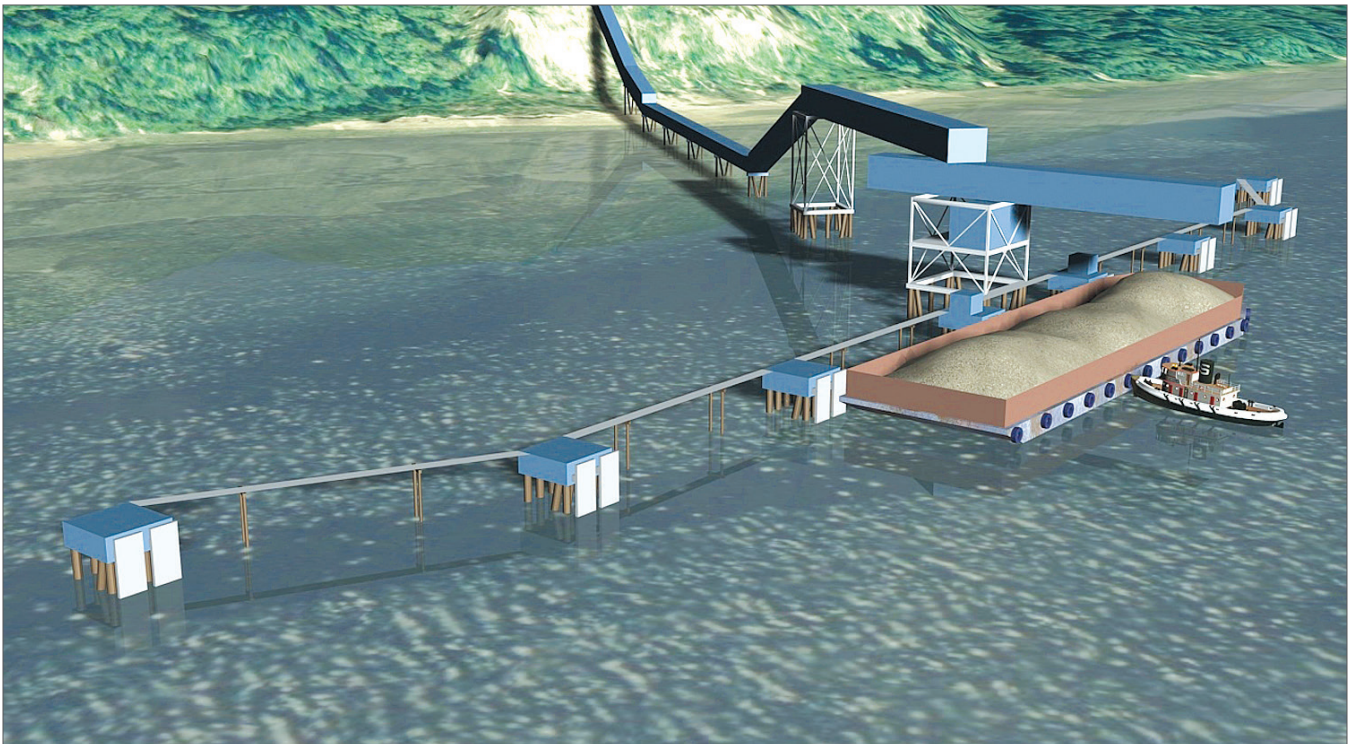


Draft Environmental Impact Statement

Thorndyke Resource



Jefferson County
Department of Community Development

June 25, 2014



Cover image credits: Applicant
Counterclockwise: Thorndyke Resource Proposed Pier schematic, active mining operations, conveyor,
covered conveyor crossing road, barge under Hood Canal Bridge eastern span.

FACT SHEET

Project Title

Thorndyke Resource

Description of Proposal

Construction and operations of various conveyor systems (Little Wahl, Wahl, Central) and load-out pier facility (Pier) to allow for marine transportation of sand and gravel from a designated mineral resource area (Meridian Extraction Area) to local, regional, intrastate and interstate markets (e.g. Port Angeles, Seattle, Vancouver WA, California). A new sand and gravel processing area (Operations Hub) located on 100-acres at where the old Shine Pit had existed, would be constructed and operated.

The Central Conveyor would extend from the Operations Hub located four miles inland to the shoreline of Hood Canal. The Pier would be designed to serve both barges and ships, would extend 990-feet into Hood Canal. Pier operations would be implemented in phases, initially utilizing barges, and then ships when there become available. The Applicant estimates annually at full production (estimated year 25 after construction of the Pier) they would load 6.75-million tons (US short), on to barges (4 mill. tons) and ships (2.75 mill. tons), subject to market demand.

Alternatives included in this Draft EIS include “No Action”.

Location of Proposal

The Central Conveyor will extend from the existing Thorndyke Shine Operations Hub (portions of Sections 6, 7, 8, 17, 18, 19 Township 27 North, Range 1E, WM) through the Thorndyke Block of the Hood Canal Tree Farm and one applicant-owned shoreline parcel to the shore of Hood Canal. The pier would be located approximately five miles southwest of the Hood Canal Bridge.

