potential Biological Removal

PSAMP	Puget Sound Ambient Monitoring Program
RCW	Revised Code of Washington
RL	Received Level
RMS	root mean square
SAR	Stock Assessment Report
SEL	Sound Exposure Level
SL	Source Level
SPCC	Spill Prevention, Control, and Countermeasures Plan
SPL	Sound Pressure Level
TL	Transmission Loss
TTS	Temporary Threshold Shift
µPa	micro-Pascals
UHMW	Ultra High Molecular Weight
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation
WSF	Washington State Department of Transportation Ferries Division

1.0 Description of the Activity

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

1.1 Introduction

The Washington State Department of Transportation (WSDOT) maintains over three thousand bridges throughout the state. To improve, maintain, and preserve the bridges, WSDOT conducts construction, repair and maintenance activities as part of its regular operations. One of these projects is proposed pier rehabilitation at the State Route (SR) 302 Purdy Bridge in Pierce County, Washington, and is the subject of this Incidental Harassment Authorization (IHA) request. The proposed project will occur in the estuarine waters of south Puget Sound that support several marine mammal species. The Marine Mammal Protection Act of 1972 (MMPA) prohibits the taking of marine mammals, which is defined as to "harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill," except under certain situations. Section 101 (a) (5)(D) allows for the issuance of an IHA, provided an activity results in negligible impacts on marine mammals and would not adversely affect subsistence use of these animals.

The project's timing and duration and specific types of activities (such as vibratory pile driving) may result in the incidental taking by acoustical harassment (Level B take) of marine mammals protected under the MMPA. WSDOT is requesting Level B take for six marine mammal species (harbor seal, California sea lion, Steller sea lion, gray whale, common dolphin, and harbor porpoise) that may occur in the vicinity of the project. If killer whale (transient or southern resident stocks) or humpback whale approach the Level B zone of harassment, vibratory hammer operation will stop until it is clear that the individuals have moved away from the Level B zone of harassment. As a result, WSDOT is not requesting Level A or B take for killer whale or humpback whale. Although other marine mammals not listed above have been documented in the Level B zone of harassment and adjacent areas in the last 10 years, the sightings have been very rare, and occurrence in the Level B zone of harassment is considered very unlikely. Therefore, no level A or B take is requested for these very rare species: northern elephant seal, bottlenose dolphin, Pacific white-sided dolphin, Dall's porpoise, Risso's dolphin, fin whale, minke whale, Bryde's whale, and false killer whale. As with killer whale and humpback whale, vibratory hammer operation will stop until these species are outside of the Level B harassment zone.

1.2 Project Purpose and Need

WSDOT is proposing to rehabilitate two of the SR 302 Purdy Bridge piers (piers 3 and 4) located between Mileposts 15.69 and 15.79. The Purdy Bridge is over 80 years old, and is considered historical so the bridge appearance cannot change. The two in-water columns on the bridge have deteriorated and need to be repaired to extend the functional life of the bridge.

1.3 Project Setting and Land Use

The SR 302 Purdy Bridge is located north of the City of Gig Harbor, and just south of the boundary of Pierce and Kitsap counties, Washington (Figure 1-1). The bridge is located in Township 22 North, Range 1 East, Section 24, between Henderson Bay and Burley Lagoon. Adjacent lands to the east are commercial and retail businesses and land to the west is Purdy Sand Spit, a Pierce County park (Figure 1-2).

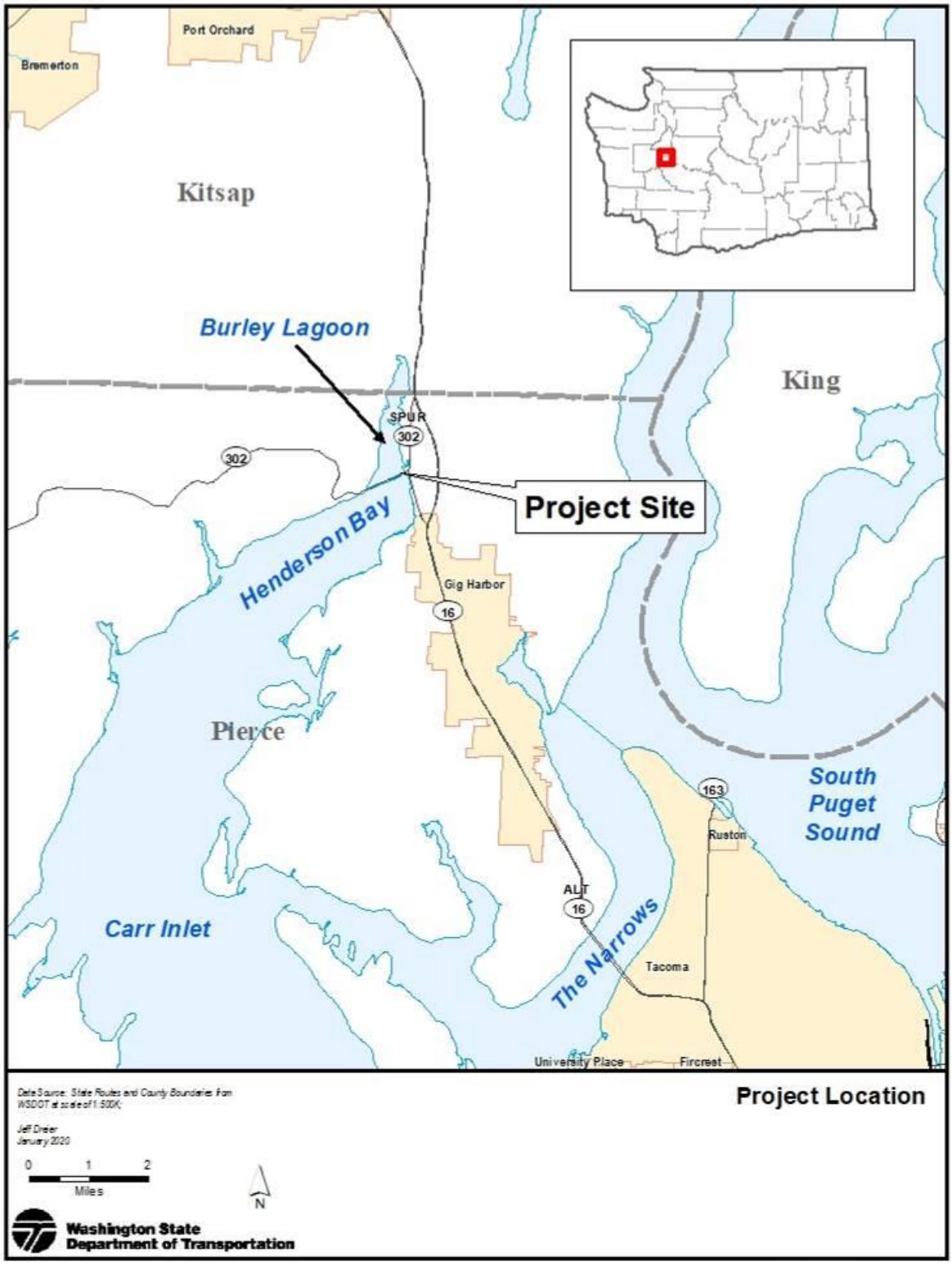

Figure 1-1. Project location

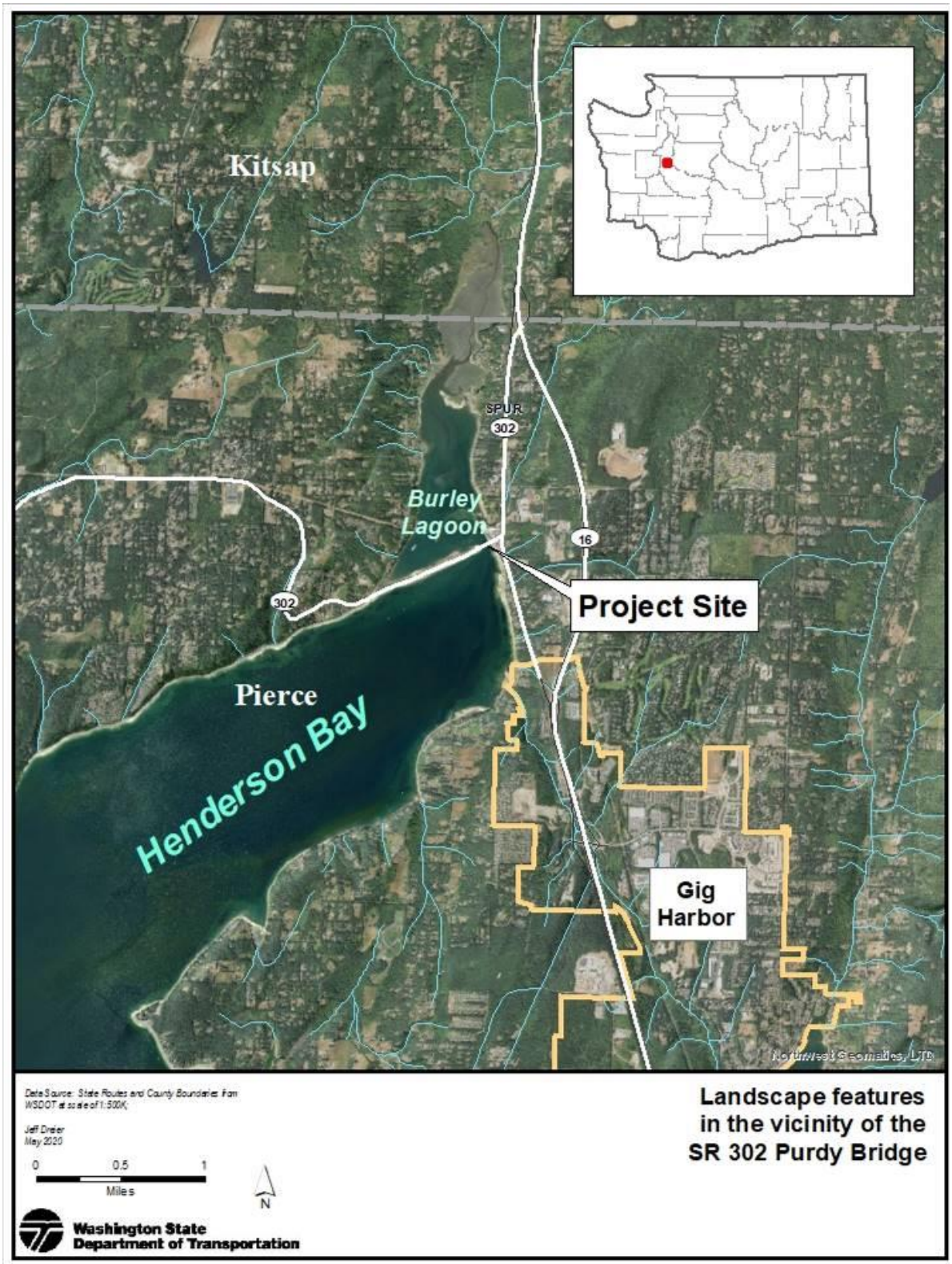

Figure 1-2. Landscape features in the vicinity of the project site.

1.4 Project Description

WSDOT is proposing to repair piers 3 and 4 of the SR 302 Purdy Bridge (Figure 1-3). The Purdy Bridge is over 80 years old, and is considered historical so the bridge appearance cannot change. The two in-water columns on the bridge have deteriorated and need to be repaired to extend the functional life of the bridge.

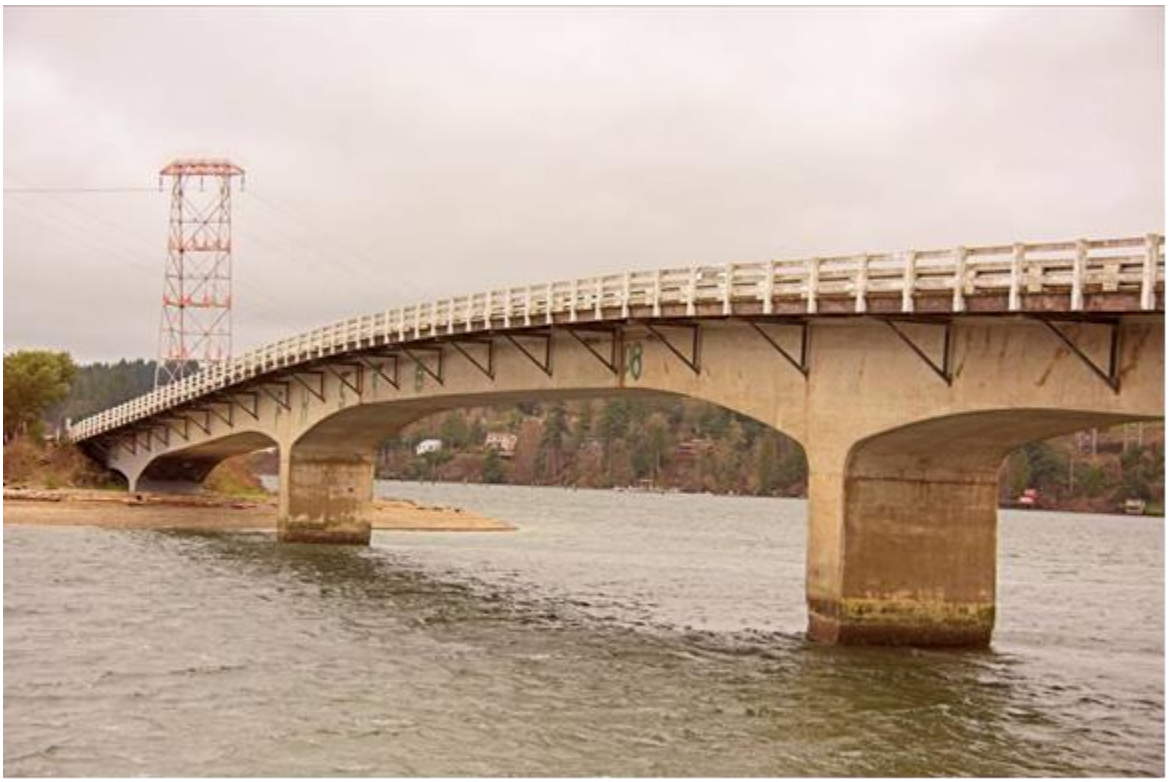

Figure 1-3. Purdy Bridge piers

In preparation for conducting the pier rehabilitation, boats will tow a barge with spuds (tubular anchoring shaft) or flexifloat (portable modular interlocking flotation system with spuds that requires less draft) supporting a crane, vibratory pile driver, excavator, and manlift to one of the piers. Due to variable tides, the barge will be grounded on the shore side of piers 3 and 4 at lower tides. Boats will also tow a second flexifloat or barge with spuds to the bridge to deliver materials and other equipment at various times. All work is expected to occur from a barge with some possible material deliveries from the roadway.

1.4.1 Excavation

Excavation (if necessary) will be limited to areas on and immediately surrounding the pier footings to expose the footings and provide a stable substrate for any cofferdam system that may be required. The excavated area will be approximately 430 square feet for each column (860 square feet total), based on a 5-foot pad around the pier.

1.4.2 Containment System Installation

Surface Preparation. A containment system will be installed prior to removing marine growth and preparing the piers for repair. It will likely made of filter fabric (100 sieve similar to what is typically used to wash bridges prior to painting). The filter fabric will be suspended above the water surface below the pier side on which work is conducted, then moved to the next pier side being prepared. It will contain all debris during marine growth removal and surface preparation, but will let water from the pressure washing pass through.

Pier Repair. Prior to pier repair, a sheet pile containment system will be installed around each pier. This system would be used to contain any water that comes into contact with uncured concrete during pier repair. If necessary, a steel template consisting of 12-inch steel H piles will be installed around each pier. The template will consist of 10 vertically driven (vibratory) H piles located around the perimeter of the pier, and an unknown number horizontal H piles tacked onto the vertical piles. This template provides a flat supportive surface to align the sheet piles. Using the template as a guide, 22 48-inch by 6-inch wide sheet piles will be driven with a vibratory hammer into the substrate immediately adjacent to each pier to form a temporary interlocked sheet pile wall shoring/form system to provide a containment system during grout work. If water will be exposed to uncured grout, water will be continuously pumped from the shoring system to draw down the water level approximately one to two feet from the surrounding water surface to maintain negative pressure, thereby containing any water that comes into contact with the grout. Any water coming in contact with uncured grout will be pumped out of the previously constructed sheet pile containment system into a temporary settlement containment system, or storage tank for disposal at an approved facility. Following repair activities, the sheet piles and H piles will be removed. Table 1-1 summarizes the number and type of piles to be installed. The containment system will temporarily impact approximately 44 square feet of benthic habitat at each pier.

1.4.3 Removal of Marine Growth

After the containment system is installed, the columns will be pressure washed which will remove all existing marine growth. Wash water will likely be filtered through a 100-sieve tarp if the fabric containment is used.

Table 1-1. Containment System Pile Summary

Method	Pile Type	Estimated Noise Level	Number of Piles (2 piers)	Minutes per pile	Total Minutes	Duration (Hours)	Piles per Day	Duration (10-hour work days)
Vibratory Driving	Sheet	In water:165 dB_{RMS}* In air: 96.9 dBA	44	30	1320	22	8	6
Vibratory Driving	H pile	In-water: 150 dB_{RMS}* In-air: 96.9 dB	20	30	600	10	8	3
Vibratory Removal	Sheet	In water: 165 dB_{RMS} In air: 96.9 dBA	44	15	660	11	16	3
Vibratory Removal	H pile	In-water: 150 dB_{RMS} In-air: 96.9 dB	20	15	300	5	16	2
Totals					2880	48		14

* CalTrans Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. 2015.

1.4.4 Prepare Pier Surfaces

The exposed concrete surface of each pier will be prepared by removing approximately 0.25 foot of the concrete on all four sides of the columns with a needle gun. Concrete removal will occur from the footing for the full length of the columns, stopping at the bottom of upper radius to the box beam. Leakage water coming in contact with concrete debris within the steel containment could be pumped to a temporary settling pond, stored in a tank or filtered through a 100-sieve tarp if the fabric containment is used.

1.4.5 Pier Repair

The columns will be repaired with the placement of corrosion resistant reinforcement (glass fiber reinforced polyester [GFRP]). Forms will be installed and approximately 0.50 foot of concrete or grout will be placed to encapsulate the GFRP. The final phase is the application of pigmented sealer on all surfaces of the columns. Once the columns are repaired and the pigmented sealer placed, the containment system will be removed. The earth removed around each column will be allowed to fill back naturally as part of the tidal process.

The water will be pumped to a temporary settlement containment system, or storage tank and/or filtered/sieved to remove large particles out of the water before re-releasing water back into the channel.

1.5 Project Elements

The proposed project includes vibratory hammer driving and removal creating elevated in-water and in-air noise that may impact marine mammals.

1.5.1 Vibratory Hammer Driving and Removal

Vibratory hammers are commonly used in steel pile driving where sediments allow and involve the same vibratory hammer used in pile removal. The pile is placed into position using a choker and crane, and then vibrated between 1,200 and 2,400 vibrations per minute (Figure 1-5). The vibrations liquefy the sediment surrounding the pile allowing it to penetrate to the required seating depth, or to be removed.

Figure 1-4. Vibratory hammer driving a steel sheet pile

1.6 Sound Levels

1.6.1 Reference Underwater Vibratory Sound Source Levels

The pier rehabilitation project includes vibratory driving and removal of 20 steel H piles and driving and removal of 44 sheet piles. According to CalTrans (2015), vibratory driving and removal of steel H piles generated 150 dB_{RMS} measured at 10 meters.

Based on in-water measurements at the Port of Oakland, vibratory pile driving of steel sheet piles generated 165 dB_{RMS} measured at 10 meters (CalTrans 2015). It is assumed that vibratory removal of steel sheet piles would result in the same source levels.

1.6.2 Underwater Background Sound

Background sound is the sound level in absence of the proposed activity (vibratory pile driving in this case) while ambient sound levels are absent of human activity (NMFS 2009). Various factors contribute to background sound levels in marine waters: ship traffic, fishing boat depth sounders, waves, wind, rainfall, current fluctuations, chemical composition and biological sound sources (e.g., marine mammals, fish, shrimp) (Carr et al. 2006). Background sound levels are compared to the NMFS threshold levels designed to protect marine mammals to determine the zone of influence for noise sources.

For example, 120 dB_{RMS} is the threshold value for Level B acoustical harassment of marine mammals exposed to continuous noise sources. However, if background noise levels exceed 120 dB_{RMS}, for example 130 dB_{RMS}, then animals would not be exposed to "harassment level" sounds at less than 130 dB_{RMS} as those sounds no longer dominate; they are essentially part of the background. In this example, the 130 dB_{RMS} isopleth becomes the new project threshold for Level B take of marine mammals. Similarly, if background sound levels are less than the threshold value for Level B acoustical harassment of marine mammals exposed to continuous noise sources, then the 120 dB_{RMS} threshold level is used to determine the harassment zone of influence.

In-water background sound data taken with the functional hearing group of relevant species are not available for the SR 302 Purdy Bridge area. Underwater background broadband sound levels measured at several ferry terminals in Puget Sound ranged from 107 to 122 dB_{RMS} (Laughlin 2015). In a study conducted in Haro Strait, San Juan Islands, data indicate that the broadband background half-hourly SPL in Haro Strait ranged from 95 dB to 130 dB (Veirs and Veirs 2006). Broadband measurements are those which cover the entire applicable frequency range for the instrument. This same study indicated that 2-second SPL averages are lowest in the winter, slightly higher during summer nights, and highest during summer days as a result of small boat traffic. Given that no background sound measurements are available, and the project will be conducted in summer, this analysis will use an estimated background sound level of 120 dB_{RMS}.

1.6.3 Underwater Transmission Loss

Underwater transmission loss has been described by Burgess et al. (2005):

> As sound propagates away from its source, several factors act to change its amplitude. These factors include the spreading of the sound over a wider area (spreading loss), losses to friction between water or sediment particles that vibrate with the passing sound wave (absorption), scattering and reflections from boundaries and objects in the sound's path, and constructive and destructive interference with one or more reflections of the sound off the surface or seafloor. The sound level that one would actually measure at any given distance from the source includes all these effects and is called the received level. Received levels differ in dimensions from source levels, and the two cannot be directly compared. Received levels of underwater sound are usually presented in dB re 1 micro-Pascal (µPa), whereas the idealized source level at 1 m from the source is presented in dB re 1 µPa-m. The sum of all propagation and loss effects on a signal is called the transmission loss.

Transmission loss (TL) is characterized by the following equation:

$$TL = B*\log_{10}(R) + C*R$$

Where **B** represents the logarithmic (predominantly spreading) loss, **C** the linear (scattering and absorption) loss, and **R** the range from the source in meters.

Transmission-loss parameters vary with frequency, temperature, sea conditions, source depth, receiver depth, water depth, water chemistry, and bottom composition and topography. Logarithmic loss **B** is typically between 10 dB (10 Log R cylindrical spreading) and 20 dB (20 Log R spherical spreading). Linear loss **C** has several physical components, including absorption in seawater, absorption in the sub-bottom, scattering from in-homogeneities in the water column and from surface and bottom roughness, and (for RMS levels of transient pulses) temporal pulse-spreading (Greeneridge 2007). Linear loss is also a function of frequency and is less a factor in the lower frequencies in which pile driving sounds dominate. Further, linear loss is site-specific, which is why there is no generally accepted **C** value for estimating linear loss in the broadband.

NMFS has requested that the 15 Log R practical (or semi-cylindrical) spreading model, without considering for linear loss, be used to estimate distances to marine mammal noise thresholds.

1.6.4 Airborne Reference Sound Source Levels

While in-air sounds are not applicable to cetaceans, they are to pinnipeds, especially harbor seals when hauled out. Loud noises can cause hauled-out seals to panic back into the water, leading to disturbance and possible injury to stampeded pups.

No unweighted in-air data is available for vibratory driving and removal of steel sheet piles and H piles. Based on in-air measurements at the Coupeville Ferry Terminal, vibratory driving of a 30-inch steel pile generated a maximum of 98 dB_{RMS} (unweighted) at 50 ft. (Laughlin 2010). It is assumed that in-air noise generated during vibratory driving and removal of steel sheet piles and H piles will generate the same source level (98 dB_{RMS}). Needle guns can have a source level as high as 112 dBA (OSHA 2020).

1.6.5 Airborne Background Sound

Background sound levels vary depending on the level of development. Urban areas have the highest background sound levels, with daytime levels approximating 60 to 65 dBA. Suburban or residential areas have background levels around 45 to 50 dBA, while rural areas are the quietest with sound levels of 35 to 40 dBA (EPA 1978). Cavanaugh and Tocci (1998) identified typical urban residential background sound at around 65 dBA, high-density urban areas at 78 dBA, and urban areas adjacent to freeway traffic at 88 dBA.

In-air background sound levels for the Purdy Bridge area are not available. In the absence of such data, population density was used to estimate airborne background sound (WSDOT 2020). The population density in the vicinity of the Purdy Bridge is approximately 1,000 per square mile (Statistical Atlas 2020). According to the Federal Transit Authority (2006), the estimated background sound is 50 dBA.

1.6.6 Airborne Transmission Loss

Noise attenuates as the distance from the source of the noise increases. A general equation shows noise propagation loss as 6 decibels (dB) for each doubling distance in areas of hard ground cover, such as streets, sidewalks, and over water (hard sites). In areas where landscape features and vegetation exist (soft sites), noise attenuates at 7.5 dB per doubling distance from the source (WSDOT 2020).

1.7 Attenuation to NMFS Thresholds

NMFS (2018) has established harassment and injury noise thresholds for marine mammals (Table 1-2). Determining the area(s) exceeding each threshold level (the Level B harassment zone) is necessary to estimate the number of animals for the Level B acoustical harassment take request, and to establish a monitoring area. No Level A take is requested for this project.

Table 1-2. Marine Mammal Injury and Disturbance Thresholds for Underwater and Airborne Noise

Marine Mammals	In-air Noise Pinniped Disturbance Threshold	Vibratory Hammer In-water Disturbance Threshold	Vibratory Hammer In-water Injury Threshold
Low-frequency cetaceans	N/A	120 dB_{RMS}	199 dB SEL_{cum}
Mid-frequency cetaceans	N/A	120 dB_{RMS}	198 dB SEL_{cum}
High frequency cetaceans	N/A	120 dB_{RMS}	173 dB SEL_{cum}
Phocid pinnipeds	90 dB_{RMS} (unweighted) for harbor seals	120 dB_{RMS}	201 dB SEL_{cum}
Otariid pinnipeds	100 dB_{RMS} (unweighted) for all other pinnipeds re: 20 µPa	120 dB_{RMS}	219 dB SEL_{cum}

1.7.1 Vibratory Pile Driving and Removal of Steel Sheet Piles (Underwater Noise)

The 120 dB_{RMS} Level B harassment threshold sound level will be used to establish the vibratory driving disturbance Level B zone of harassment. The NOAA/NMFS practical spreading model (sound transmission loss of 4.5 dB per doubling distance) was used to determine the distance where underwater noise will attenuate to the 120 dB_{RMS} Level B harassment threshold sound level.

The distance where noise generated by steel sheet pile vibratory driving and removal (165 dB_{RMS} at 10 meters) attenuates to the 120 dB_{RMS} Level B harassment threshold level for all marine mammals is 10,000 meters/6.21 miles or nearest land. The area of Level B Zone 1 is 17.9 square kilometers (Figure 1-5).

The Level A injury zones were determined using the NMFS (2018) calculator (Table 1-3; Appendix B).

Table 1-3. Marine mammal Level A injury zones during sheet pile installation and removal.

Hearing Group	Low-frequency cetaceans (Level A Zone 1)	Mid-frequency cetaceans (Level A Zone 2)	High-frequency cetaceans (Level A Zone 3)	Phocid pinnipeds (Level A Zone 4)	Otariid pinnipeds (Level A Zone 5)
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to Threshold (meters)	31.8	2.8	47.0	19.3	1.4

1.7.2 Vibratory Pile Driving and Removal of Steel H Piles (Underwater Noise)

The 120 dB_{RMS} Level B harassment threshold sound level will be used to establish the vibratory driving/removal disturbance Level B zone of harassment. The NOAA/NMFS practical spreading model (sound transmission loss of 4.5 dB per doubling distance) was used to determine the distance where underwater noise will attenuate to the 120 dB_{RMS} Level B harassment threshold sound level.

The distance where noise generated by steel H pile vibratory driving/removal (150 dB_{RMS} at 10 meters) attenuates to the 120 dB_{RMS} background/harassment threshold level for all marine mammals at 1,000 meters/3,280 ft. The area of Level B Zone 2 is 1.36 square kilometers (Figure 1-6).

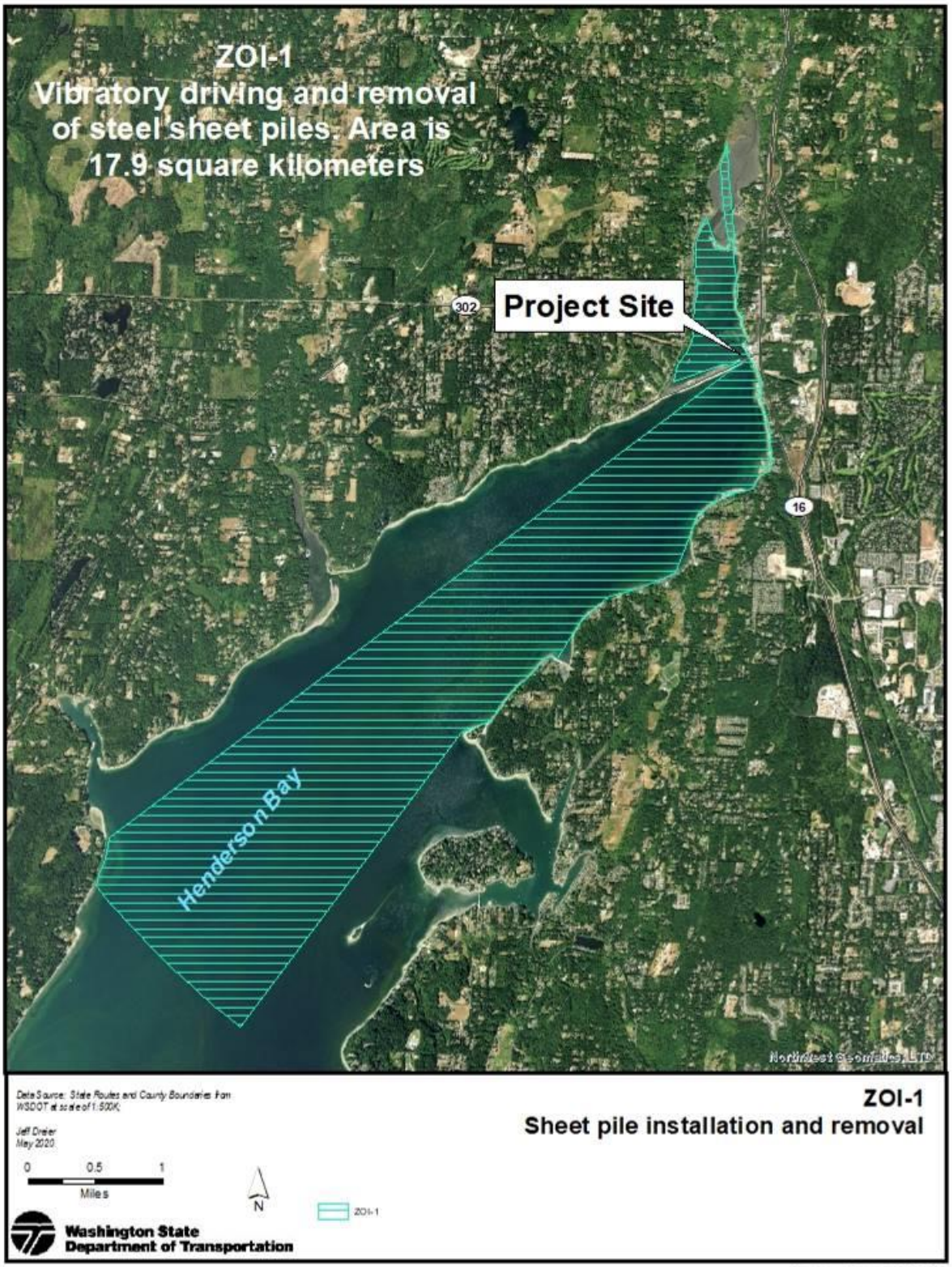

Figure 1-5. Level B Zone 1

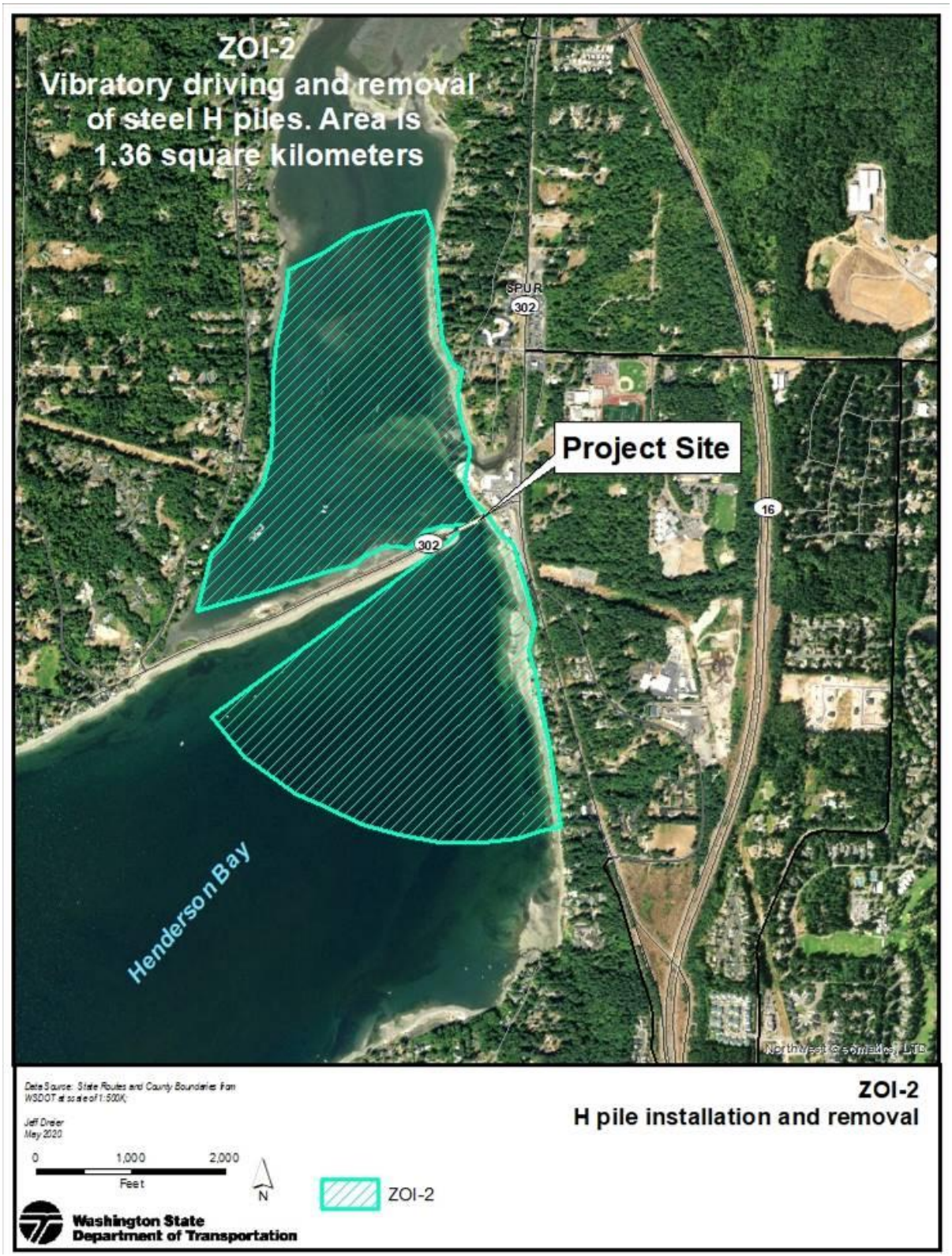

Figure 1-6. Level B Zone 2

The Level A injury zones were determined using the NMFS (2018) calculator (Table 1-4; Appendix B).

Table 1-4. Marine mammal Level A injury zones during H pile installation and removal.

Hearing Group	Low-frequency cetaceans (Level A Zone 6)	Mid-frequency cetaceans (Level A Zone 7)	High-frequency cetaceans (Level A Zone 8)	Phocid pinnipeds (Level A Zone 9)	Otariid pinnipeds (Level A Zone 10)
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to Threshold (meters)	3.2	0.3	4.7	1.9	0.1

1.7.3 Shutdown Zone

The purpose of the shutdown zone is to ensure that noise-generating activities are shut down before Level A (injury) take occurs from:

- low-frequency cetaceans entering the 199 dB SEL_{cum} injury zone
- mid-frequency cetaceans entering the 198 dB SEL_{cum} injury zone
- high-frequency cetaceans entering the 173 dB SEL_{cum} injury zone
- phocid pinnipeds entering the 201 dB SEL_{cum} injury zone, and
- otariid pinnipeds entering the 219 dB SEL_{cum} injury zone while vibratory pile driving is active.

Sheet Piles. During vibratory driving and removal of steel sheet piles, Level A take (for cetaceans) can occur out to 47 m/154 ft. (the distance to the 173 dB SEL_{cum} isopleth [Level A Zone 3]). During vibratory hammer operation, a 50 m radius shutdown zone will be fully monitored and vibratory driving/removal will shut down at the approach of any cetaceans to this zone (see Appendix C, Marine Mammal Monitoring Plan).

During vibratory driving and removal of steel sheet piles, Level A take (for pinnipeds) can occur out to 19.3 m/63 ft. (the distance to the 201 dB SEL_{cum} isopleth [Level A Zone 4]). During vibratory hammer operation, a 20 m radius shutdown zone will be fully monitored and vibratory driving/removal will shut down at the approach of any pinniped to this zone (see Appendix C, Marine Mammal Monitoring Plan).