Project Proponent

Hood Canal Sand and Gravel, LLC dba Thorndyke Resource
17791 Fjord Drive N.E., Suite 130
Poulsbo, WA 98370

Date of Implementation

Initial operations are expected to commence approximately one year after authorization and issuance of required permits.

Lead Agency

Jefferson County Department of Community Development
621 Sheridan Street
Port Townsend, WA 98368
Telephone: 360.379.4450

Responsible Official

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Jefferson County File Numbers

MLA03-00155, ZON03-00017, and SDP03-00007

Required Permits and Approvals

Construction of the Central Conveyor and Pier will require permits from Jefferson County, the State of Washington and the U.S. Government, as follows:

Central Conveyor and Pier***Jefferson County***

Zoning Conditional Use Permit
Shoreline Substantial Development Permit
Shoreline Conditional Use Permit
Building Permit
Right-of-Way Use Permit (Thorndyke Road crossing)
On-Site Sewage System Permit, Group B Public Water System Approval

State of Washington

Hydraulics Project Approval (HPA) – Department of Fish and Wildlife
Aquatics Land Use Authorization – Department of Natural Resources
Forest Practices Permit/Forestry Service Road – Department of Natural Resources
Section 401 Water Quality Certification – Department of Ecology
Coastal Zone Management Certification – Department of Ecology
Expansion of Stormwater NPDES Permit – Department of Ecology
Water Rights Approval – Department of Ecology

U. S. Army Corps of Engineers

Rivers and Harbor Act/Section 10 Permit, including:

- NEPA Review
- National Historic Preservation Act/Section 106 Review Endangered Species Act/Section 7 Consultation
- Essential Fish Habitat (EFH) Review

Clean Water Act/Section 404 Permit

Tribal Nations

The Jamestown S’Klallam, Lower Elwah S’Klallam, Port Gamble S’Klallam, Skokomish and Suquamish Tribal Nations are cooperating agencies for federal NEPA review.

Surface Mining

Additional permits from Jefferson County and the State of Washington will also be required for expanding sand and gravel mining into the Meridian Extraction Area.

Adoption of Existing Environmental Documents

The following documents are adopted as part of this EIS:

- *Jefferson County Comprehensive Plan Amendment Environmental Analysis for Adoption of Mineral Resources Land Overlay (MLA 02-035: Fred Hill Materials), March 2004*
- *U.S. Navy NAVSEA NUWC Keyport Range Complex Extension Final EIS/OEIS, May 2010*
- *U.S. Navy Trident Support Facilities Explosive Handling Wharf (EHW-2) Final Environmental Impact Statement, March 2012*

Authors and Principal Contributors

This Draft EIS has been prepared under the direction of the Jefferson County Department of Community Development. Research and analysis was provided by the following firms:

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Longshore Sediment Transport

Wetlands

Noise (Human receptors)

Aggregate Resource, Hydrogeology

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Team 4 Engineers 5819 NE Minder Road, Poulsbo, WA 98370	Preliminary Engineering, Drainage

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Parsons Brinckerhoff 999 Third Avenue, Suite 3200, Seattle, WA 98104	Air Quality, Noise

Date of Issue of Draft EIS

June 25, 2014

Date Comments on Draft EIS are Due

August 11, 2014

Date and Location of Open House on Draft EIS

Monday, August 4, 2014 from 5:30 p.m. to 8:00 p.m.

Port Ludlow Bay Club
120 Spinnaker Place
Port Ludlow, WA 98365

Date Planned for Final Action

The Jefferson County Department of Community Development will set a date for a public hearing before the Jefferson County Hearing Examiner on this project in conjunction with issuance of the Final EIS. Notice of the public hearing will be provided to all parties of record and will be published in the Jefferson County/Port Townsend Leader.

Subsequent Environmental Review

Review of this project pursuant to the National Environmental Policy Act will be required as part of consideration of subsequent federal permits and approvals.

Location of Draft EIS and Background Data

Jefferson County Department of Community Development
621 Sheridan Street
Port Townsend, WA 98368
Telephone: 360.379.4940

Electronic copies of this Draft EIS are available to download and print at the Jefferson County website:

<http://www.co.jefferson.wa.us/commdevelopment/FHMhome.htm>

<http://www.jeffersonco-treis.info/>

Cost of Draft EIS

Copies of the Draft EIS and Technical Appendices on a CD are available for \$2.50; these documents may also be viewed and downloaded from the Jefferson County websites as noted above.

Persons interested in purchasing a copy of the Draft EIS on CD should contact David Johnson at (360) 379-4465 or email: djohnson@co.jefferson.wa.us.

Printed copies may be purchased at SOS Printing located at 2319 Washington Street, Port Townsend, WA 98368 and (360) 385-4194.

COVER LETTER

Thorndyke Resource has submitted applications to Jefferson County requesting approval of a zoning Conditional Use Permit, Shoreline Conditional Use Permit and Substantial Development Permit to allow construction and operation of a Central Conveyor and Pier load-out facility on Hood Canal to enable marine transportation of sand and gravel to local, regional, intrastate and interstate markets (Proposed Action). The mining and processing components of the project would be located within commercial forest lands (Thorndyke Block of the Hood Canal Tree Farm) within a Commercial Forest zoning district. The Pier and a portion of the Central Conveyor would be located on undeveloped waterfront residential property on the western shore of Hood Canal (Rural Residential zoning district), approximately five miles south of the Hood Canal Bridge. The site on the Hood Canal shoreline lies within “Conservancy” and “Aquatic” Shoreline Designations in the Jefferson County Shoreline Master Program.

For purposes of analysis, the applicant has divided the proposed project into five major components:

- Surface mining in the Meridian Extraction Area
- Operations Hub – processing, storing, and loading material onto conveyor
- Central Conveyor – transports material to the Pier
- Pier – loading of barges and ships
- Marine Transportation – from the Pier to local, interstate and intrastate markets

This Draft Environmental Impact Statement (DEIS) identifies those aspects of the Proposed Action and the No Action Alternative that have a probable significant risk of an adverse environmental impact, and evaluates the extent to which those impacts can be mitigated or are unavoidable. Jefferson County is the SEPA lead agency.

This EIS is intended to provide information—it does not represent a decision regarding approval of the project. Following completion of the EIS process and public hearings on the project applications, a decision will be made to approve the project, approve the project with conditions, or deny the project. Any approval of the project will also require further Jefferson County design-level permits prior to construction and operation of any of the Proposed Action’s components.

The Draft EIS represents the second formal opportunity, following initial formal scoping process in 2007 for public participation in the decision-making process. Jefferson County is now soliciting comments on this DEIS, including comments addressing the adequacy of DEIS analyses and conclusions regarding probable significant adverse environmental impacts, study methodologies, reasonable alternatives and possible mitigation measures.

Written public comments on the DEIS will be accepted for a 45-day comment period (address below) beginning on **June 25, 2014**, and ending at **5:00 p.m. on August 11, 2014**. Written and oral comments will also be accepted at a public meeting; date and time to be determined.

At conclusion of the comment period, Jefferson County will prepare and issue a Final EIS (FEIS), including responses to comments received and any additional analysis necessary to adequately evaluate the proposal. Following completion of the FEIS, a public hearing on the Jefferson County applications will be held by the Jefferson County Hearing Examiner. The hearing will take formal testimony from the Department of Community Development (including its staff report), the applicant, the public, and other interested agencies and parties. Upon the closing of the public hearing and comment period, the Hearing Examiner will make a final decision on the zoning Conditional Use Permit (whether to approve, approve with conditions, or deny) and a recommendation to Ecology to either grant or deny the application for the Shoreline Conditional Use and Shoreline Substantial Development permits. Ecology will then review the Shoreline permits, determine if they comply with Shoreline Management Act, and render its final decision approving, approving with conditions or disapproving these permits within 30 days of the date of submittal by local government.

The pier component of the proposed project is also subject to federal permits and licenses that include a separate environmental review under the National Environmental Policy Act (NEPA). If the federal process results in approval of the project but includes significant changes to the project, a Supplemental SEPA EIS may be required by Jefferson County to evaluate the impacts of those changes.

As part of its review of this Draft EIS and the subsequent public hearing on the requested permits, Jefferson County will determine whether the requirements of its development regulations and comprehensive plan, as well as other applicable local, state, or federal laws and rules, are adequately analyzed and met. As a condition of any approval, the County will require that the Proposed Action be constructed and operated in accordance with the terms of the permits and approvals issued by the various agencies.

Written comments can be sent to:

Thorndyke Resource DEIS c/o
Jefferson County Department of Community Development
621 Sheridan Street
Port Townsend, WA 98368

Or email to: t-roc@co.jefferson.wa.us

Information about the EIS may be obtained at the Department of Community Development by contacting David Johnson between the weekday hours of 9 a.m. to 4:30 p.m. located at 621 Sheridan Street, Port Townsend, WA 98368 and telephone (360) 379-4465.

This DEIS and other information regarding this project also posted online at:

<http://www.co.jefferson.wa.us/commdevelopment/FHMhome.htm>

and

<http://www.jeffersonco-treis.info/>

Published by Jefferson County

This 25 day of June, 2014.



Carl Smith, Director

Acting SEPA Responsible Official

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GLOSSARY OF TERMS

All reasonable, known and available methods of prevention, control and treatment (AKART)

Area of Potential Effects (APE)

Bald and Golden Eagle Protection Act (BGEPA)

Biological Evaluation (BE)

Best Management Practices (BMPs)

Conditional Use Permit (CUP)

Clean Water Act (CWA)

Coastal Consistency Determination (CCD)

Dead weight tons (DWT)

Dissolved Oxygen (DO)

Draft Environmental Impact Statement (DEIS)

Endangered Species Act, 7 U.S.C. § 136, 16 U.S.C. § 1531 et seq. (ESA)

Environmental Designation of Noise Abatement (EDNA)

Environmental Impact Statement (EIS)

Environmental Management System (EMS)

Essential Fish Habitat (EFH).