H Piles. All Level A zones associated with vibratory driving and removal of steel H piles are less than 10 m from pile driving activities. To simplify monitoring during vibratory driving and removal of H piles, a 10 m/33 ft. radius shutdown zone will be fully monitored and vibratory operation will shut down at the approach of any marine mammal to this zone (see Appendix C, Marine Mammal Monitoring Plan).

1.7.4 Vibratory Pile Driving In-air Noise

NMFS has established an in-air noise disturbance threshold of 90 dB_{RMS} (unweighted) for harbor seals, and 100 dB_{RMS} (unweighted) for all other pinnipeds (sea lions).

The project includes vibratory driving and removal of steel sheet piles and H piles. In-air noise generated during vibratory installation and/or removal of these piles (98 dB at 50 feet)

will reach the phocid (harbor seal) threshold (90 dB) at approximately 38.3 meters/126 feet, and is below the otariid (sea lion) threshold (100 dB).

The nearest documented harbor seal haul out site to the SR 302 Purdy Bridge consists of rafts and floats located 3.7 miles to the southwest. The nearest documented California sea lion haul out site consists of mooring buoy off the northwest side of McNeil Island, approximately 10.5 miles south of Purdy Bridge. The nearest documented Steller sea lion haul out site is the Toliva Shoals buoy off the east side of McNeil Island, approximately 13 miles to the south.

1.7.5 Needle Gun In-air Noise

NMFS has established an in-air noise disturbance threshold of 90 dB_{RMS} (unweighted) for harbor seals, and 100 dB_{RMS} (unweighted) for all other pinnipeds (sea lions).

The project includes the use of a pneumatic needle gun. In-air noise generated during needle gun use (112 dB at 50 feet) will reach the phocid (harbor seal) threshold (90 dB) at approximately 192 meters/629 feet, and the otariid (sea lion) threshold (100 dB) at 60 meters/200 feet. Both in-air disturbance threshold areas will be monitored for all pinnipeds.

The nearest documented harbor seal haul out site to the SR 302 Purdy Bridge consists of rafts and floats located 3.7 miles to the southwest. The nearest documented California sea lion haul out site consists of mooring buoy off the northwest side of McNeil Island, approximately 10.5 miles south of Purdy Bridge. The nearest documented Steller sea lion haul out site is the Toliva Shoals buoy off the east side of McNeil Island, approximately 13 miles to the south.

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2.0 Dates, Duration, and Region of Activity

The date(s) and duration of such activity and the specific geographical region where it will occur.

2.1 Dates

Due to NMFS and the U.S. Fish and Wildlife Service (USFWS) in-water work timing restrictions to protect ESA-listed salmonids, in-water construction is limited to July 15 through February 15. For this project, in-water work is planned to take place between July 16, 2021 and September 30, 2021. WSDOT is requesting the IHA to cover activities between July 16, 2021 and February 15, 2022.

2.2 Duration

The total worst-case time for pile installation and removal is 48 hours over 12 days (Table 1-1). The daily construction window for pile removal and driving will begin no sooner than 30 minutes after sunrise to allow for initial marine mammal monitoring, and will end 30 minutes prior to sunset to allow for post-pile removal and driving marine mammal monitoring.

- Vibratory driving of each steel sheet pile will take approximately 30 minutes per pile, 8 sheet piles installed per day, with 44 sheet piles installed in 5.5 days.
- Vibratory driving of each steel H pile will take approximately 30 minutes per pile, with 8 H piles installed in one day, with all 20 H piles installed in 2.5 days.
- Vibratory removal of each steel sheet pile will take approximately 15 minutes per pile, 16 sheet piles removed per day, with all sheet piles removed in 2.75 days.
- Vibratory removal of each steel H pile will take approximately 15 minutes per pile, with 16 piles removed in one day, and all piles removed in 1.25 days.
- It is likely that the actual hours of vibratory pile driving/removal will be less.
- Needle gun use to prepare each pier will take approximately 4 hours per day for three days, with two piers requiring a total of 24 hours over 6 days.

2.3 Region of Activity

The proposed activities will occur at the SR 302 Purdy Bridge located north of the City of Gig Harbor, Washington (see Figures 1-1 and 1-2). Water depths at the bridge vary from exposed substrate at low tides to 15 feet at high tide. The sheet and H piles will likely be 20 feet long. The substrate is likely glacial till (gravels in a sand matrix). In most situations, sheet and H piles (non-load bearing) can be installed in this substrate using a vibratory hammer. The tidal currents likely transport finer sediments past the narrow channel connecting Burley Lagoon from Henderson Bay.

3.0 Species and Numbers of Marine Mammals in Area

This section is a combination of items 3 and 4 from NOAA's list of information required for an incidental take authorization. It provides:

> *The species and numbers of marine mammals likely to be found within the activity area.*
>
> *A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.*

It also describes the ESA and MMPA status for each species. Possible ESA status designations include:

- Threatened: "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."
- Endangered: "any species which is in danger of extinction throughout all or a significant portion of its range."
- Proposed: *candidate species* that were found to warrant listing as either threatened or endangered and are officially proposed as such in a *Federal Register* notice.
- Delisted: No longer listed under the ESA.
- Unlisted: Not currently listed under the ESA.

Possible MMPA status designations include:

- Strategic: a marine mammal stock for which the level of direct human-caused mortality exceeds the potential biological removal level; which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; or which is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA.
- Depleted: the Secretary, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals established under MMPA title II, determines that a species or population stock is below its optimum sustainable population; a State, to which authority for the conservation and management of a species or population stock is transferred under section 109, determines that such species or stock is below its optimum sustainable population; or a species or population stock is listed as a threatened or endangered species under the ESA.
- Non-depleted: a species or population stock is at or above its optimum sustainable population (NMFS 2013a).

3.1 Species Present

Nine species of marine mammals may be found in the SR 302 Purdy Bridge Project area (Table 3-1).

Table 3-1 Marine Mammal Species Potentially Present in Region of Activity

Species	Frequency Hearing Group	ESA Status	MMPA Status	Timing of Occurrence	Frequency of Occurrence
Harbor seal	phocid	Not listed	Non-depleted	Year-round	Common
Northern elephant seal	phocid	Not listed	Non-depleted	Summer	rare
California sea lion	otariid	Not listed	Non-depleted	Year-round	Common
Steller sea lion	otariid	Delisted	Non-depleted	August-April	Occasional
Humpback whale	Low-frequency	Listed	Depleted	Year-round	Rare
Gray whale	low-frequency	Delisted	Unclassified	January-May	Occasional
Transient killer whale	Mid-frequency	Not listed	Non-depleted	Year-round	Occasional
Southern resident killer whale	Mid-frequency	Listed	Depleted	Year-round	Rare
Harbor porpoise	High-frequency	Not listed	Non-depleted	May-June peak	Common
Short-beaked common dolphin	High-frequency	Not listed	Non-depleted	May-September peak	Occasional

3.2 The Whale Museum Data

This application includes data provided by The Whale Museum (TWM). Thousands of marine mammal sightings are submitted to The Whale Hotline each year through partnerships with local researchers, non-profits organizations, commercial whale watch operators, marine naturalists and members of the general public. TWM maintains the data archives of this unique long-term record and makes it available to numerous research, education and management projects all over the world. WSDOT requested TWM to prepare a marine mammal sightings report for this project.

The Whale Museum compiles marine mammal sightings data for the Puget Sound region. Based on the geographic data reported, each sighting is assigned to a geographic quadrant. Quadrants are grid cells roughly 4.6 kilometers by 4.6 kilometers that were developed for reporting SRKW, and later used for non-SRKW, sightings before GPS units were readily available. The primary zone of interest (ZOI) was quadrant 424 (dark orange, Figure 3-1). SRKW can travel large distances in a day (~100 miles) and other marine mammals are also highly mobile, therefore it is important to analyze this data set across a region, rather than just single quadrants. Furthermore, there is a good chance that whales will be missed within a specific quadrant, thus a proper analysis further necessitates the use of a larger area for comparison to the single ZOI quadrant.

In this case, the larger areas include the land-locked bays to the west of the ZOI quadrant (i.e. Chambers Bay, Carr Inlet, Anderson Island, Butler Cove, Drayton Passage, Dana Passage, Squaxin Passage, Oakland Bay, etc.) as the SRKW and other marine mammals may have traveled into further inland waters en route to or from the ZOI. These areas either shared a border (quadrant 425) or nearby the ZOI and therefore labelled 'adjacent'. Cells, moving southward from the entrance to Admiralty Inlet (quadrant 365), to Tacoma Narrows (the last non-bordering quadrant to the ZOI, 422) in Puget Sound were also included in the analysis (blue, Figure 3-1). This is because if SRKW or other marine mammals were seen in the ZOI or in the adjacent region, it is likely that they traveled through this 'transit' region.

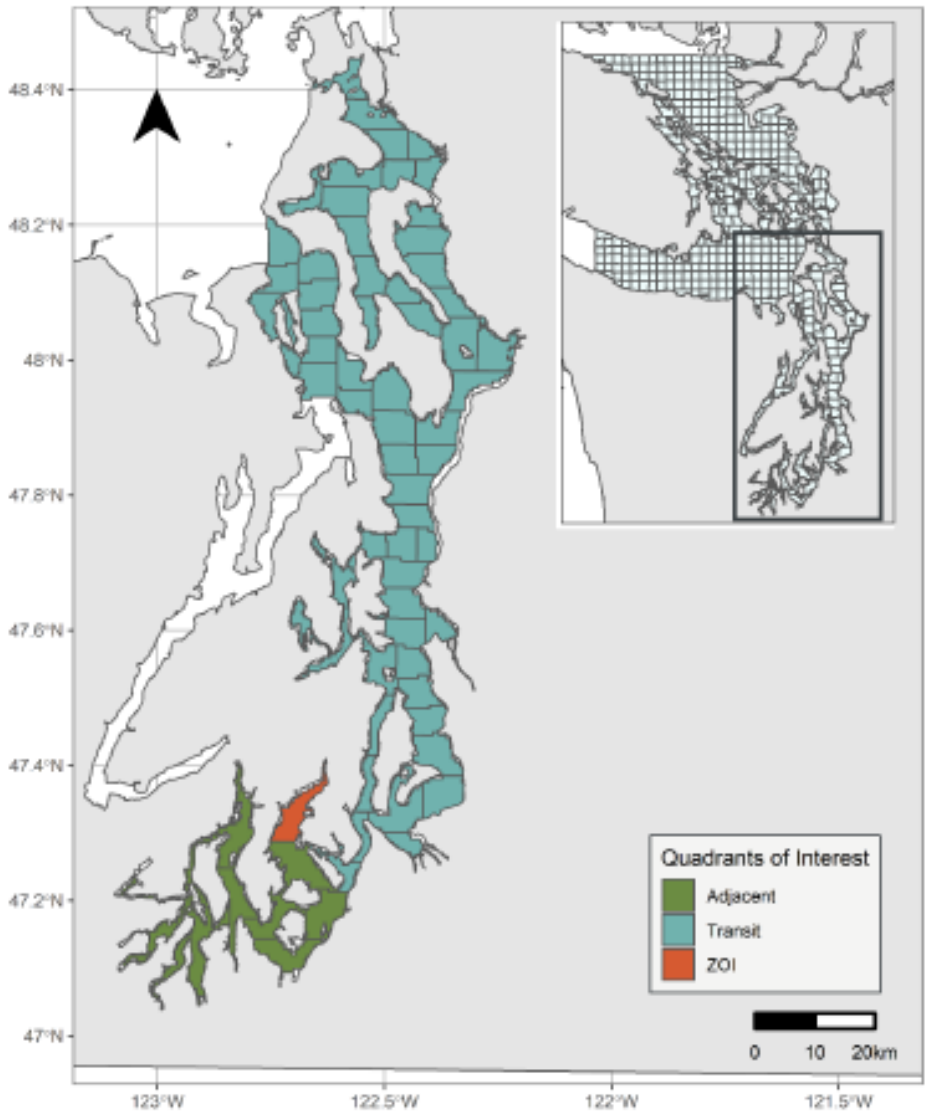

Figure 3-1. The Whale Museum quadrants of interest

3.3 Pinnipeds

There are four species of pinnipeds that may be found in the SR 302 Purdy Bridge area: northern elephant seal (*Mirounga angustirostris*), harbor seal (*Phoca vitulina richardsi*), California sea lion (*Zalophus californianus*) and Steller sea lion (*Eumetopias jubatus*).

3.3.1 Harbor Seal

Harbor seals in Henderson Bay and Burley Lagoon are part of the Southern Puget Sound Stock. Of the pinniped species that commonly occur within the region of activity, harbor seals are the most common and the only pinniped that breeds and remains in the inland marine waters of Washington year-round (Calambokidis and Baird 1994).

3.3.1.1 Numbers

In 1999, Jeffries et al. (2003) recorded a mean count of 9,550 harbor seals in Washington's inland marine waters, and estimated the total population to be approximately 14,612 animals (including the Strait of Juan de Fuca). According to the 2014 Stock Assessment Report, the most recent (2003) estimate for the Southern Puget Sound Stock is 1,025 (NMFS 2014a). No minimum population estimate is available. However, there are an estimated 32,000 harbor seals in Washington today, and their population appears to have stabilized (Jeffries 2013), so the Southern Puget Sound Stock estimate may be low. Given the wide range of estimates, this analysis will conservatively use the Southern Puget Sound Stock population estimate of 1,025 animals.

3.3.1.2 Status

The Southern Puget Sound stock of harbor seals is "non-depleted" under the MMPA and "unlisted" under the ESA.

3.3.1.3 Distribution

Harbor seals are non-migratory; their local movements are associated with such factors as tides, weather, season, food availability and reproduction (Scheffer and Slipp 1944; Fisher 1952; Bigg 1969, 1981). They are not known to make extensive pelagic migrations, although some long-distance movements of tagged animals in Alaska (108 miles) and along the U.S. west coast (up to 342 miles) have been recorded (Pitcher and McAllister 1981; Brown and Mate 1983; Herder 1983).

Harbor seals haul out on rocks, reefs and beaches, and feed in marine, estuarine and occasionally fresh waters. Harbor seals display strong fidelity for haul out sites (Pitcher and Calkins 1979; Pitcher and McAllister 1981). The nearest WDFW documented harbor seal haul out site to the SR 302 Purdy Bridge are the Rosedale Beach floats located 3.6 miles to the southwest (Figure 3-2), outside the Level B harassment zones.

Project-specific Observations

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of harbor seals in Henderson Bay as 3.91 animals per square kilometer.

Figure 3-2. Nearest documented harbor seal haul outs in the project vicinity

According to the NMFS National Stranding Database, there were numerous confirmed harbor seal strandings in the waters of Pierce County between 2006 and 2015 (Figure 3-3) (NMFS 2016a). These numbers suggest that numbers of harbor seals in the Purdy Bridge area peak in mid-summer.

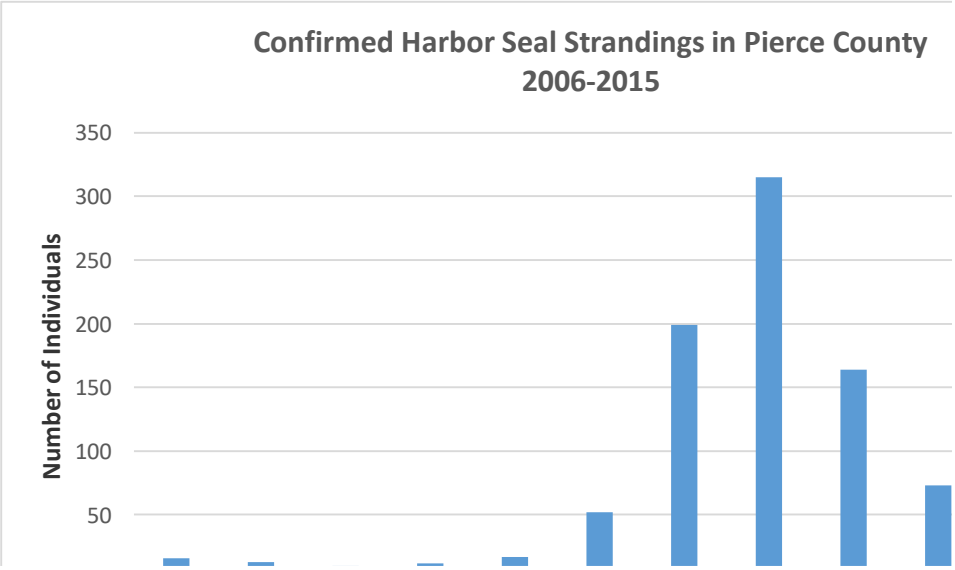

Figure 3-3. Harbor seal strandings in Pierce County.

3.3.2 Northern Elephant Seal

The California breeding stock of northern elephant seal (*Mirounga angustirostris*) may be present near the project site.

3.3.2.1 Numbers

The California stock of northern elephant seal minimum population size is estimated very conservatively as 81,368 (NMFS 2015a). In Puget Sound and the Strait of San Juan de Fuca, 10 to 15 northern elephant seal pups are born each year on Whidbey, Protection, and Smith Islands, Dungeness Spit and Race Rocks. Using a multiplier of 4.4 (NMFS 2015a) with the maximum pup count of 15, the Salish Sea population could be as large as 66 individuals.

3.3.2.2 Status

Northern elephant seals are not listed as "endangered" or "threatened" under the Endangered Species Act nor designated as "depleted" under the MMPA.

3.3.2.3 Distribution

Northern elephant seals breed and give birth in California (U.S.) and Baja California (Mexico), primarily on offshore islands, from December to March. Males feed near the eastern Aleutian Islands and in the Gulf of Alaska, and females feed further south, south of 45° north latitude. Adults return to land between March and August to molt, with males returning later than

females. Adults return to their feeding areas again between their spring/summer molting and their winter breeding seasons (NMFS 2015a).

The closest documented northern elephant seal haulouts are at Protection Island, approximately 75 miles directly north of the Purdy Bridge (shoreline distance is considerably more).

Elephant seals also use area beaches as haulouts, such as a female elephant seal who has been coming to a south Whidbey beach to rest while molting each spring for several years, and recently gave birth to a pup. Male elephant seals have also been observed in Puget Sound, as far south as Vashon Island.

Project-specific Observations

The Navy Marine Species Density Database (U.S. Navy 2019) concludes that northern elephant seals in Henderson Bay are extremely unlikely to be present at any time of year (density estimate is zero animals per square kilometer).

According to the NMFS National Stranding Database, there were no confirmed northern elephant seal strandings in Pierce County between 2006 and 2015 (NMFS 2016a).

3.3.3 California Sea Lion

Washington California sea lions are part of the U.S. stock, which begins at the U.S./Mexico border and extends northward into Canada.

3.3.3.1 Numbers

The minimum population size of the U.S. stock was estimated at 233,515 in 2014 (NMFS 2019a). Some 3,000 to 5,000 animals are estimated to move into northwest waters (both Washington and British Columbia) during the fall (September) and remain until the late spring (May) when most return to breeding rookeries in California and Mexico (Jeffries et al. 2000). Peak counts of over 1,000 animals have been made in Puget Sound (Jeffries et al. 2000).

The nearest documented California sea lion haul out site to the SR 302 Purdy Bridge project site are on the Toliva Shoals Buoys, approximately 16 water miles to the south (Jeffries, et al. 2000). This haul out typically is used by less than 10 individuals at any one time.

3.3.3.2 Status

California sea lions are not listed as endangered or threatened under the ESA or as depleted under the MMPA. The stock is estimated to be approximately 40 percent above its maximum net productivity level, and it is therefore considered within the range of its optimum sustainable population size (NMFS 2019a).

3.3.3.3 Distribution

California sea lions breed on islands off Baja Mexico and southern California with primarily males migrating north to feed in the northern waters (Everitt et al. 1980). Females remain in the waters near their breeding rookeries off California and Mexico. All age classes of males are seasonally present in Washington waters (Jeffries, et al. 2000).

California sea lions do not avoid areas with heavy or frequent human activity, but rather may approach certain areas to investigate. This species typically does not flush from a buoy or haul out if approached.

Project-specific Observations

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of California sea lions in Henderson Bay as ranging from 0.0152 to 0.2211 animals per square kilometer in summer and fall. The higher estimate will be used in this analysis.

According to the NMFS National Stranding Database, there were 23 confirmed California sea lion strandings in Pierce County between 2006 and 2015 (NMFS 2016a). The majority of strandings were during the winter months (Figure 3-4).

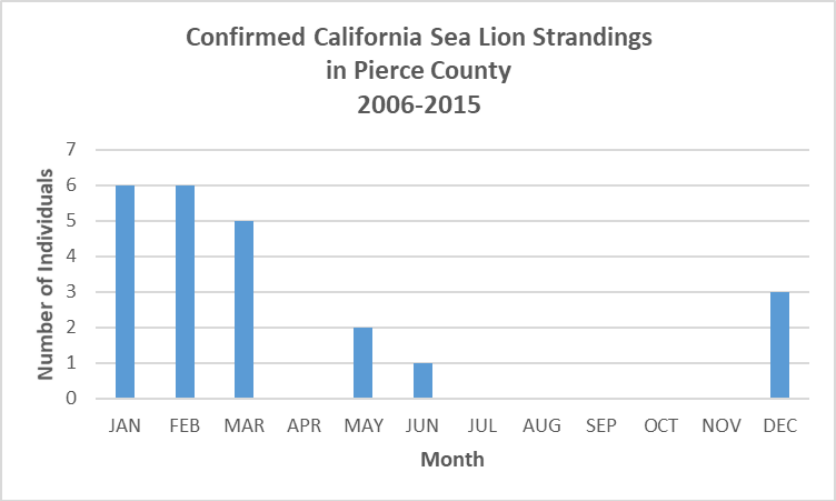

Figure 3-4. California sea lion strandings in Pierce County.

3.3.4 Steller Sea Lion

The Eastern U.S. stock of Steller sea lion may be present near the project site.

3.3.4.1 Numbers

The minimum estimated eastern U.S. stock of Steller sea lions is 43,201 based on pup counts, and a Washington minimum population estimate of 1,407 (NMFS 2019b). In Washington waters, Steller sea lion abundances vary seasonally with a minimum estimate of 1,000 to 2,000 individuals present or passing through the Strait of Juan de Fuca in fall and winter months (Jeffries, et al. 2000).

Steller sea lion numbers in Washington State decline during the summer months, which correspond to the breeding season at Oregon and British Columbia rookeries (approximately late May to early June) and peak during the fall and winter months (Jeffries, et al. 2000). A few Steller sea lions can be observed year-round in Puget Sound although most of the breeding age animals return to rookeries in the spring and summer.

3.3.4.2 Status

The eastern stock of Steller sea lions is currently not listed under ESA and is not considered depleted under the MMPA.

3.3.4.3 Distribution

Adult Steller sea lions congregate at rookeries in California, Oregon, Washington, and British Columbia for pupping and breeding from late May to early June (Gisiner 1985; NMFS 2016b). Rookeries are usually located on beaches of relatively remote islands, often in areas exposed to wind and waves, where access by humans and other mammalian predators is difficult (WDFW 1993).

The nearest documented Steller sea lion haul out site to the SR 302 Purdy Bridge project site is at the Toliva Shoals Buoy, 16 miles to the south (Jeffries, et al. 2000). Less than 10 individuals may occur at this haul out. An individual Steller sea lions may haul out on buoys or floats anywhere in the vicinity of the proposed project.

Project-specific Observations

According to the NMFS National Stranding Database, there were four confirmed Steller sea lion stranding in Pierce County between 2006 and 2015 (NMFS 2016a). These strandings occurred between January and June.

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of Steller sea lions in Henderson Bay as ranging from 0.001 to 0.0478 animals per square kilometer in summer and fall. The higher estimate will be used in this analysis.

3.4 Cetaceans

Five cetacean species may be present in the immediate vicinity of the SR 302 Purdy Bridge: humpback whale, gray whale, killer whale, harbor porpoise, and common dolphin. The killer whale discussion is separated into two sections: transient and southern resident.

3.4.1 Humpback Whale

The California-Oregon-Washington (CA-OR-WA) stock of humpback whale may be found near the project site. Humpback whales are low-frequency hearing range cetaceans (Southall et al. 2007).

3.4.1.1 Numbers

The SAR abundance estimate is 2,900 individuals. The minimum population estimate is 2,784 (NMFS 2019c).

3.4.1.2 Status

As a result of commercial whaling, humpback whales were listed as "endangered" under the Endangered Species Conservation Act of 1969. This protection was transferred to the Endangered Species Act (ESA) in 1973. The humpback whale ESA listing final rule (81 FR 62259, September 8, 2016) established 14 distinct population segments (DPSs) with different

listing statuses. The CA/OR/WA humpback whale stock primarily includes whales from the endangered Central American DPS and the threatened Mexico DPS, plus a small number of whales from the non-listed Hawaii DPS. Humpback whale stock delineation under the MMPA is currently under review, and until this review is complete, the CA/OR/WA stock will continue to be considered endangered and depleted for MMPA management purposes (e.g., selection of a recovery factor, stock status). Consequently, the California/Oregon/ Washington stock is automatically considered as a "strategic" stock under the MMPA (NMFS 2019c).

3.4.1.3 Distribution

Historically, humpback whales were common in inland waters of Puget Sound and the San Juan Islands (Calambokidis et al. 2004). In the early 1900s, there was a productive commercial hunt for humpbacks in Georgia Strait that was probably responsible for their long disappearance from local waters (Osborne et al. 1988). Commercial hunts ended in the 1960's. Since the mid-1990s, sightings in Puget Sound have increased.

This stock calves and mates in coastal Central America and Mexico and migrates up the coast from California to southern British Columbia in the summer and fall to feed (NMFS 1991; Marine Mammal Commission 2003; Carretta et al. 2007). Humpback whales are seen in Puget Sound, but more frequent sightings occur in the Strait of Juan de Fuca and near the San Juan Islands. Most sightings are in spring and summer.

Project-specific Observations

U.S. Navy Density Report

In the summer and fall timeframe scheduled for this project, the report estimates the density of humpback whales in the Henderson Bay area as 0.00074 animal/ km^2 (U.S. Navy 2019).

The Whale Museum

For the years 2009 to 2018, in the July to October timeframe scheduled for this project, The Whale Museum reported one sighting of humpback whale in the Level B zone of harassment (Figure 3-6), and several sightings in adjacent areas (Figure 3-1) (TWM 2020).

NMFS Stranding Data

From the years 2006-2015, in the July to October timeframe scheduled for this project, there were no humpback whale strandings in Pierce County (NMFS 2016a).

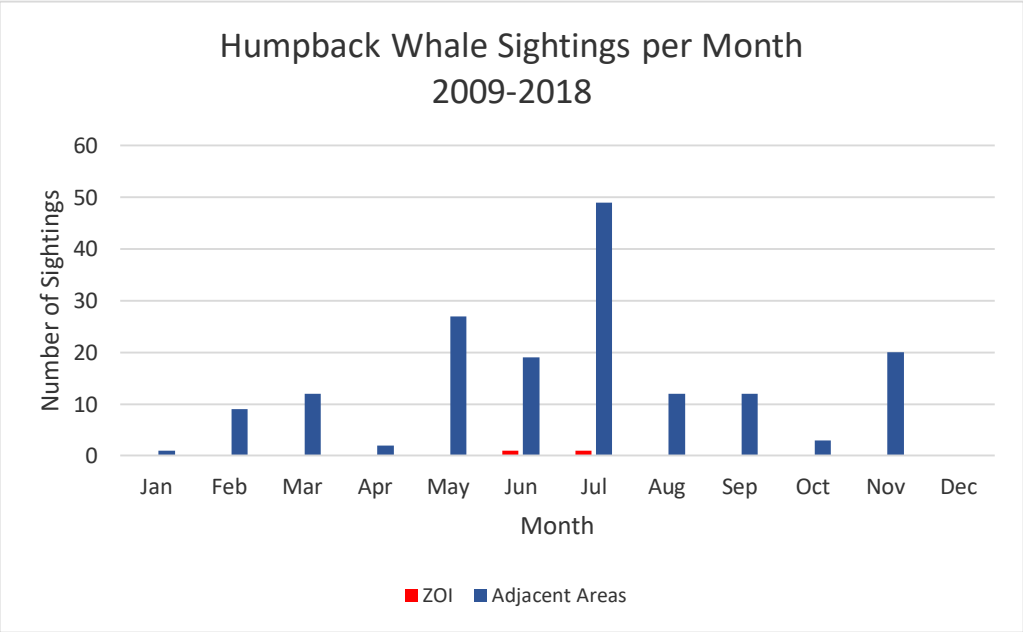

Figure 3-5. Humpback whale sightings by month

3.4.2 Gray Whale

The Eastern North Pacific gray whale may be found near the project site. Gray whales are low-frequency range cetaceans (Southall et al. 2007).

3.4.2.1 Numbers

The most recent minimum population estimate for the Eastern North Pacific stock is 25,849 individuals (NMFS 2019d).

3.4.2.2 Status

The Eastern North Pacific stock of gray whales is "non-depleted" under the MMPA, and was "delisted" under the ESA in 1994 after a 5-year review by NOAA Fisheries. In 2001 NOAA Fisheries received a petition to relist the stock under the ESA, but it was determined that there was not sufficient information to warrant the petition (NMFS 2019d).

Eastern North Pacific gray whales experienced an unusual mortality event (UME) in 1999 and 2000, when large numbers of emaciated animals stranded along the west coast of North America (NMFS 2019d). Over 60 percent of the dead whales were adults, compared with previous years when calf strandings were more common. Several factors following this UME suggest that the high mortality rate observed was a short-term, acute event: 1) in 2001 and 2002, strandings decreased to levels below UME levels; 2) average calf production returned to levels seen before 1999; and 3) in 2001, living whales no longer appeared emaciated. Oceanographic factors that limited food availability for gray whales were identified as likely causes of the UME (LeBouef et al. 2000; Moore et al. 2001; Minobe 2002; Gulland et al. 2005), with resulting declines in

survival rates of adults during this period (Punt and Wade 2012). The population has recovered to levels seen prior to the UME of 1999-2000 and the current estimate of abundance is the highest that has been recorded in the 1967-2015 time series (NMFS 2019d).

Since January 1, 2019, elevated gray whale strandings have occurred along the west coast of North America from Mexico through Alaska. This has also been declared an UME. Full or partial necropsy examinations were conducted on a subset of the whales. Preliminary findings in several of the whales have shown evidence of emaciation. These findings are not consistent across all the whales examined, so more research is needed. In 2019, strandings in Washington represented 28 percent of the U.S. total, and approximately 16 percent in 2020 (NMFS 2020).

3.4.2.3 Distribution

During summer and fall, most whales in the Eastern North Pacific population feed in the Chukchi, Beaufort and northwestern Bering Seas. An exception to this is the relatively small number of whales (approximately 200) that summer and feed along the Pacific coast between Kodiak Island, Alaska and northern California, referred to as the "Pacific Coast Feeding Group" (NMFS 2019d). Three primary wintering lagoons in Baja California, Mexico are utilized, and some females are known to make repeated returns to specific lagoons (Jones 1990).

Photo-identification studies between northern California and northern British Columbia provide data on the abundance and population structure of PCFG whales (Calambokidis et al. 2017). Gray whales using the study area in summer and autumn include two components: (1) whales that frequently return to the area, display a high degree of intra-seasonal "fidelity" and account for a majority of the sightings between 1 June and 30 November. Despite movement and interchange among sub-regions of the study area, some whales are more likely to return to the same sub-region where they were observed in previous years; (2) "visitors" from the northbound migration that are sighted only in one year, tend to be seen for shorter time periods in that year, and are encountered in more limited areas (NMFS 2019d).

Project-specific Observations

U.S. Navy Density Report

In the summer and fall timeframe scheduled for this project, the report estimates the density of gray whales in the Henderson Bay area as 0.000086 animal/ km^2 (U.S. Navy 2019).

The Whale Museum

For the years 2009 to 2018, in the July to October timeframe scheduled for this project, The Whale Museum reported no sightings of gray whale in the Level B zone of harassment (Figure 3-7), and several sightings in adjacent areas (see Figure 3-1). One individual was observed near the Purdy Bridge in June 2013, but there are no other documented sightings between November and June in the Level B zone of harassment (TWM 2020).

NMFS Stranding Data

From the years 2006-2015, in the July to October timeframe scheduled for this project, there were no gray whale strandings in Pierce County (NMFS 2016a).

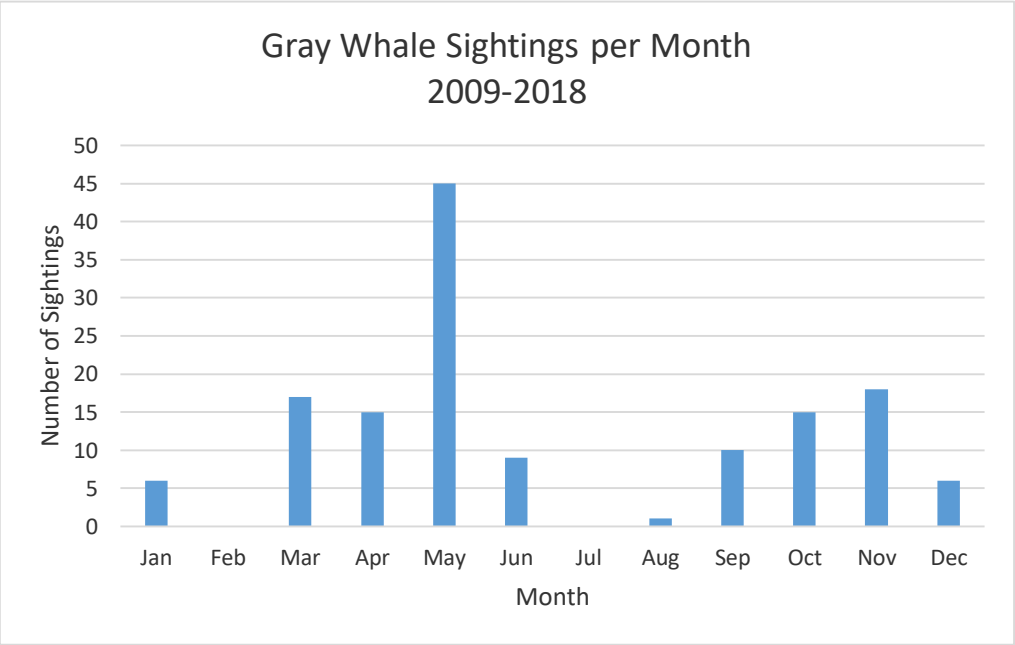

Figure 3-6. Gray whale sightings by month in areas adjacent to the Level B zone of harassment

3.4.3 West Coast Transient Killer Whale

The West Coast Transient (Transient) stock of killer whale may be found near the project site. Killer whales are mid-frequency hearing range cetaceans (Southall et al. 2007).

3.4.3.1 Numbers

Transient killer whales generally occur in smaller (less than 10 individuals), less structured pods, though pods as large as 12 have been occasionally observed in Puget Sound (NMFS 2013b). According to the Center for Whale Research (CWR 2015), they tend to travel in small groups of one to five individuals, staying close to shorelines, often near seal rookeries when pups are being weaned. The West Coast Transient stock, which includes individuals from California to southeastern Alaska, has a population estimate of 243 (NMFS 2013b). Unlike the Southern Resident killer whale pods, transients may be present in the area for hours as they hunt pinnipeds.

3.4.3.2 Status

The West Coast Transient stock is “non-depleted” under the MMPA, and “unlisted” under the ESA (NMFS 2013b).

Washington State Status

In Washington State, all killer whales that may be present in Washington waters (Southern Resident, West Coast Transient, and Offshore) were listed as a state candidate species in 2000. In April 2004, the State upgraded their status to a “state endangered species” (Wiles 2004).

3.4.3.3 Distribution

The West Coast Transient stock is found within Washington inland waters. Individuals of this stock have long-ranging movements and regularly leave the inland waters (Calambokidis and Baird 1994). The West Coast Transient stock occurs in California, Oregon, Washington, British Columbia, and southeastern Alaskan waters. Within the inland waters, they may frequent areas near seal rookeries when pups are weaned (Baird and Dill 1995).

West Coast Transients are documented intermittently year-round in Washington inland waters.

Project-specific Observations

U.S. Navy Density Report

In the summer and fall timeframe scheduled for this project, the report estimates the density of West Coast transients in the Henderson Bay area ranging between as 0.001582 and 0.002373 animal/ km^2 (U.S. Navy 2019). The higher estimate will be used in this analysis.

The Whale Museum

In the last 10 years, transient killer whales have rarely entered the Level B zones of harassment (Figure 3-8). For the years 2009 to 2018, in the July to October timeframe scheduled for this project, The Whale Museum reported no transient killer whale sightings in the Level B zones of harassment (Figure 3-9), and several sightings in adjacent areas (see Figure 3-1). In January 2015, transients occurred in the Level B zones of harassment over a two-day period, but there are no other documented sightings in the Level B zones of harassment (TWM 2020).

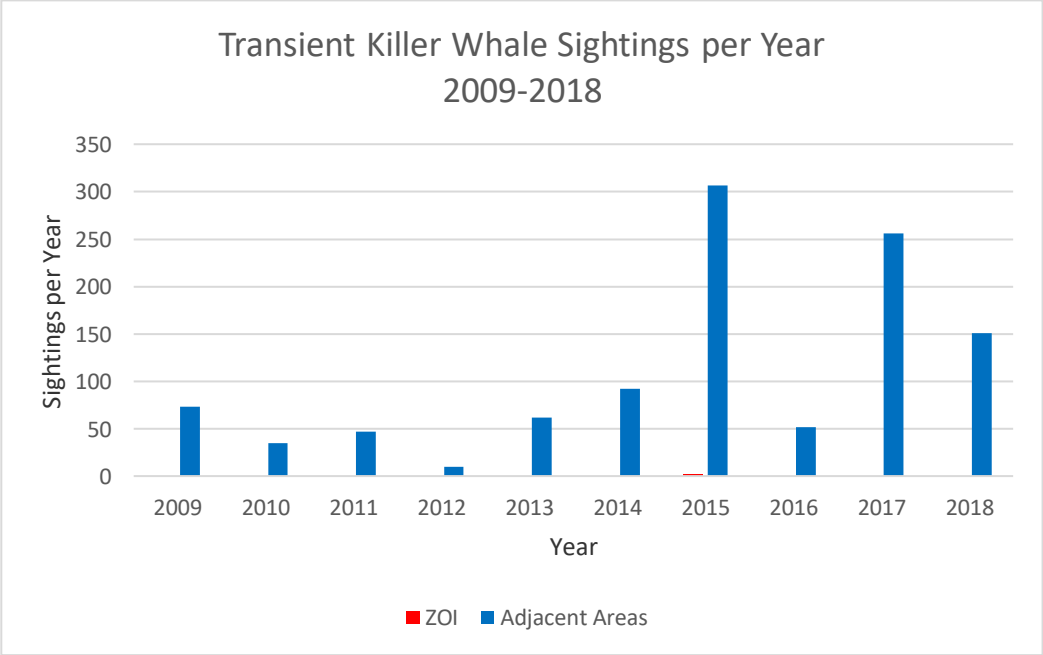

Figure 3-7. Transient killer whale occurrence by year in the Level B zones of harassment and adjacent areas.