Extreme Low Tide Mark (ELTM)

Federal Mine Safety & Health Act of 1977 (Mine Act) (Public Law 91-173, as amended by Public Law 95-164)

Final Environmental Impact Statement (FEIS)

Fish and Wildlife Habitat Conservation Areas (FWHCAs)

GeoEngineers, Inc. (GEO)

Geographic Information Systems (GIS)

Hydraulic Project Approval (HPA)

Joint Aquatic Resources Permit Application (JARPA)

Jefferson County Code (JCC)

Jefferson County Department of Community Development (DCD)

Jefferson County Department of Public Works (DPW)

Jefferson County Fire District #3 (FD #3)

Jefferson County Health Department (JCHD)

Jefferson County Ordinance 08-0706-04 (Ordinance)

Jefferson County Public Utility District #1 (PUD #1)

Jefferson County Sheriff Department (Sheriff)

Jefferson County Shoreline Master Program (SMP)

Jefferson County Unified Development Code, Chapter 18 Jefferson County Code (UDC)

Level of Service (LOS)

Magnuson-Stevens Fishery Conservation and Management (MSFCMA)

Marine Mammal Protection Act, 16 USC 1361 et seq., as amended (MMPA)

Marine Operations Plan (MOP)

mean high high water (MHHW)

mean low low water (MLLW)

Migratory Bird Treaty Act (MBTA; 16 USC 703 et seq.)

Mineral Resource Land Overlay (MRLO)

Mine Safety and Health Administration (MSHA)

National Ambient Air Quality Standards (NAAQS)

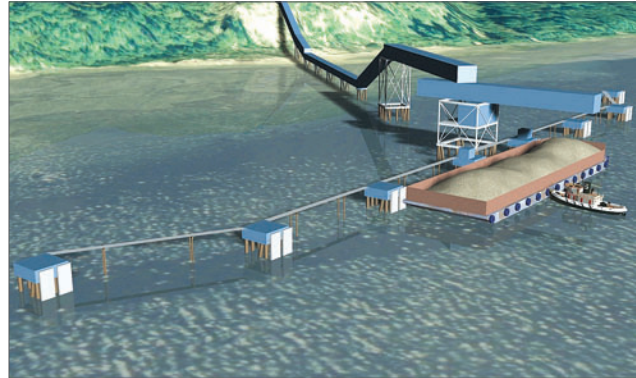
National Environmental Policy Act (NEPA)

National Historic Preservation Act (NHPA)

National Marine Fisheries Service (NMFS)
National Oceanic and Atmospheric Administration (NOAA)
National Pollutant Discharge Elimination System (NPDES)
ordinary high water (OHW)
Occupational Safety and Health Administration (OSHA)
Port and Tanker Safety Act of 1978, 33 USC 1221 et seq., (PTSA)
Ports and Waterways Safety Act of 1972, 33 USC 1221 et seq. (PWSA)
Priority Habitats and Species (PHS)
Puget Sound Harbor Safety Committee (PSHSC)
Request for Qualifications (RFQ)
Safe Water Drinking Act (SWDA)
State Environmental Policy Act (SEPA)
Shoreline Conditional Use Permit (SCUP)
Shoreline Management Act (SMA)
Shoreline Master Program (SMP)
Standards of Care (SOC)
tributyltin (TBT)
Total Suspended Particulates (TSP)
Unified Development Code (UDC)
U.S. Army Corp of Engineers (USACE)
U.S. Coast Guard (Coast Guard)
U.S. Department of Homeland Security (DHS)
U.S. Department of Transportation-Federal Highway Administration (FHWA)
U.S. Environmental Protection Agency (EPA)
U.S. Fish and Wildlife Service (USFWS)
U.S. Mine Safety and Health Administration (MSHA)
U.S. National Ocean & Atmospheric Administration-Marine Fisheries Service (NOAA Fisheries)
U.S. Navy (Navy)
U.S. Occupational and Safety Administration (OSHA)
Vessel Traffic Service – Puget Sound (VTS)
Washington Industrial Safety and Health Act (WISHA)
Washington State Coastal Zone Management (CZM)
Washington State Department of Archaeology and Historic Preservation (WDAHP)
Washington State Department of Ecology (Ecology)
Washington State Department of Fish and Wildlife (WDFW)
Washington State Department of Labor and Industry (DOL)
Washington State Department of Natural Resources (WDNR)
Washington State Department of Transportation (WSDOT)
Washington State Environmental Protection Act, Chapter 43.21C RCW (SEPA)
Washington State Growth Management Act (GMA)
Washington Surface Mining Act (WSMA)
Washington State Olympic Region Clean Air Agency (ORCAA)
Washington State Shoreline Management Act, RCW 90.58 (SMA)
Washington Surface Mining Act, RCW 78.44 and WAC 332-18 (WSMA)
Water Pollution Control Act (WPCA)
Water Resource Inventory Area (WRIA)

CHAPTER 1

Proposed Action and Alternatives



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1.0 Introduction

On March 27, 2003, on behalf of applicant property owners, Fred Hill Materials, Inc. submitted application materials to Jefferson County for the approval of a Central Conveyor and Pier load-out facility on Hood Canal for marine transportation of sand and gravel to local, regional, intrastate and interstate markets.