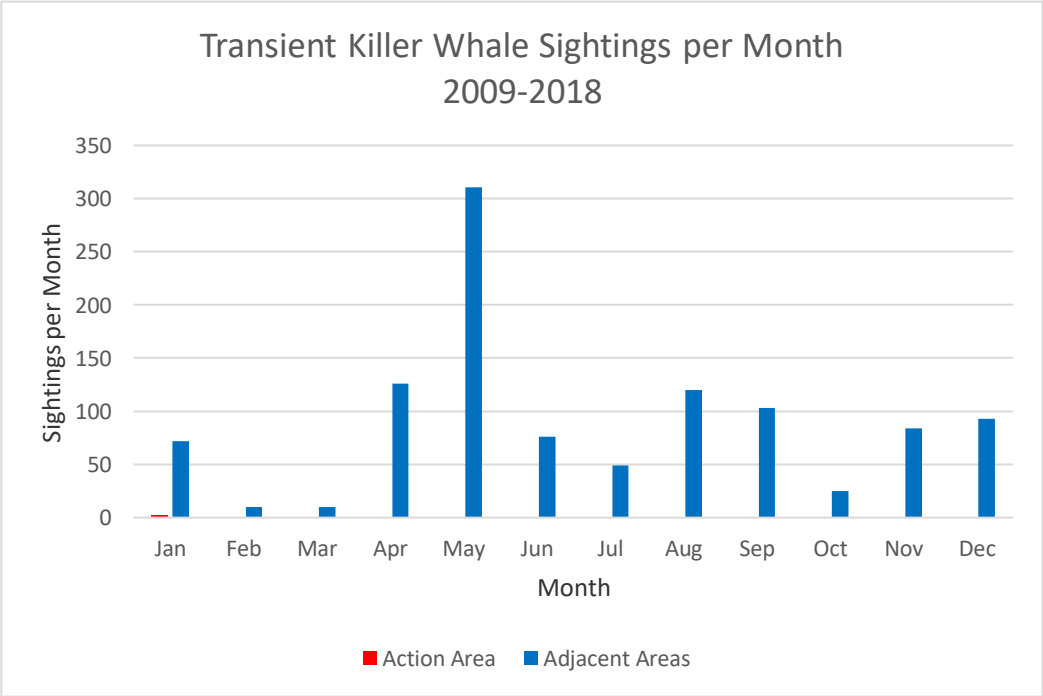

Figure 3-8. Transient killer whale occurrence by month in the Level B zones of harassment and adjacent areas.

3.4.4 Southern Resident Killer Whale

The Southern Resident stock of killer whale (SRKW) may be found near the project site. Killer whales are mid-frequency hearing range cetaceans (Southall et al. 2007).

3.4.4.1 Numbers

The Southern Residents live in three family groups known as the J, K and L pods. As of December 2019, the stock collectively numbered 73 individuals (J Pod=22, K Pod=17, L Pod=34) (CWR 2020).

3.4.4.2 Status

The SRKW stock was declared "depleted/strategic" under the MMPA in May 2003 (68 FR 31980). On November 18, 2005, the SR stock was listed as "endangered" under the ESA (70 FR 69903). On November 29, 2006, NMFS published a final rule designating critical habitat for the SR killer whale DPS. Both Puget Sound and the San Juan Islands are designated as core areas of critical habitat under the ESA, excluding areas less than 20 feet deep relative to extreme high water (71 FR 69054). The entire Level B disturbance zone is within designated critical habitat. A final recovery plan for Southern Residents was published in January of 2008 (NMFS 2008a). On September 19, 2019, NOAA Fisheries announced a proposed rule to revise the Critical Habitat Designation for the Southern Resident killer whale distinct population (NMFS 2019e).

3.4.4.3 Distribution

Southern Residents are documented in coastal waters ranging from central California to the Queen Charlotte Islands, British Columbia (NMFS 2008a). They occur in all inland marine waters. SR killer whales generally spend more time in deeper water and only occasionally enter water less than 15 feet deep (Baird 2000). Distribution is strongly associated with areas of greatest salmon abundance, with heaviest foraging activity occurring over deep open water and in areas characterized by high-relief underwater topography, such as subsurface canyons, seamounts, ridges, and steep slopes (Wiles 2004).

Fall/Winter Distribution. In fall, all three pods occur in areas where migrating salmon are concentrated such as the mouth of the Fraser River. They may also enter areas in Puget Sound where migrating chum and Chinook salmon are concentrated (Osborne 1999). In the winter months, the K and L pods spend progressively less time in inland marine waters and depart for coastal waters in January or February. The pods spend over 50 percent of the winter months on the outer coast. The J pod is most likely to appear year-round near the San Juan Islands, and in the fall/winter, in the lower Puget Sound and in Georgia Strait at the mouth of the Fraser River.

Project-specific Observations

U.S. Navy Density Report

In the summer and fall timeframe scheduled for this project, the report estimates the density of SRKWs in the Henderson Bay area ranging from zero to 0.0002 animal/ km^2 (U.S. Navy 2019). The higher estimate will be used in this analysis.

The Whale Museum

For the years 2009 to 2018, in the July to October timeframe scheduled for this project, The Whale Museum reported no SRKW sightings in the Level B zones of harassment (Figure 3-10), and only a few sightings in adjacent areas (see Figure 3-1) (TWM 2020).

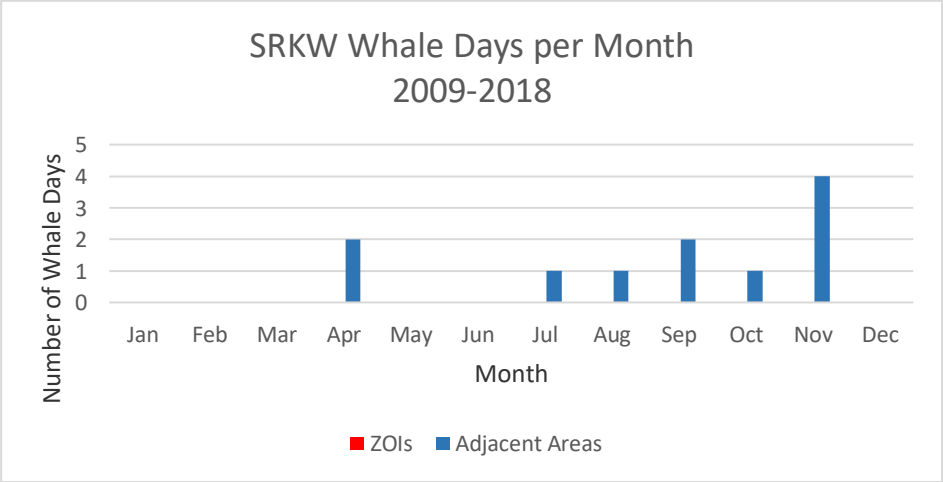

Figure 3-9. SRKW observations by month in the Level B zones of harassment and adjacent areas

3.4.5 Harbor Porpoise

The Washington Inland Waters Stock of harbor porpoise may be found near the project site. Harbor porpoise are high-frequency hearing range cetaceans (Southall et. al. 2007).

3.4.5.1 Numbers

The Washington Inland Waters Stock mean abundance estimate based on 2013 to 2015 aerial surveys conducted in the Strait of Juan de Fuca, San Juan Islands, Gulf Islands, and Strait of Georgia is 11,233 harbor porpoises (NMFS 2017a). The minimum population estimate is 8,308.

No harbor porpoise were observed within Puget Sound proper during comprehensive harbor porpoise surveys (Osmek et al. 1994) or Puget Sound Ambient Monitoring Program (PSAMP) surveys conducted in the 1990s (WDFW 2008). Declines were attributed to gill-net fishing, increased vessel activity, contaminants, and competition with Dall's porpoise.

However, populations appear to be rebounding with increased recent sightings in central Puget Sound (Carretta et al. 2007) and southern Puget Sound (WDFW 2008; WDFW/Cascadia 2016). Recent systematic boat surveys of the main basin indicate that at least several hundred and possibly as many as low thousands of harbor porpoise are now present. While the reasons for this recolonization are unclear, it is possible that changing conditions outside of Puget Sound, as evidenced by a tripling of the population in the adjacent waters of the Strait of Juan de Fuca and San Juan Islands since the early 1990s, and the recent higher number of harbor porpoise mortalities in coastal waters of Oregon and Washington, may have played a role in encouraging harbor porpoise to explore and shift into areas like Puget Sound (Hanson, et. al. 2011; WDFW/Cascadia 2016).

3.4.5.2 Status

The Washington Inland Waters Stock of harbor porpoise is "non-depleted" under MMPA, and "unlisted" under the ESA.

3.4.5.3 Distribution

Harbor porpoises are common in the Strait of Juan de Fuca and south into Admiralty Inlet, especially during the winter, and are becoming more common south of Admiralty Inlet.

Little information exists on harbor porpoise movements and stock structure in waters near the Purdy Bridge, although it is suspected that in some areas harbor porpoises migrate (based on seasonal shifts in distribution). For instance the WDFW's PSAMP data show peaks in Washington waters to occur during the winter.

Hall (2004) found that the frequency of sighting of harbor porpoises decreased with increasing depth beyond 150 m with the highest numbers observed at water depths ranging from 61 to 100 m. Although harbor porpoises have been spotted in deep water, they tend to remain in shallower shelf waters (<150 m) where they are most often observed in small groups of one to eight

animals (Baird 2003). Most of Henderson Bay south of the Purdy Bridge is less than 60 m in depth. Burley Lagoon north of the bridge is mostly intertidal.

Project-specific Observations

U.S. Navy Density Report
In the timeframe scheduled for this project, the report estimates the density of harbor porpoise in the Henderson Bay area ranges between 0.75 and 0.86 animals/ km2 (U.S. Navy 2019). The take estimate will be based on 0.86 animals/km^2.

WDFW Aerial Surveys
WDFW has carried out annual winter aerial marine bird surveys for Washington inner marine water every year from 1994 to 2014 (excluding 2007). The survey results were used to estimate the winter mean densities of harbor porpoise by basin. The mean density of harbor porpoise in the Henderson Bay area is estimated at 0.513 per square kilometer (WDFW/Cascadia 2016).

The Whale Museum
For the years 2009 to 2018, in the July to October timeframe scheduled for this project, The Whale Museum (2020) reported no sightings days for harbor porpoise in the Level B zone of harassment, and very few in adjacent areas (Figures 3-1 and 3-11). This is likely the result of the difficulty of observing this small species.

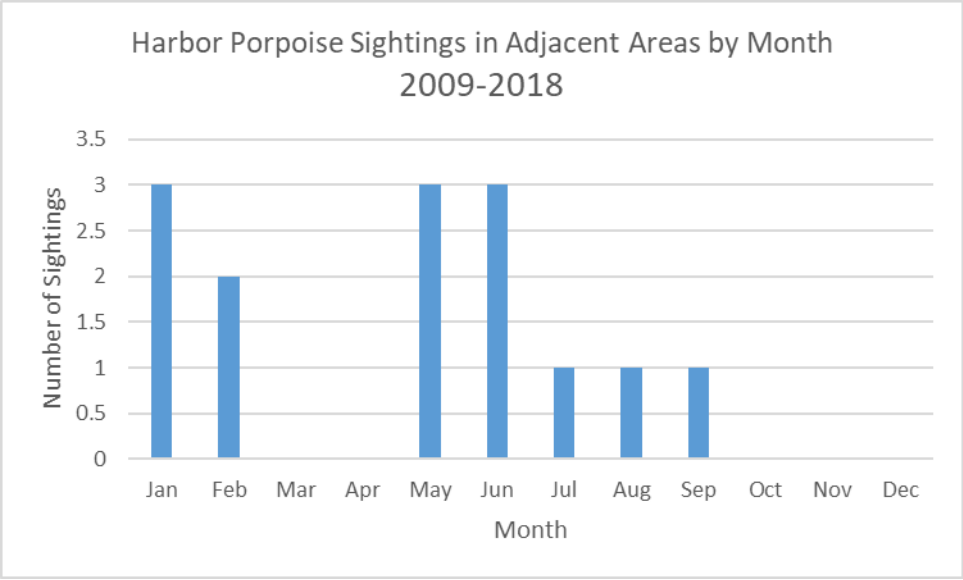

Figure 3-10. Harbor porpoise sightings in areas adjacent to the Level B zones of harassment by month.

NMFS Stranding Data
From the years 2006-2015, in the July to October timeframe scheduled for this project, there were five harbor porpoise strandings in Pierce County (NMFS 2016a).

3.4.6 Short-beaked Common Dolphin

The California/Oregon/Washington Stock of short-beaked common dolphin may be found near the project site. This species are high-frequency hearing range cetaceans (Southall et. al. 2007).

3.4.6.1 Numbers

The most recent estimate of short-beaked common dolphin abundance is the geometric mean of estimates from 2008 and 2014 summer/autumn vessel-based line-transect surveys of California, Oregon, and Washington waters, 969,861 animals (NMFS 2017).

3.4.6.2 Status

The California/Oregon/Washington Stock of short-beaked common dolphin is "non-depleted" under MMPA, and "unlisted" under the ESA (NMFS 2017).

3.4.6.3 Distribution

This species is encountered in a much broader portion of the Pacific than the closely related long-beaked common dolphin (Hamilton et al., 2009). Short-beaked common dolphins are the most abundant cetacean off California, and are widely distributed between the coast and at least 300 nautical mile distance from shore (NMFS 2017). The distribution of short-beaked common dolphins throughout this region is highly variable, apparently in response to oceanographic changes on both seasonal and interannual time scales (Heyning and Perrin 1994; Forney 1997; Forney and Barlow 1998).

Project-specific Observations

U.S. Navy Density Report

The Navy Marine Species Density Database (U.S. Navy 2019) concludes that short-beaked common dolphins are extremely unlikely to be present at any time of year in Henderson Bay and elsewhere in Puget Sound (density estimate is zero animals per square kilometer).

The Whale Museum

For the years 2009 to 2018, in the July to October timeframe scheduled for this project, The Whale Museum reported no short-beaked common dolphin sightings in the Level B zones of harassment (Figure 3-12), and only a few sightings in adjacent areas (see Figure 3-1) (TWM 2020). The Whale Museum data refer to observations of common dolphin. According to NMFS (2017), long-beaked common dolphins occur primarily off the coast of southern California. The sightings in adjacent areas are assumed to be the more widely-ranging short-beaked common dolphin, with most of those occurring in 2016 and 2017.

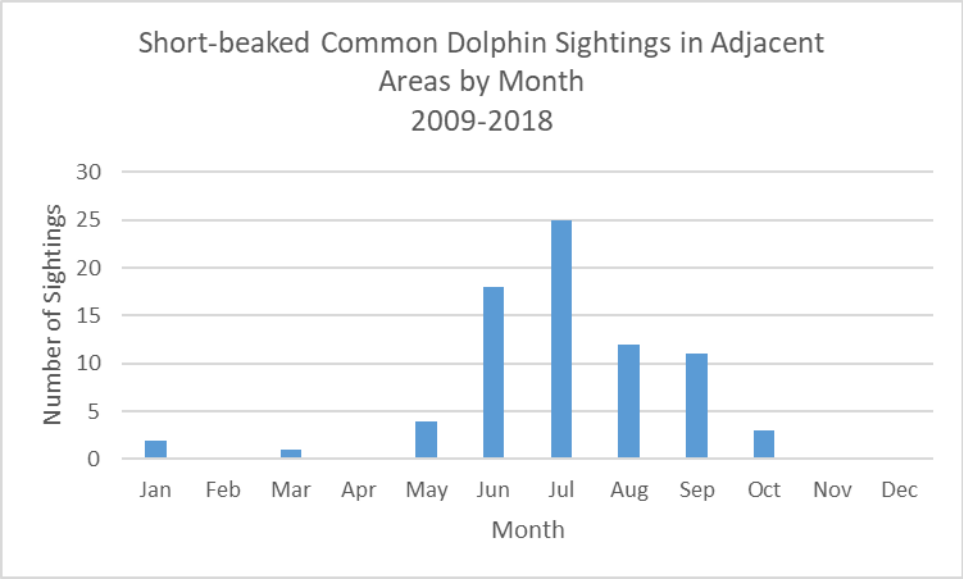

Figure 3-11. Short-beaked common dolphin sightings in areas adjacent to the Level B zones of harassment by month.

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4.0 Status and Distribution of Affected Species or Stocks

A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.

This section has been combined with Section 3.0.

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5.0 Type of Incidental Take Authorization Requested

The type of incidental taking authorization that is being requested (i.e., takes by harassment only, takes by harassment, injury and/or death), and the method of incidental taking.

The MMPA defines "harassment" as:

> any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (50 C.F.R, Part 216, Subpart A, Section 216.3-Definitions).

Level A is the more severe form of harassment because it may result in injury or death, whereas Level B only results in disturbance *without* the potential for injury. (B. Norberg pers. comm. 2007a).

5.1 Incidental Take Authorization Request

Under Section 101 (a)(5)(D) of the MMPA, WSDOT requests an IHA from July 16, 2021 through February 15, 2022 for Level B incidental take (behavioral harassment) of the marine mammals described in this application during the pier rehabilitation project at the SR 302 Purdy Bridge.

The requested authorization is for incidental harassment of any six species of marine mammal that might enter the 120 dB background/disturbance threshold zone (Level B zone of harassment) during active vibratory pile driving or removal activity.

The scheduled pile-driving and pile-removal activities discussed in this application will occur between July 16, 2021 and February 15, 2022.

5.2 Method of Incidental Taking

The method of incidental take is Level B acoustical harassment of any marine mammal occurring within the 120 dB disturbance threshold zone (Level B zone of harassment) during active vibratory pile driving or removal activity.

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6.0 Number of Marine Mammals that May Be Affected

By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in [Section 5], and the number of times such takings by each type of taking are likely to occur.

This section summarizes potential incidental take of marine mammals during the SR 302 Purdy Bridge project. Section 6.2 describes the methods used to calculate the estimated Level B zone of harassment and Section 6.3 describes the potential incidental take for each marine mammal species. Section 6.4 provides the number of marine mammals by species for which take authorization is requested.

Due to the vibratory pile driving and removal source levels, this IHA application will incidentally take by Level B acoustical harassment small numbers of harbor seal, California sea lion, Steller sea lion, gray whale, harbor porpoise, and common dolphin. With the exception of harbor seals and California sea lions, it is anticipated that all of the marine mammals that enter a Level B zones of harassment will be exposed to pile driving noise only briefly as they are transiting the area. Only harbor seals and California sea lions are expected to forage and haul out in the project Level B zones of harassment with any frequency and could be exposed multiple times during the project.

6.1 Estimated Duration of Pile Driving

Durations are provided below and summarized in Table 6-1. The actual number of hours is expected to be less.

- Vibratory driving of each steel sheet pile will take approximately 30 minutes per pile, 8 sheet piles installed per day, with 44 sheet piles installed in 6 days.
- Vibratory driving of each steel H pile will take approximately 30 minutes per pile, with 8 H piles installed in one day, with all 20 H piles installed in 3 days.
- Vibratory removal of each steel sheet pile will take approximately 15 minutes per pile, 16 sheet piles removed per day, with all sheet piles removed in 3 days.
- Vibratory removal of each steel H pile will take approximately 15 minutes per pile, with 16 piles removed in one day, and all piles removed in 2 days.

Table 6-1. Worst Case Pile Durations

Method	Pile Type	Estimated Noise Level	Number of Piles (2 piers)	Minutes per pile	Total Minutes	Duration (Hours)	Piles per Day	Duration (10-hour work days)
Vibratory Driving	Sheet	In water:165 dB_{RMS}* In air: 96.9 dBA	44	30	1320	22	8	6
Vibratory Driving	H pile	In-water: 150 dB_{RMS}* In-air: 96.9 dB	20	30	600	10	8	3
Vibratory Removal	Sheet	In water: 165 dB_{RMS} In air: 96.9 dBA	44	15	660	11	16	3
Vibratory Removal	H pile	In-water: 150 dB_{RMS} In-air: 96.9 dB	20	15	300	5	16	2
Totals					2880	48		14

6.2 Estimated Duration of Needle Gun Use

Needle gun use to prepare each pier will take approximately 4 hours per day for three days, with two piers requiring a total of 24 hours over 6 days.

6.3 Estimated Harassment Zone/Injury Zone

Distances to the NMFS threshold for Level A (injury) and Level B (harassment) take for vibratory installation and removal, and needle gun operation were presented in Section 1.6.6, Attenuation to NMFS Thresholds.

Tables 6-2 and 6-3 summarize these distances.

Table 6-2. Summary of Level B Zones of Harassment

Zone of Harassment	Activity	Distance*	Area (km^2)
Level B Zone 1	Sheet pile vibratory installation and removal (underwater)	10 km	17.9
Level B Zone 2	H pile vibratory installation and removal (underwater)	1 km	1.36
Level B Zone 3	Vibratory hammer operation (in-air phocid and otarriid)	38.3	0.01
Level B Zone 4	Needle gun operation (in-air phocid)	192 m	0.06
Level B Zone 5	Needle gun operation (in-air otarriid)	60 m	0.01

*In most cases, the ensonified area is contained by land and does not extend the full potential distance.

Table 6-3. Summary of Level A injury zones

Activity	Injury Zone	Hearing Group	Distance to Threshold (m)
Sheet pile vibratory installation and removal	Level A Zone 1	Low-frequency cetaceans	31.8
	Level A Zone 2	Mid-frequency cetaceans	2.8
	Level A Zone 3	High-frequency cetaceans	47.0
	Level A Zone 4	Phocid pinnipeds	19.3
	Level A Zone 5	Otariid pinnipeds	1.4
H pile vibratory installation and removal	Legel A Zone 6	Low-frequency cetaceans	3.2
	Level A Zone 7	Mid-frequency cetaceans	0.3
	Level A Zone 8	High-frequency cetaceans	4.7
	Level A Zone 9	Phocid pinnipeds	1.9
	Level A Zone 10	Otariid pinnipeds	0.1

The nearest WDFW documented harbor seal haul out site to the SR 302 Purdy Bridge are the Rosedale Beach floats located 3.6 miles to the southwest (Figure 3-2). The nearest documented California sea lion haul out site to the SR 302 Purdy Bridge project site are on the Toliva Shoals Buoys, approximately 16 water miles to the south (Jeffries, et al. 2000). This haul out typically is used by less than 10 individuals at any one time.

During vibratory pile driving and removal, and needle gun operation, temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate bridge area, or hauled-out on beaches or man-made structures within 38.3 m/126 ft.

6.4 Estimated Incidental Takes

Incidental take is estimated for each species by estimating the likelihood of a marine mammal being present within a Level B zone of harassment during active pile driving or removal. Expected marine mammal presence is determined by past observations and general abundance near the Purdy Bridge during the construction window. Typically, potential take is estimated by multiplying the area of the Level B zones of harassment by the local animal density. This provides an estimate of the number of animals that might occupy the Level B zone of harassment at any given moment. There are two sources of density estimates available, the U.S. Navy Marine Species Density Report (2019), and the WDFW density estimates for harbor porpoise (2016). These density estimates will be used to calculate takes, unless site-specific data is available that supports a different take estimate approach.

As a result, the take requests were estimated using local marine mammal data sets (e.g., state and federal agencies), opinions from state and federal agencies, observations from local area whale specialists, and best professional judgment.

The calculation for marine mammal exposures is estimated by:

Exposure estimate = N (number of animals) * days of pile driving/removal activity

All estimates are conservative. A summary of underwater noise durations per Level B zone of harassment is provided in Table 6-4.

Table 6-4. Level B Zone of Harassment Area/Days Present

Zone of Harassment	Activity	Zone of Harassment Area	Days Zone of Harassment Present
Level B Zone 1	Sheet pile installation (underwater)	17.9 km^2	9
Level B Zone 2	H-pile installation and removal (underwater)	1.36 km^2	5
Level B Zone 3	Vibratory hammer operation (in-air)	0.01 km^2	14
Level B Zone 4	Needle gun operation (in-air phocids)	0.06 km^2	6
Level B Zone 5	Needle gun operation (in-air otarriids)	0.01 km^2	6

6.4.1 Harbor Seal

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of harbor seals in the Henderson Bay area as 3.91 animals per square kilometer. Based on this density estimate, the following number of harbor seals may be present in the Level B zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 69.989 animals * 9 days of pile activity = 629.901
- Level B Zone 2 (1.36 km^2) exposure estimate: 5.3176 animals * 5 days of pile activity = 26.588
- Level B Zone 3 (0.01 km^2) in-air noise exposure estimate: 0.0391 animal * 14 days of vibratory hammer operation = 0.5474
- Level B Zone 4 (0.06 km^2) in-air noise exposure estimate: 0.2346 animal * 6 days of needle gun operation = 1.4076

The Level B Zone 3 in-air exposures are not included in this request because they are already taken by in-water activity. WSDOT is requesting authorization for Level B acoustical harassment take of 658 harbor seals. It is assumed that this number will include multiple harassments of the same individual(s).

6.4.2 California Sea Lion

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of California sea lions in the Henderson Bay area as 0.2211 animal per square kilometer. Based on this density estimate, the following number of California sea lions may be present in the Level B zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 3.95769 animals * 9 days of pile activity = 35.61921
- Level B Zone 2 (1.36 km^2) exposure estimate: 0.300696 animal * 5 days of pile activity = 1.50348
- Level B Zone 3 (0.01 km^2) in-air noise exposure estimate: 0.002211 animal * 14 days of vibratory hammer operation = 0.030954
- Level B Zone 5 (0.01 km^2) in-air noise exposure estimate: 0.002211 animal * 6 days of needle gun operation = 0.013266

WSDOT is requesting authorization for Level B acoustical harassment take of 38 California sea lions. It is assumed that this number will include multiple harassments of the same individual(s).

6.4.3 Steller Sea Lion

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of Steller sea lions in the Henderson Bay area as 0.0478 animal per square kilometer. Based on this density estimate, the following number of Steller sea lions may be present in the Level B zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 0.85562 animal * 9 days of pile activity = 7.70058
- Level Zone 2 (1.36 km^2) exposure estimate: 0.065008 animal * 5 days of pile activity = 0.32504
- Level B Zone 3 (0.01 km2) exposure estimate: 0.000478 animal * 14 days of vibratory hammer operation = 0.006692
- Level B Zone 5 (0.01 km2) exposure estimate: 0.000478 animal * 6 days of needle gun operation = 0.002868

WSDOT is requesting authorization for Level B acoustical harassment of 9 Steller sea lions. It is assumed that this number will include multiple harassments of the same individual(s).

6.4.4 Humpback Whale

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of humpback whales in the Henderson Bay area as 0.00074 animal per square kilometer. Based on this density estimate, the following number of humpback whales may be present in the Level zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 0.013246 animal * 9 days of pile activity = 0.119214

- Level B Zone 2 (1.36 km^2) exposure estimate: 0.0010064 animal * 5 days of pile activity = 0.005032

WSDOT will stop all vibratory hammer operation if a humpback whale approaches the Level B zones of harassment. Therefore, WSDOT is not requesting authorization for Level B acoustical harassment of humpback whales.

6.4.5 Gray Whale

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of gray whales in the Henderson Bay area as 0.000086 animal per square kilometer. Based on this density estimate, the following number of gray whales may be present in the Level B zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 0.0015394 animal * 9 days of pile activity = 0.0138546
- Level B Zone 2 (1.36 km^2) exposure estimate: 0.00011696 animal * 5 days of pile activity = 0.0005848

The total represents less than one gray whale. In the event an individual enters the area and is harassed multiple times, WSDOT is requesting authorization for Level B acoustical harassment of 10 gray whales. It is assumed that this number will include multiple harassments of the same individual(s).

6.4.6 Transient Killer Whale

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of transient killer whales in the Henderson Bay area as 0.002373 animal per square kilometer. Based on this density estimate, the following number of transient killer whales may be present in the Level B zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 0.04247 animal * 9 days of pile activity = 0.38229
- Level B Zone 2 (1.36 km^2) exposure estimate: 0.00322728 animal * 5 days of pile activity = 0.0161364

The total represents less than one transient killer whale. In the event one or more individuals approach the Level B zones of harassment, all vibratory hammer operation will be stopped, and will not resume until it is verified that all individuals have moved away from the Level B zone of harassment. WSDOT is not requesting authorization for Level B acoustical harassment of transient killer whale.

6.4.7 Southern Resident Killer Whale

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of southern resident killer whales in the Henderson Bay area as 0.0002 animal per square kilometer. Based on this density estimate, the following number of southern resident killer whales may be present in the Level B zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 0.00358 animal * 9 days of pile activity = 0.032244
- Level B Zone 2 (1.36 km^2) exposure estimate: 0.000272 animal * 5 days of pile activity = 0.00136

In the event one or more individuals approach the Level B zones of harassment, all vibratory hammer operation will be stopped, and will not resume until it is verified that all individuals have moved away from the Level B zone of harassment. WSDOT is not requesting authorization for Level B acoustical harassment of SRKW.

6.4.8 Short-beaked Common Dolphin

The Navy Marine Species Density Database (U.S. Navy 2019) does not provide a short-beaked common dolphin density estimate in the Henderson Bay area because the species is not anticipated to be present. However, The Whale Museum data indicate that common dolphins have been documented in waters adjacent to the Level B zones of harassment (it is assumed these sightings are short-beaked common dolphins). Nearly all sightings were in 2016 and 2017 and consisted of no more than five individuals in a group (Orca Network 2020); in most years there have been few if any sightings. Due to the unlikelihood of occurrence, a conservative density estimate of 5 animals per day in Zone 1 will be used for this analysis. For the smaller Zone 2, it is estimated that one group of 5 individuals may occur every 5 days. Based on this density estimate, it is assumed that the following number of short-beaked common dolphins may be intermittently in the Level B zones of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 5 animals * 9 days of pile activity = 45
- Level B Zone 2 (1.36 km^2) exposure estimate: 5 animals per every 5 days of pile activity = 5

WSDOT is requesting authorization for Level B acoustical harassment of 50 short-beaked common dolphins. It is assumed that this number will include multiple harassments of the same individual(s).

6.4.9 Harbor Porpoise

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of harbor porpoises in the Henderson Bay area as 0.86 animal per square kilometer. According to Evenson, et al. (2016), the mean harbor porpoise density in south Puget Sound in 2014 was 0.513 animal per square kilometer. The higher density estimate (0.86) will be used for this analysis. Based on this density estimate, it is assumed that the following number of harbor porpoise may be intermittently in the Level B zone of harassment:

- Level B Zone 1 (17.9 km^2) exposure estimate: 15.394 animals * 9 days of pile activity = 138.546
- Level B Zone 2 (1.36 km^2) exposure estimate: 1.1696 animals * 5 days of pile activity = 5.848

WSDOT is requesting authorization for Level B acoustical harassment take of 145 harbor porpoises. It is assumed that this number will include multiple harassments of the same individual(s).

6.5 Number of Takes for Which Authorization is Requested

The total number of takes for which Level B acoustical harassment authorization is requested is presented in the table below:

Table 6-5 Level B Acoustical Harassment Take Requests

Species	Take Request
Harbor seal	658
California sea lion	38
Steller sea lion	9
Gray whale	10
Short-beaked common dolphin	50
Harbor porpoise	145

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7.0 Anticipated Impact on Species or Stocks

The anticipated impact of the activity upon the species or stock of marine mammals.

7.1 Underwater Noise Disturbance

NMFS is currently using an in-water noise disturbance threshold of 120 dB_{RMS} for pinnipeds and cetaceans for continuous noise sources, unless the site-specific background noise is higher than 120 dB_{RMS}. In that case, the higher background becomes the threshold. The distance to the Level B acoustical harassment thresholds is described in Section 1.6.4, Attenuation to NMFS Thresholds.

There are several short-term and long-term effects from noise exposure that may occur to marine mammals, including impaired foraging efficiency and its potential effects on movements of prey, harmful physiological conditions, energetic expenditures and temporary or permanent hearing threshold shifts due to chronic stress from noise (Southall et al. 2007). The majority of the research on underwater noise impacts on whales is associated with vessel and navy sonar disturbances and does not often address impacts from pile driving.

The threshold levels at which anthropogenic noise becomes harmful to whales are poorly understood. Because whale occurrence is rare near the project site, and in-water noise impacts are localized and of short duration, any impact on individual cetaceans and pinnipeds will be limited. Pile removal and driving will expose marine mammals to potential Level B harassment. The vibratory pile driving Level A injury zones will be monitored, and work ceased if any marine mammals approach the injury zones. Because there are no documented haul outs within the immediate project area, pinniped disturbance will be limited to individuals transiting the Level B zone of harassment.

WSDOT is requesting authorization for Level B acoustical harassment take of marine mammals as listed in Table 7-1. Any incidental takes will very likely be multiple takes of individuals, rather than single takes of unique individuals. The stock take calculations below assume takes of individual animals, instead of repeated takes of a smaller number; therefore, the stock take percentage calculations are very conservative.

These numbers in relation to the overall stock size of each species are summarized in Table 7-1.

If incidental takes occur, it is expected to only result in short-term changes in behavior and potential temporary hearing threshold shift. These takes would be unlikely to have any impact on stock recruitment or survival and therefore, would have a negligible impact on the stocks of these species.

Table 7-1 Level B Acoustical Harassment Take Request Percent of Total Stock

Species	Stock Size	Take Request	Take Request % of Stock
Harbor Seal	1,025	658	64.1
California Sea Lion	233,515	38	0.00
Steller Sea Lion	41,638	9	0.02
Gray Whale	25,849	10	0.04
Harbor Porpoise	11,233	145	1.29
Short-beaked common dolphin	969,861	50	0.00

7.2 In-air Noise Disturbance to Haul Outs

Disturbance of pinnipeds hauled out near the project and surfacing when swimming within the threshold distances is possible.

During vibratory pile driving and removal, temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate area, or hauled-out on shorelines within 38.3 m/126 ft. Although in-air noise levels are below the otariid threshold level, the 90 dB threshold area will be monitored for all pinnipeds.

During needle gun operation, temporary in-air disturbance will occur to harbor seals swimming on the surface through the immediate area, or hauled-out on shorelines within 192 m/629 ft. Temporary in-air noise disturbance will occur to sea lions swimming on the surface through the immediate area, or hauled-out within 60 m/200 ft.

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8.0 Anticipated Impact on Subsistence

The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses. ***Applies only to Alaska****.*

9.0 Anticipated Impact on Habitat

The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat.

9.1 Introduction

Construction activities will have temporary impacts on marine mammal habitat through changes to water quality (increases in turbidity levels during pile driving and removal) and prey species distribution. Best management practices (BMPs) and minimization practices used by WSDOT to minimize potential environmental effects from project activities are outlined in Section 11 - Mitigation Measures.

9.2 Water and Sediment Quality

Short-term turbidity is a water quality effect of most in-water work, including pile driving. WSDOT must comply with state water quality standards during these operations by limiting the extent of turbidity to the immediate project area.

Roni and Weitkamp (1996) monitored water quality parameters during a pier replacement project in Manchester, Washington. The study measured water quality before, during and after pile removal and driving. The study found that construction activity at the site had "little or no effect on dissolved oxygen, water temperature and salinity", and turbidity (measured in nephelometric turbidity units [NTU]) at all depths nearest the construction activity was typically less than 1 NTU higher than stations farther from the project area throughout construction.

Similar results were recorded during pile removal operations at two Washington State Ferries (WSF) facilities. At the Friday Harbor terminal, localized turbidity levels within the regulatory compliance radius of 150 feet (from three timber pile removal events) were generally less than 0.5 NTU higher than background levels and never exceeded 1 NTU. At the Eagle Harbor maintenance facility, within 150 feet, local turbidity levels (from removal of timber and steel piles) did not exceed 0.2 NTU above background levels (WSF 2014). In general, turbidity associated with pile installation is localized to about a 25-foot radius around the pile (Everitt et al. 1980). It is expected that river and tidal currents will result in increased turbidity downstream from project activities. The distance affected by project-generated turbidity will depend on river flow and tide conditions, but will probably exceed 25 feet.

Cetaceans are not expected to be close enough to the SR 302 Purdy Bridge to experience elevated turbidity from the project, and any pinnipeds will be transiting the bridge area and could avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to be discountable to marine mammals.

9.3 Passage Obstructions

Pile driving and removal at the SR 302 Purdy Bridge will not obstruct movements of marine mammals. Pier work will occur within approximately 15 meters (50 feet) of the shoreline leaving approximately 70 meters (225 feet) of the channel for marine mammals to pass. A construction

barge may be used during the project. The barge will be anchored and/spudded. No dynamic positioning system (DPS) will be used. In a previous concurrence letter for the Vashon Island Dolphin Replacement Project (NMFS 2008b), NMFS stated the following:

> Vessels associated with any project are primarily tug/barges, which are slow moving, follow a predictable course, do not target whales, and should be easily detected by whales when in transit. Vessel strikes are extremely unlikely and any potential encounters with Southern Residents [killer whales] are expected to be sporadic and transitory in nature.

Similarly, vessel strikes are unlikely for the proposed project.

Passage is not expected to be obstructed as a result of the proposed project. Any temporary obstruction due to barge placement will be localized and limited in duration, and a traveling barge with tugs is too slow to strike marine mammals.