The project name (aka Central Conveyor and Pier, Thorndyke Resource Operations Complex [T-ROC], or “pit-to-pier”) has since been abbreviated to “Thorndyke Resource” by the two applicant property owners, Hood Canal Sand and Gravel, LLC, and Pope Resources, LP, who authorized the application for the project located on the Hood Canal Tree Farm and adjacent waterfront parcel. In this document, Thorndyke Resource denotes both applicant and project.

In the project application, the applicant formally requested an EIS following pre-application meetings with the Jefferson County Department of Community Development (DCD). The county determined on April 23, 2003 that the application was “substantially complete” and in 2006 selected GeoEngineers as its third-party consultant to assist in its public scoping and environmental review. Formal scoping began in August of 2007. The county staff subsequently met with the applicant, which updated existing technical studies and commissioned new ones.

A summary of the Jefferson County formal scoping process is contained in Appendix B.

This Draft Environmental Impact Statement (DEIS) is a formal State Environmental Policy Act (SEPA) document issued by Jefferson County as the lead agency. It describes the Proposed Action’s affected environment, probable significant adverse environmental impacts and reasonable alternatives; outlines the overall decision-making process and substantive issues identified through the formal scoping process; evaluates direct and indirect impacts within the context of 13 environmental elements and topics, including interdisciplinary analyses; and, summarizes the environmental analysis, scoped issues, cumulative impacts and any reasonable alternatives that would achieve project objectives at a lower environmental cost. The Environmental Impact Statement (EIS) will also, if required, propose and evaluate possible mitigating measures that could become conditions of approval if the requested permits are approved by Jefferson County. The pier component of the proposed project is also subject to federal licenses that include a separate environmental review under the National Environmental Policy Act (NEPA).

This DEIS does not represent the final project decision. As part of the general preparation for an EIS, agencies conduct their environmental review of private proposals at the conceptual stage rather than the final detailed design stage.

This DEIS does not represent the final project decision. As part of the general preparation for an EIS, agencies conduct their environmental review of private proposals at the conceptual stage rather than the final detailed design stage (WAC 197-11-055(4)). Once the DEIS is published, any person or agency has 30 days plus a potential 15-day extension in which to review and comment (WAC 197-11-455 (6)(7)). A Final EIS (FEIS) will then be prepared and include responses to comments received on the DEIS.

This environmental information, together with applicable regulations and other relevant information, will be used by state and county agencies in making a decision to approve, approve with conditions, or deny the requested permits.

1.1 Applicant's Project Objective

To build a Central Conveyor and Pier to move sand and gravel from upland mining operations to a shoreline load-out facility for transport by barges and ships. (See Figure 1-1) As examples, the applicant cites market destinations such as Port Angeles (local), Puget Sound (regional), Vancouver, WA (intrastate) and Oregon, California and Hawaii (interstate).

Vicinity Map The project would be located in rural Jefferson County on a commercial tree farm adjacent to an applicant-owned property on Hood Canal.



1.2 Project General Location

The proposed project is located in east Jefferson County, WA on the Upper Coyle Peninsula north of the Toandos Peninsula. (See Figure 1-2) Situated south and west of the Hood Canal Bridge, the proposed project is located in the Thorndyke Block of the Hood Canal Tree Farm commercial forestlands and on an adjacent waterfront property and associated Class II tidelands owned by the applicant.



Proposed Pier Location Northern Hood Canal

The proposed pier would be located on the western shore of Hood Canal, approximately 5 miles south of the Hood Canal Bridge; 2.7 miles north of Naval Base Kitsap-Bangor's northernmost land boundary; 1.25 miles southwest of Southpoint; 1 mile northwest of Thorndyke Bay. See Figure 1-5 for location of proposed project components. **Source:** Google Earth 2013.

For purposes of this environmental analysis, the project's Upland Area connects with the Shoreline Area via an enclosed conveyor overpass near Mile Post 3 of Thorndyke Road, a Jefferson County right-of-way and the primary north-south access for local shoreline communities.

1.2.1 Upland Area Location

Sand and gravel extraction, processing and approximately 3.8 miles of the 4-mile Central Conveyor transport will take place within the Thorndyke Area South portion of the Hood Canal Tree Farm. Initial mining will be conducted within the Meridian Extraction Area, part of an approved Mineral Resource Lands Overlay (**MRLO**). An Operations Hub will be reconfigured where the old Shine Pit operated. Also located within the Upland Area are the Central Conveyor's Twin Conveyors and initial segment of the Single Conveyor.

1.2.2 Shoreline Area Location

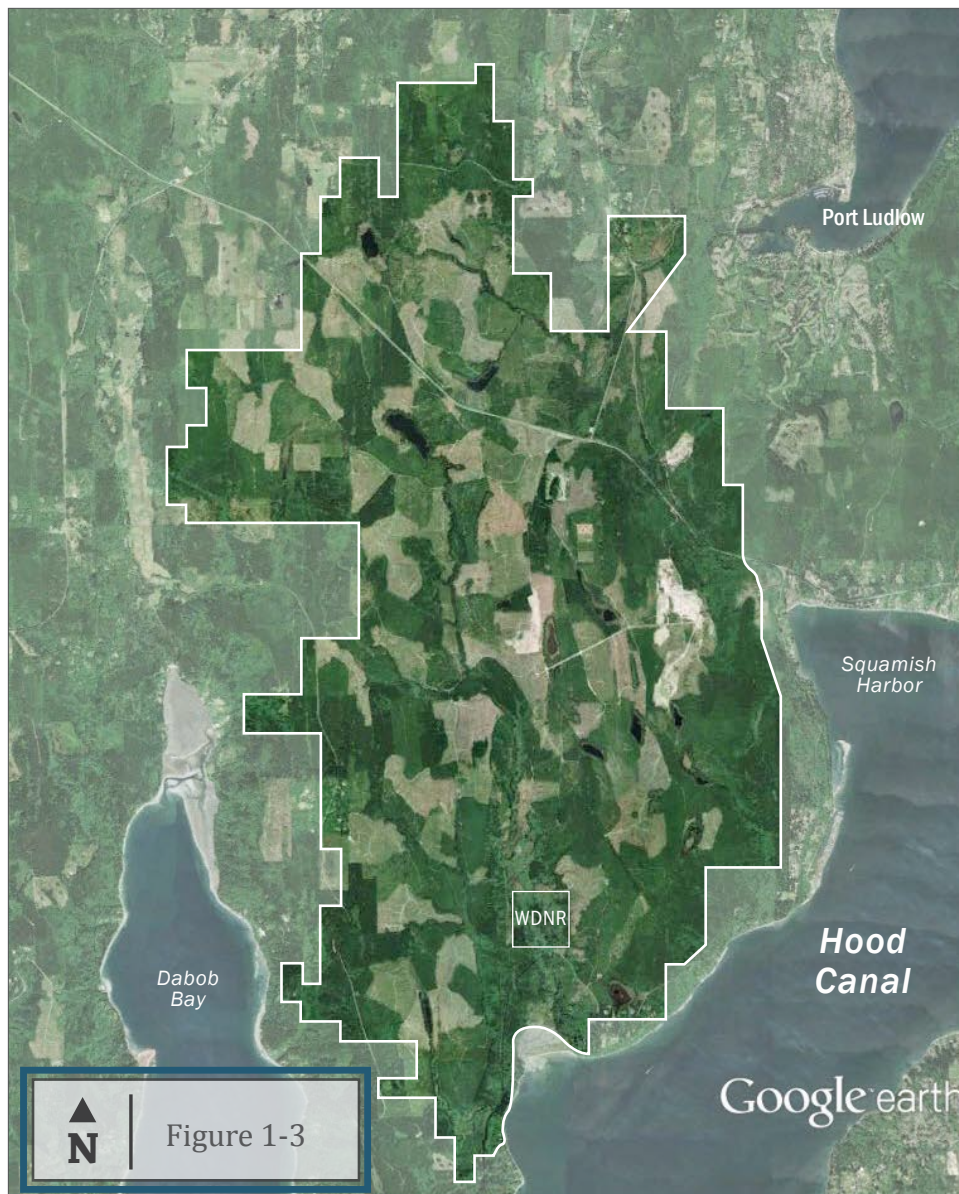
The remaining Central Conveyor and proposed Pier are located within the project's Shoreline Area, which includes 42 acres of the Hood Canal Tree Farm adjacent to the 14.7-acre waterfront parcel. The Pier would be built on Class II tidelands of the waterfront property and extend onto state-owned beds of navigable waters managed by the Washington Department of Natural Resource (**WDNR**). A lease between the **WDNR** and the applicant will be necessary for the portion of the Pier not located on Class II tidelands. An application for such a lease is pending.

By water, the Pier site is situated approximately 12 miles south of Admiralty Inlet and the Puget Sound Shipping lanes; five miles southwest of the Hood Canal Bridge; and, 1.25 miles southwest of South Point and former ferry terminal. The Pier site is approximately 50 miles north of the southern tip of Hood Canal (Belfair); five miles north of the Navy's Delta Pier (located across Hood Canal on the Kitsap side); 2.7 miles north of Kitsap Naval Base Bangor's northernmost land boundary; and, one mile northeast of Thorndyke Bay (Jefferson side). The Pier site is 2.25 miles west of (and across Hood Canal from) Kitsap Memorial Park and the former Lofall ferry terminal, both located on the eastern side of Hood Canal within Kitsap County.