9.4 Benthic Habitat Impacts

Twenty-two 48-inch by 6-inch wide sheet piles will be driven with a vibratory hammer into the substrate immediately adjacent to each pier to form a temporary interlocked sheet pile wall shoring/form system to provide a containment system during grout work. The containment system will temporarily impact approximately 44 square feet of benthic habitat at each pier. Since the impact area is insignificant in comparison to the size of Henderson Bay, benthic impacts are not expected to have measurable effects on marine mammal habitat or marine mammal prey species.

9.5 Impacts to Prey Species

Any adverse effects on prey species during project construction will be short term. Given the large numbers of fish and other prey species in Puget Sound, the short-term nature of effects on fish species and the minimization measures to protect fish during construction (use of a vibratory hammer, BMPs, conducting work within the approved in-water work window), the proposed project is not expected to have measurable effects on the distribution or abundance of potential marine mammal prey species.

10.0 Anticipated Impact of Loss or Modification of Habitat

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

The proposed project will not result in a significant permanent loss or modification of habitat for marine mammals or their food sources. The most likely effects on marine mammal habitat for the proposed project are temporary, short duration in-water noise, temporary prey (fish) disturbance, and localized, temporary water quality effects. The direct loss of habitat available to marine mammals during the project is expected to be minimal. These temporary impacts have been discussed in detail in Section 9.0, Anticipated Impact on Habitat.

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11.0 Minimization Measures

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

WSDOT activities are subject to federal, state and local permit regulations. WSDOT has developed and routinely uses the best guidance available (e.g., BMPs and minimization measures) to avoid and minimize (to the greatest extent possible) impacts on the environment, ESA species, designated critical habitats and species protected under the MMPA.

Minimization measures will be employed during all pile driving activities at the SR 302 Purdy Bridge site. The language in each measure is included in the Contract Plans and Specifications and must be agreed upon by the contractor prior to any construction activities. Upon signing the contract, it becomes a legal agreement between the Contractor and WSDOT. Failure to follow the prescribed measures is a contract violation.

General measures used for all construction practices are listed first (Section 11.1, All Construction Activities), followed by specific measures for pile related activities (Section 11.2, Pile Removal and Installation). The measures listed under Section 11.1 apply to different activities and are, therefore, listed additional times where appropriate.

11.1 All Construction Activities

All WSDOT construction is performed in accordance with the current WSDOT Standard Specifications for Road, Bridge, and Municipal Construction. Special Provisions contained in preservation and repair contracts are used in conjunction with, and supersede, any conflicting provisions of the Standard Specifications. Mitigation measures include:

- All construction equipment will comply with applicable equipment noise standards of the U.S. Environmental Protection Agency, and all construction equipment will have noise control devices no less effective than those provided on the original equipment.
- WSDOT will have a WSDOT inspector on site during construction. The role of the inspector is to ensure contract compliance. The inspector and the contractor will have a copy of the Contract Plans and Specifications on site and will be aware of all requirements. The inspector will also be trained in environmental provisions and compliance.
- WSDOT will obtain Hydraulic Project Approval (HPA) from WDFW as appropriate and the contractor will follow the conditions of the HPA. HPA requirements will be listed in the contract specifications, and will be a legal requirement of the contract.
- The contractor shall be responsible for the preparation of a Spill Prevention, Control and Countermeasures (SPCC) plan to be used for the duration of the project:

- The SPCC plan shall be submitted to the Project Engineer prior to the commencement of any construction activities. A copy of the plan with any updates will be maintained at the work site by the contractor.
- The SPCC plan shall identify construction planning elements and recognize potential spill sources at the site. The SPCC plan shall outline BMPs, responsive actions in the event of a spill or release and identify notification and reporting procedures. The SPCC plan shall also outline contractor management elements such as personnel responsibilities, project site security, site inspections and training.
- The SPCC will outline what measures shall be taken by the contractor to prevent the release or spread of hazardous materials, either found on site and encountered during construction but not identified in contract documents, or any hazardous materials that the contractor stores, uses, or generates on the construction site during construction activities. These items include, but are not limited to gasoline, oils and chemicals. Hazardous materials are defined in Revised Code of Washington (RCW) 70.105.010 under "hazardous substance."
- The contractor shall maintain, at the job site, the applicable spill response equipment and material designated in the SPCC plan.
- The contractor shall regularly check fuel hoses, oil drums, oil or fuel transfers valves, fittings, etc. for leaks, and shall maintain and store materials properly to prevent spills.
- No petroleum products, chemicals or other toxic or deleterious materials shall be allowed to enter surface waters.
- WSDOT will comply with water quality restrictions imposed by the Washington State Department of Ecology (Ecology) (Chapter 173-201A WAC), which specify a mixing zone beyond which water quality standards cannot be exceeded. Compliance with Ecology's standards is intended to ensure that fish and aquatic life are being protected to the extent feasible and practicable.
- Wash water resulting from washdown of equipment or work areas shall be contained for proper disposal, and shall not be discharged into state waters unless authorized through a state discharge permit.
- Equipment that enters the surface water shall be maintained to prevent any visible sheen from petroleum products appearing on the water.
- There shall be no discharge of oil, fuels, or chemicals to surface waters, or onto land where there is a potential for reentry into surface waters.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.

11.2 Timing Windows

Timing restrictions are used to avoid in-water work when ESA-listed salmonids are most likely to be present. The in-water work window for the SR 302 Purdy Bridge is July 15 through February 15.

11.3 Pile Removal BMPs

The following pile removal mitigation measures are proposed by WSDOT to reduce impacts on marine mammals to the lowest extent practicable. For WSDOT's Construction Minimization Measures, see WSF Biological Assessment Reference Section 2.3 (2014). Additional BMPs that will be incorporated into the project include:

- Marine mammal monitoring during vibratory pile removal will be employed for the Level B zone of harassment.
- The crane operator will be instructed to remove piles slowly to minimize turbidity in the water as well as sediment disturbance.
- The operator will "wake up" the pile to break the bond with surrounding sediment by vibrating the pile slightly prior to removal. Waking up the pile avoids pulling out large blocks of sediment, and usually results in little to no sediment attached to the pile during withdrawal.
- Barges will not be anchored over vegetated shallows for more than 24 hours.
- Demolition and construction materials shall not be stored where high tides, wave action, or upland runoff can cause materials to enter surface waters.

11.4 Pile Driving BMPs

BMPs to be employed during pile installation include:

- The contractor will be required to retrieve any floating debris generated during construction. Retrieved debris will be disposed of at an upland disposal site.
- Steel sheet piles and H piles will be used. No creosote-treated, or other chemically treated timber piling will be used.

11.5 Shutdown Zone

The purpose of the shutdown zone is to ensure that noise-generating activities are shut down before Level A (injury) take occurs from:

- low-frequency cetaceans entering the 199 dB SEL_{cum} vibratory pile driving injury zone
- high-frequency cetaceans entering the 173 dB SEL_{cum} vibratory pile driving injury zone
- phocid pinnipeds entering the 201 dB SEL_{cum} vibratory pile driving injury zone
- otariid pinnipeds entering the 219 dB SEL_{cum} vibratory pile driving injury zone

- pinnipeds
- marine mammals entering a 10 m zone around barge and other vessel activity
- weather conditions that reduce visibility of monitors and subsequent detectability of marine mammals, and
- species present without or exceeding take shutdown at level B extent.

11.5.1 Sheet Piles

During vibratory driving and removal of steel sheet piles, Level A take (for cetaceans) can occur out to 47 m/154 ft. (the distance to the 173 dB SELcum isopleth [Level A Zone 3]). During vibratory hammer operation, a 50 m radius shutdown zone will be fully monitored and vibratory driving/removal will shut down at the approach of any cetaceans to this zone (see Appendix C, Marine Mammal Monitoring Plan).

During vibratory driving and removal of steel sheet piles, Level A take (for pinnipeds) can occur out to 19.3 m/63 ft. (the distance to the 201 dB SELcum isopleth [Level A Zone 4]). During vibratory hammer operation, a 20 m radius shutdown zone will be fully monitored and vibratory driving/removal will shut down at the approach of any pinniped to this zone (see Appendix C, Marine Mammal Monitoring Plan).

NMFS has established an in-air noise disturbance threshold of 90 dB_{RMS} (unweighted) for harbor seals, and 100 dB_{RMS} (unweighted) for all other pinnipeds (sea lions).

In-air noise generated during vibratory installation and/or removal of these piles (98 dB at 50 feet) will reach the phocid (harbor seal) threshold (90 dB) at approximately 12.1 meters/40 feet, and is below the otariid (sea lion) threshold (100 dB). Although in-air noise levels are below the otariid threshold level, the 90 dB threshold area will be monitored for all pinnipeds.

The nearest documented harbor seal haul-out site to the SR 302 Purdy Bridge consists of rafts and floats located 3.7 miles to the southwest. The nearest documented California sea lion haul out site consists of mooring buoy off the northwest side of McNeil Island, approximately 10.5 miles south of Purdy Bridge. The nearest documented Steller sea lion haul out site is the Toliva Shoals buoy off the east side of McNeil Island, approximately 13 miles to the south.

11.5.2 H Piles

All Level A injury zones associated with vibratory driving and removal of steel H piles are less than 10 m from pile driving activities. To simplify monitoring during vibratory driving and removal of H piles, a 10 m/33 ft. radius shutdown zone will be fully monitored and vibratory operation will shut down at the approach of any marine mammal to this zone (see Appendix C, Marine Mammal Monitoring Plan).

11.5.3 Needle Guns

NMFS has established an in-air noise disturbance threshold of 90 dB_{RMS} (unweighted) for harbor seals, and 100 dB_{RMS} (unweighted) for all other pinnipeds (sea lions).

The project includes the use of a pneumatic needle gun. In-air noise generated during needle gun use (112 dB at 50 feet) will reach the phocid (harbor seal) threshold (90 dB) at approximately

192 meters/629 feet, and the otariid (sea lion) threshold (100 dB) at 60 meters/200 feet. Both in-air disturbance threshold areas will be monitored for all pinnipeds.

The nearest documented harbor seal haul out site to the SR 302 Purdy Bridge consists of rafts and floats located 3.7 miles to the southwest. The nearest documented California sea lion haul out site consists of mooring buoy off the northwest side of McNeil Island, approximately 10.5 miles south of Purdy Bridge. The nearest documented Steller sea lion haul out site is the Toliva Shoals buoy off the east side of McNeil Island, approximately 13 miles to the south.

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12.0 Arctic Subsistence Uses, Plan of Cooperation

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. A plan must include the following:

(i) A statement that the applicant has notified and provided the affected subsistence community with a draft plan of cooperation;

(ii) A schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation;

(iii) A description of what measures the applicant has taken an/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing; and

(iv) What plans the applicant has to continue to meet with the affected communities, both prior to and while conducting activity, to resolve conflicts and to notify the communities of any changes in the operation.

This section is not applicable. The proposed activities will take place in Washington State. No activities will take place in or near a traditional Arctic subsistence hunting area.

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13.0 Monitoring and Reporting Plan

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.

13.1 Coordination

WSDOT will conduct briefings with the construction supervisors and the crew, and marine mammal observer(s) prior to the start of pile driving to discuss marine mammal monitoring protocol and requirement to halt work.

13.2 Visual Monitoring

WSDOT has developed a monitoring plan that will collect sighting data for each marine mammal species observed during pile driving and removal activities. Monitoring for marine mammal presence will take place 30 minutes before, during and 30 minutes after pile driving and removal.

Marine mammal behavior, overall numbers of individuals observed, frequency of observation and the time corresponding to the daily tidal cycle will also be included. Qualified marine mammal observers will be present on site during pile driving and removal. A monitoring plan is provided in Appendix C.

13.3 Reporting Plan

WSDOT will provide NMFS with a draft monitoring report within 90 days of the conclusion of monitoring. This report will detail the monitoring protocol, summarize the data recorded during monitoring and estimate the number of marine mammals that may have been harassed.

If comments are received from the Regional Administrator on the draft report, a final report will be submitted to NMFS within 30 days thereafter. If no comments are received from NMFS, the draft report will be considered to be the final report.

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14.0 Coordinating Research to Reduce and Evaluate Incidental Take

Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

In-water noise generated by pile removal and driving at the project site is the primary issue of concern relative to local marine mammals. WSDOT has conducted research on sound propagation from vibratory and impact hammers, and plans on continuing that research to provide data and new technologies for future projects.

Marine mammal monitoring will be conducted to collect information on presence of marine mammals within the Level B zones of harassment for this project.

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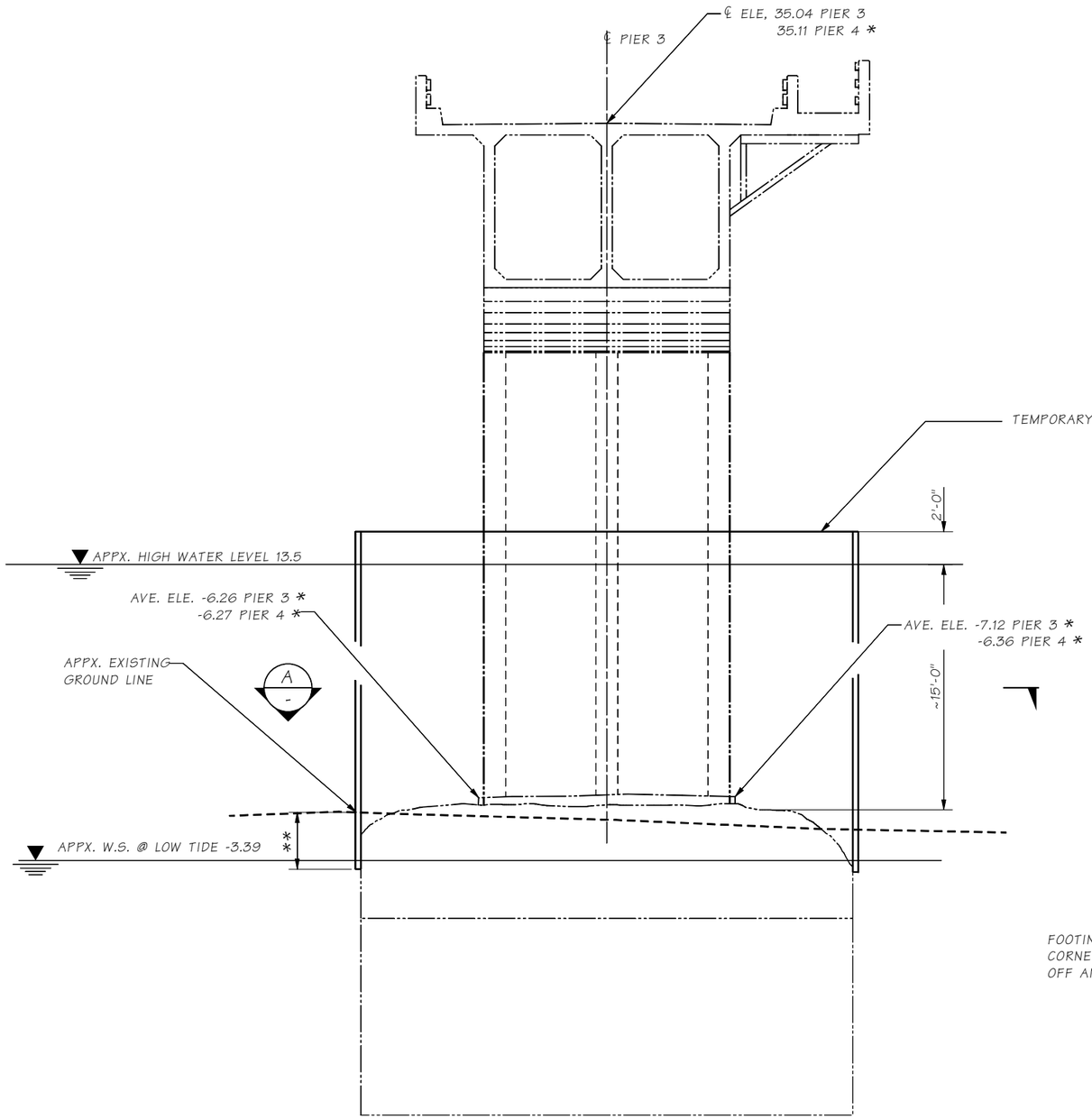
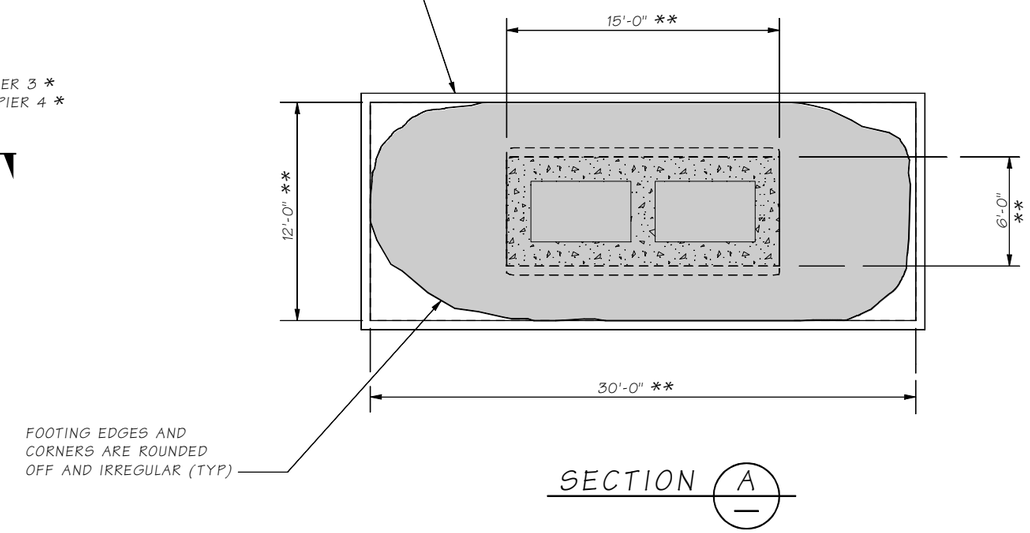
Appendix A
Plan Sheets



PIERS 3 AND 4
ELEVATION



SECTION A
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* DIMENSION OR ELEVATION TO BE VERIFIED BY THE CONTRACTOR
** TO BE DETERMINED BY THE CONTRACTOR

SR ___ FILE NO. ___ SHEET 0

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Supervisor	Stoddard, RB				REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
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Bridge Projects Engr.									
Prelim. Plan By					CONTRACT NO.				
Architect/Specialist		DATE	REVISION	BY	APP'D				

Thu May 24 11:14:12 2018

BRIDGE AND STRUCTURES OFFICE

PRELIMINARY

Washington State Department of Transportation

NOT FOR CONSTRUCTION

SR 302
PURDY BRIDGE
COLUMN REHABILITATION
PURDY BRIDGE NO. 302/105

TEMP. WATER CONTAINMENT SYSTEM

BRIDGE SHEET NO. 0

SHEET OF SHEETS

Appendix B
NOAA Fisheries Marine Mammal Spreadsheet Results

Sheet pile vibratory installation

Source Level (RMS SPL)	165
Number of piles within 24-h period	8
Duration to drive a single pile (minutes)	30
Duration of Sound Production within 24-h period (seconds)	14400
10 Log (duration of sound production)	41.58
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**31.8**	**2.8**	**47.0**	**19.3**	**1.4**

Sheet pile vibratory removal

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	165
Number of piles within 24-h period	16
Duration to drive a single pile (minutes)	15
Duration of Sound Production within 24-h period (seconds)	14400
10 Log (duration of sound production)	41.58
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**31.8**	**2.8**	**47.0**	**19.3**	**1.4**

H pile vibratory installation

Source Level (RMS SPL)	150
Number of piles within 24-h period	8
Duration to drive a single pile (minutes)	30
Duration of Sound Production within 24-h period (seconds)	14400
10 Log (duration of sound production	41.58
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**3.2**	**0.3**	**4.7**	**1.9**	**0.1**

H pile vibratory removal

Source Level (RMS SPL)	150
Number of piles within 24-h period	16
Duration to drive a single pile (minutes)	15
Duration of Sound Production within 24-h period (seconds)	14400
10 Log (duration of sound production	41.58
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**3.2**	**0.3**	**4.7**	**1.9**	**0.1**

Appendix C
Marine Mammal Monitoring Plan

SR 302 Purdy Bridge Rehabilitation Project

Marine Mammal Monitoring Plan

August 2020

In accordance with the July 2020 Washington State Department of Transportation SR 302 Purdy Bridge Rehabilitation Project Incidental Harassment Authorization Request, marine mammal monitoring will be implemented during this project.