1.3 Existing Thorndyke Block Mining Activities

The Thorndyke Block and its Shine Pit area are longtime sites for commercial forestry and mining (See Figure 1-3). The proposed project's upland processing hub would be situated within Shine Pit while actual mining would be conducted within the Meridian Extraction Area of Thorndyke's 690-acre approved **MRLO** approved in 2004.

Overall, the Thorndyke Block comprises 20,901 acres of Hood Canal Tree Farm's overall 71,762 acres, most of which (46,252 acres) are located in Jefferson County. Divided by State Route 104, the Thorndyke Block has been site to both basalt/black rock and granite mining operations since the 1950s as part of Jefferson County's long-term commercially significant forestry resource zones, which collectively include 300,000-plus acres where mining is an allowed use.



Thorndyke Block Approximate Perimeter

The Proposed Action is located within the 20,901-acre Thorndyke Block of the Hood Canal Tree Farm (71,762 total acres), a privately owned commercial forest on designated GMA resource lands. Proposed project components represent approximately 700 acres (3.5 percent) of the overall Thorndyke Block. **Source:** Google Earth 2013. **Note:** Illustration shows DNR land block and excludes small privately owned forest lands within the Hood Canal Tree Farm.

Various ongoing mining operations reside within the north and south areas of the Thorndyke Block. Of the 20,901 acres within the Thorndyke Block, approximately 50 acres are being actively mined between various mining operators at any one time. Overall, approximately 1,050 acres are designated and/or permitted for mining extraction and processing.

Thorndyke Area North (6,102 acres) is predominantly a site for basalt quarrying, which involves blasting. In this area, Mason Quarry (formerly Shine Quarry) has mined under various operators since 1957. Iron Mountain Quarry, adjacent to Mason Quarry and south of Port Ludlow, has been permitted by Jefferson County for the basalt New Shine Quarry.

Shine Pit, located in the Thorndyke Area South (14,799 acres), is largely devoted to granite surface mining, which does not involve blasting. Port Orchard Sand and Gravel Company, a part of Miles Sand and Gravel (Miles), has shut down its Shine Pit operations and has moved to its newly built Wahl Lake operations hub, located a mile-plus west from old Shine Pit and just north of the Wahl Extraction Area. In addition to sand and gravel processing and truck delivery, Miles received permits to build concrete and asphalt batch plants at its Wahl Lake operations hub, which is accessed by a reconfigured forestry service road (T-1000) just north of the SR 104/SR 19 intersection (JeffCo BLD11-00063). Currently, the asphalt batch plant has begun operations

Smaller mining operations also exist within the Thorndyke Area South. Seton Construction mines sand and gravel near the SR 104/SR19 intersection. Pope Resources operates multiple borrow pits smaller than three acres in various locations within its holdings to build and maintain its forestry service roads.

The proposed Thorndyke Resource extraction, processing and primary conveyor transport project components are located in Thorndyke Area South.

1.3.1 Shine Pit Mining Activity

Shine Pit was an approximately 200-acre site within the Thorndyke Area South. Situated south of SR 104 and accessed by forestry service (“Rock-to-Go”) road T-3100, the Shine Pit vicinity has been a sand and gravel extraction and processing site for truck delivery to local markets in the Kitsap and Olympic peninsulas since 1959, when the deposit was established to provide sand and gravel for construction of the Hood Canal Bridge and expansion and maintenance of SR 104.

See History of Shine Pit in Appendix A: Original T-ROC Application.

Since that time, various truck-based operators have mined sand and gravel at Shine Pit. In 1976, Fred Hill Materials took over operation of Shine Pit and in 1979 obtained a Surface Mine Reclamation permit issued by **WDNR**. A panorama of the Shine Hub at the height of activity was taken in 2006 (See Figure 1-4). In 2009, Fred Hill Materials sold its truck-based (delivery by truck) Shine Pit mining operation to Miles Sand and Gravel. As part of the sale, Miles secured leased rights for truck-based mining in the Wahl Extraction Area while Thorndyke Resource secured leased rights for marine-based (delivery by barges and ships) mining within the Meridian Extraction Area.