Qualified Protected Species Observers (PSOs) will be present on site at all times during pile removal and driving. Marine mammal behavior, overall numbers of individuals observed, frequency of observation, weather, construction, activity, time in zone, direction of travel, and the time corresponding to the daily tidal cycle will be recorded.

The project includes vibratory driving and/or removal of steel sheet piles and H piles. Distances to in-water harassment and injury thresholds (based on NMFS 2018 guidance) are provided in Tables 1 and 2.

Table 1. Level B zone of harassment summary

Zone of Harassment	Activity	Distance	Zone of Harassment Area
Level B Zone 1	Sheet pile installation (underwater)	10 km	17.9 km^2
Level B Zone 2	H-pile installation and removal (underwater)	1 km	1.36 km^2
Level B Zone 3	Vibratory hammer operation (in-air phocids)	38.3 m	0.01 km^2
Level B Zone 4	Needle gun operation (in-air phocids)	192 m	0.06 km^2
Level B Zone 5	Needle gun operation (in-air otarriids)	60 m	0.01 km^2

Table 2. Level A injury zone summary

Activity	Injury Zone	Hearing Group	Distance to Threshold (m)
Sheet pile vibratory installation and removal	Level A Zone 1	Low-frequency cetaceans	31.8
	Level A Zone 2	Mid-frequency cetaceans	2.8
	Level A Zone 3	High-frequency cetaceans	47.0
	Level A Zone 4	Phocid pinnipeds	19.3
	Level A Zone 5	Otariid pinnipeds	1.4
H pile vibratory installation and removal	Level A Zone 6	Low-frequency cetaceans	3.2
	Level A Zone 7	Mid-frequency cetaceans	0.3

Activity	Injury Zone	Hearing Group	Distance to Threshold (m)
	Level A Zone 8	High-frequency cetaceans	4.7
	Level A Zone 9	Phocid pinnipeds	1.9
	Level A Zone 10	Otariid pinnipeds	0.1

Monitoring to Estimate Level B Take Levels and Prevent Level A Take

WSDOT proposes the following Marine Mammal Monitoring Plan in order to prevent Level A injury take, and to estimate Level B harassment take in the harassment zones:

Sheet Pile Installation and Removal

During vibratory driving and removal of steel sheet piles, Level A take (for cetaceans) can occur out to 47 m/155 ft. (the distance to the 173 dB SEL_{cum} isopleth [Level A Zone 3]). During vibratory hammer operation, a 50 m radius shutdown zone will be fully monitored and vibratory hammer operation will shut down at the approach of any cetaceans to this zone (Figure 1).

During vibratory driving and removal of steel sheet piles, Level A take (for pinnipeds) can occur out to 19.3 m/63 ft. (the distance to the 201 dB SEL_{cum} isopleth [Level A Zone 4]). During vibratory hammer operation, a 20 m radius shutdown zone will be fully monitored and vibratory hammer operation will shut down at the approach of any pinniped to this zone (Figure 1).

Level B Zone 1 (17.9 km^2) will be monitored to estimate Level B harassment take during sheet pile installation and removal (Figure 2).

Level B Zone 3 (0.01 km^2) will be monitored to estimate Level B in-air harassment take during all vibratory hammer operation.

The Level B zones also serve as shutdown zones for species not provided take or for which take has been exceeded. Whenever a shutdown occurs, the zone must be clear of marine mammals for 15 minutes before work can continue.

H Pile Installation and Removal

All Level A injury zones associated with vibratory driving and removal of steel H piles are less than 10 m from pile driving activities. To simplify monitoring during vibratory driving and removal of H piles, a 10 m/33 ft. radius shutdown zone will be fully monitored and vibratory hammer operation will shut down at the approach of any marine mammal to this zone (Figure 3).

Level B Zone 2 (1.36 km^2) will be monitored to estimate Level B harassment take during H pile installation and removal (Figure 4).

Level B Zone 3 (0.01 km^2) will be monitored to estimate Level B in-air harassment take of harbor seals during all vibratory hammer operation.

The Level B zones also serve as shutdown zones for species not provided take or for which take has been exceeded. Whenever a shutdown occurs, the zone must be clear of marine mammals for 15 minutes before work can continue.

Needle Gun Operation

Level B Zone 4 (0.06 km^2) will be monitored to estimate Level B in-air harassment take of harbor seals during needle gun operation.

Level B Zone 5 (0.01 km^2) will be monitored to estimate Level B in-air harassment take of sea lions during needle gun operation.

These zones also serve as shutdown zones for species not provided take or for which take has been exceeded. Whenever a shutdown occurs, the zone must be clear of marine mammals for 15 minutes before work can continue.

The following will be implemented daily during monitoring:

- To verify the required monitoring distance, the Level A injury zones and Level B harassment zones will be determined by using a range finder or hand-held global positioning system device.
- The Level A injury zones and Level B harassment zones will be monitored for the presence of marine mammals 30 minutes before, during, and 30 minutes after any pile removal activity.
- Monitoring will be continuous unless the contractor takes a significant break, in which case, monitoring will be required 30 minutes prior to restarting pile removal.
- If marine mammals are observed, their location within the Level B harassment zones, and their reaction (if any) to pile removal or driving activities will be documented.

Monitoring to Prevent Killer Whale (Southern Resident and Transient) and Humpback Whale Take

WSDOT proposes the following measures to prevent killer whale and humpback whale Level B acoustical harassment take:

- If killer whale or humpback whale (as identified by Orca Network, NMFS or another qualified source) approaches the relevant Level B zone of harassment during pile removal or driving, work will be paused until these species exit the Level B zone of harassment to avoid harassment take.

Minimum Qualifications for Protected Species Observers

Qualifications for PSOs include:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance. Use of binoculars may be necessary to correctly identify the target.
- Experience or training in the field identification of marine mammals (cetaceans and pinnipeds).

- Sufficient training, orientation or experience with the construction operation to provide for personal safety during observations.
- Ability to communicate orally, by radio or in person, with project personnel to provide real time information on marine mammals observed in the area as necessary.
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Writing skills sufficient to prepare a report of observations that would include such information as the number and type of marine mammals observed; the behavior of marine mammals in the project area during construction, dates and times when observations were conducted; dates and times when in water construction activities were conducted; dates and times when marine mammals were present at or within the Level B acoustical harassment zone; dates and times when pile driving or removal was paused due to the presence of marine mammals.

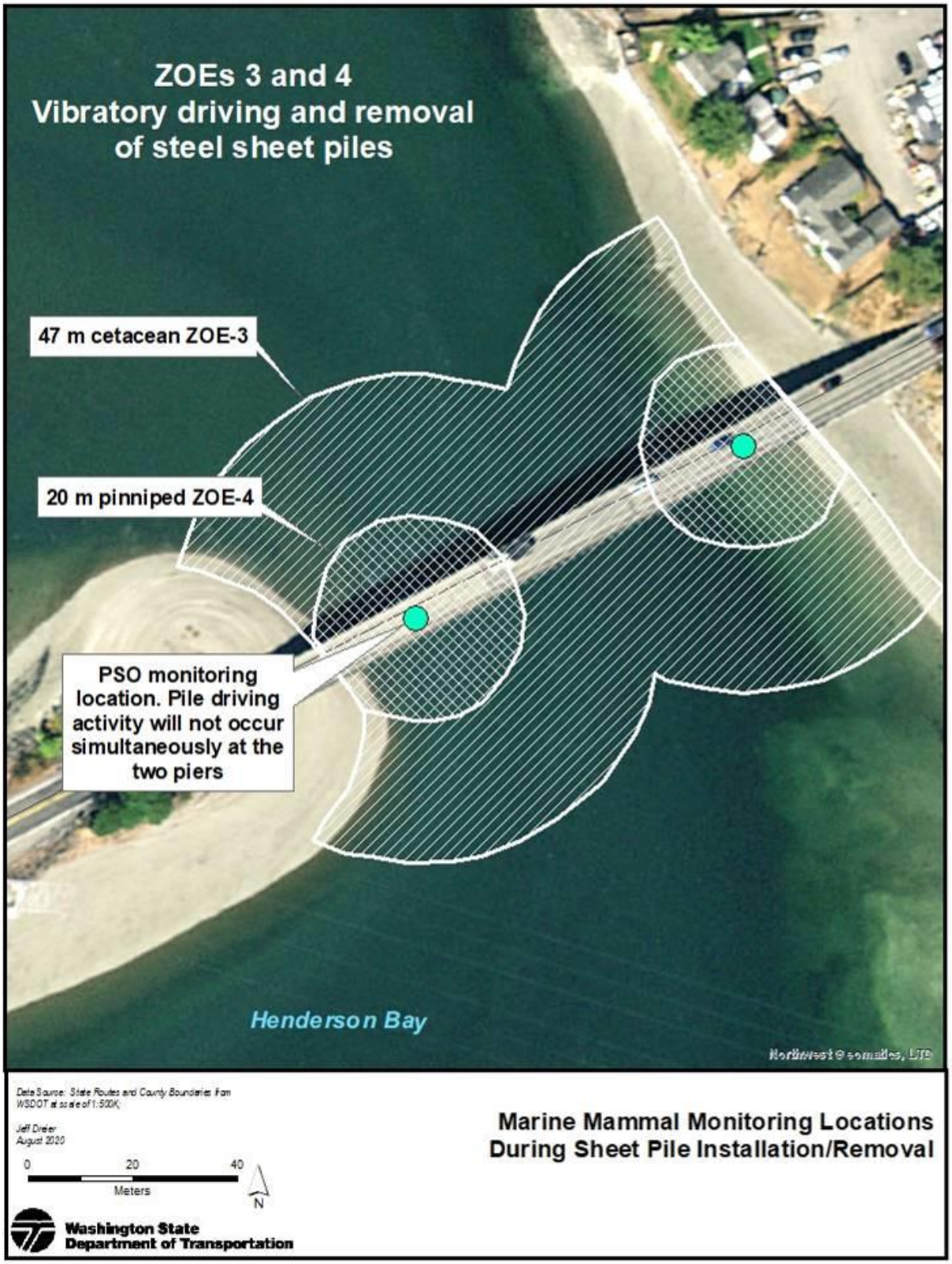

Figure 1. Level A Zones 3 and 4 monitoring locations during vibratory installation or removal of sheet piles.

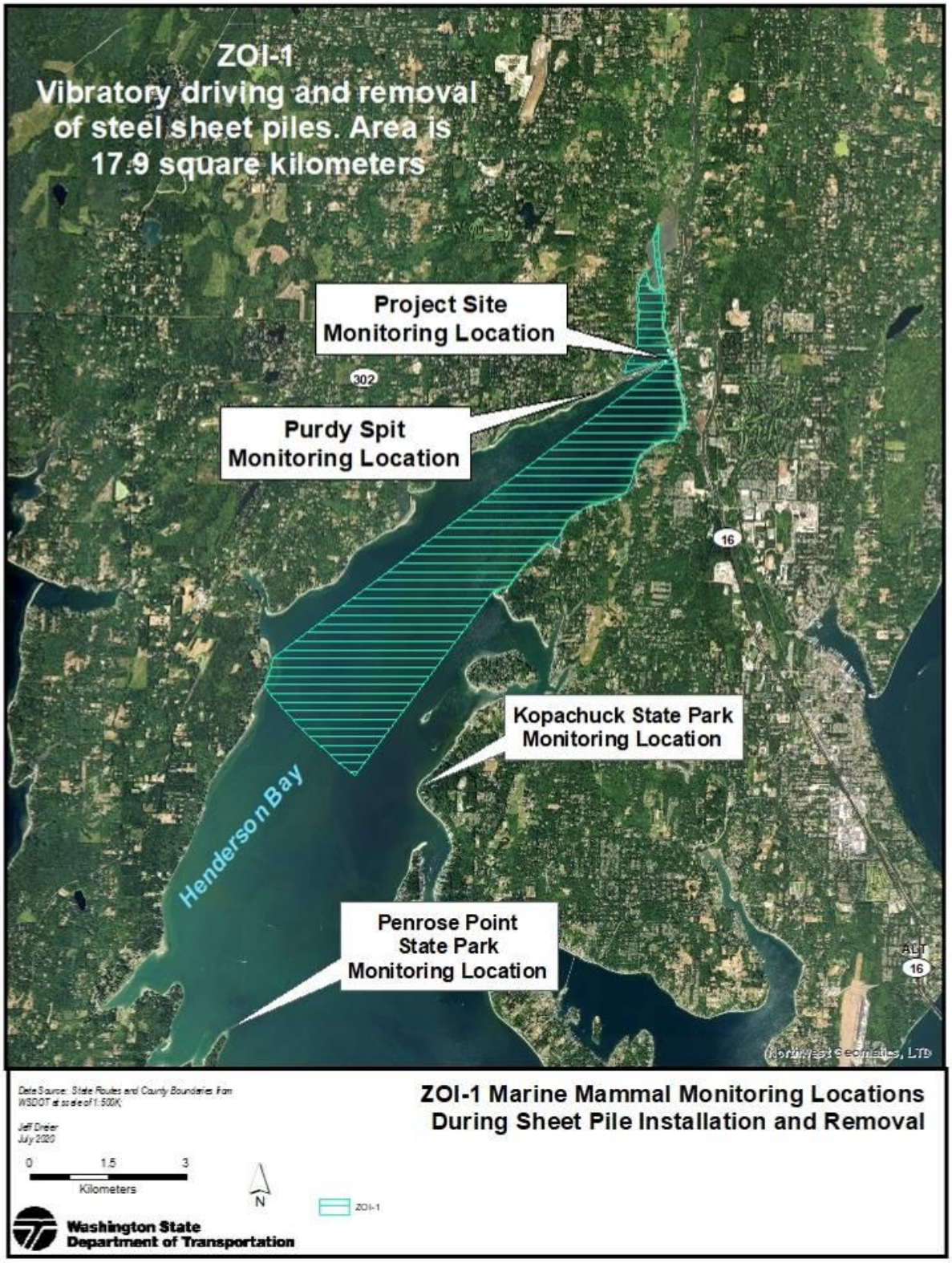

Figure 2. Level B Zone 1 monitoring locations during vibratory installation or removal of sheet piles.

Figure 3. Level A Zone monitoring locations during vibratory installation or removal of steel H piles.

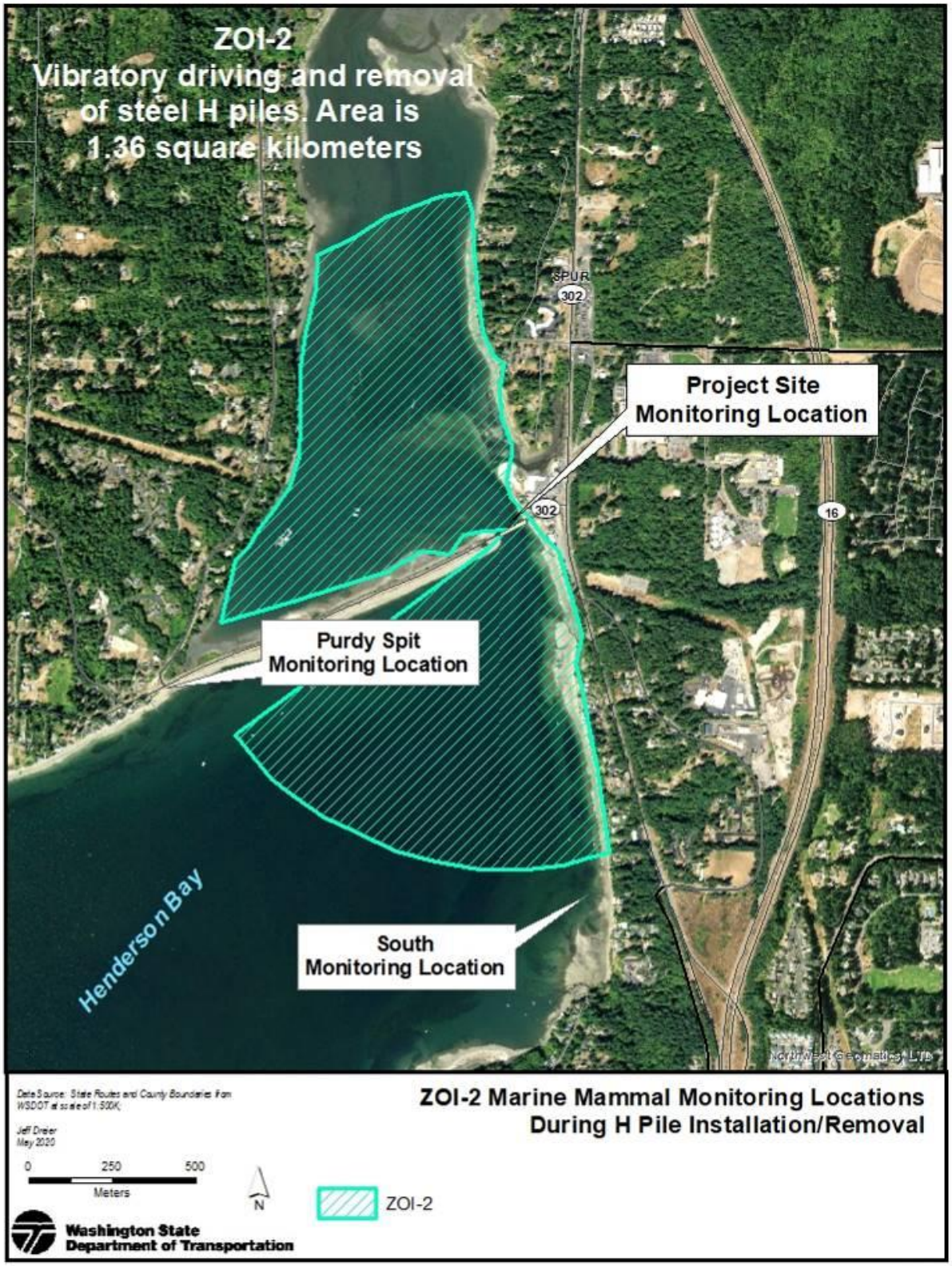

Figure 4. Level B Zone 2 monitoring locations during vibratory installation or removal of steel H piles.