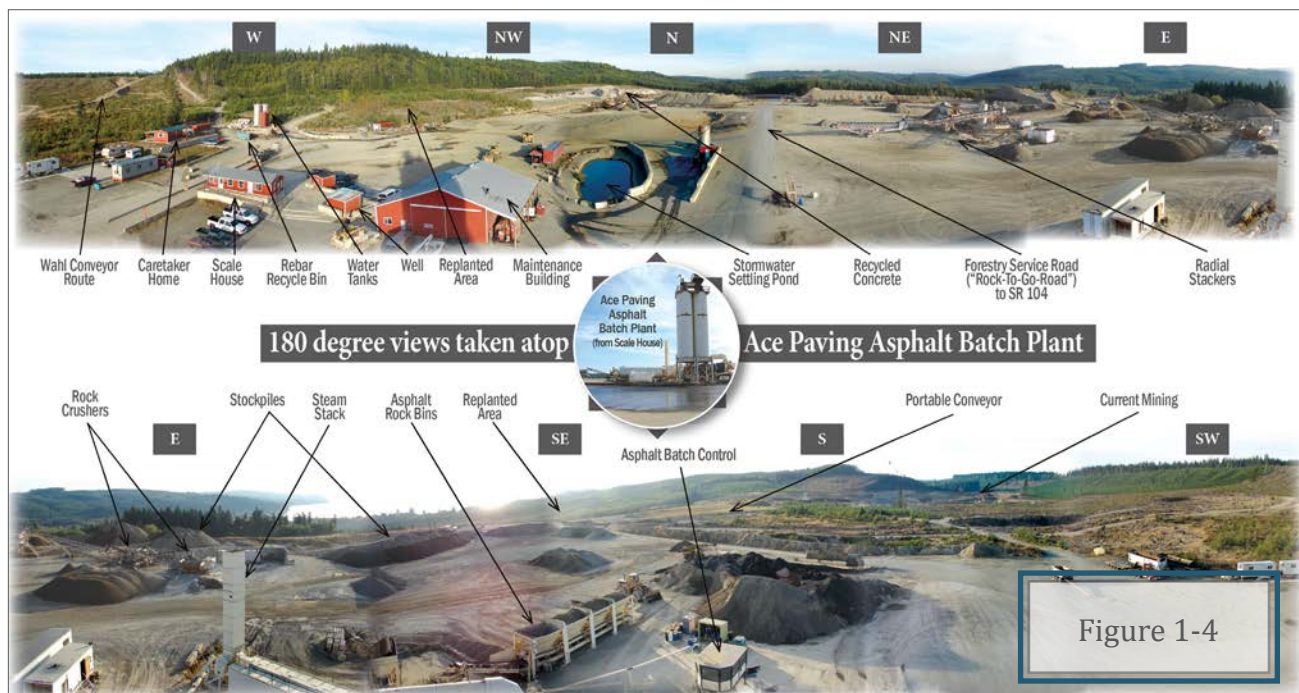
Upon moving west to its new Wahl Lake hub, Miles is reclaiming the Shine Pit area and no longer use Rock-to-Go Road for truck delivery of aggregates from Shine Pit to SR 104. A settlement agreement between the property owner and Washington State Department of Transportation (**WSDOT**) clarified and limited access to SR 104 from Shine Pit, including prohibiting truck delivery of aggregate (WSDOTROCK 2012). Vehicles utilizing Rock-to-Go Road will predominantly be employees of Thorndyke Resource working at the Operations Hub or Meridian Extraction Area. It is anticipated that the now closed Shine Pit portable asphalt plant will be removed in the near future.

The project application has been modified, as outlined in 1.4 Proposed Action. Historically, the Shine Pit area has consisted of components comparable to those identified in the 2003 Thorndyke Resource project application:

1. Shine Pit sand and gravel extraction area;
2. Shine Hub, including
 - portable crushing, washing, and sorting equipment for sand and gravel
 - portable equipment for recycling of concrete waste
 - stockpile areas
 - trucks and loaders
 - scale house, maintenance building, caretaker home, well, and outbuildings
 - Rock-To-Go access road (forestry service road T-3100) to SR 104;
3. Portable conveyors used to move sand and gravel from the extraction area to the Hub;
4. Asphalt batch plant;
5. Mined acreage in various stages of use and reclamation

Shine Pit operations were conducted under the requirements of the following permits and/or regulations:

- Mining permit (4502816), United States Department of Labor, Mine Safety and Health Administration (MSHA)
- Mine Reclamation permit (70-011936), WDNR
- National Pollution Discharge Elimination System (NPDES) General Sand and Gravel permit (WAG 50-1120), Washington Department of Ecology (Ecology)
- Recycled solid waste requirements, Ecology
- Air Quality permits, Washington State Olympic Region Clean Air Agency (ORCAA)
- Administrative Type 1 stormwater permits, Jefferson County DCD
- Recycled solid waste requirements, Jefferson County Health Department (JCHD)
- On-site septic permit, JCHD



Shine Hub This panorama view taken in October of 2006 from the top of the asphalt batch plant depicts 191.5 acres (102 replanted and 89.5 for processing and active mining) of then-existing Shine Pit operations. To continue growth of existing operations, the Wahl Conveyor route (upper left) led to future mining areas one mile behind the ridge, including the Meridian Extraction Area.

The portable asphalt batch plant operating under a sub-leased five acres within the Shine Pit area was also subject to these regulations, including a site-specific **NPDES** sand and gravel permit and an **ORCAA** air quality permit. In addition, Ace Paving Inc. obtained a Jefferson County Conditional Use Permit (**CUP**) (JC ZON98-0041) in 1999.

Surface mining techniques for extraction of Shine Pit's granite aggregate deposits have been small-segment (generally 10 acres) and open-faced (no blasting). Ongoing reclamation processes include re-applying set-aside surface organic layer (topsoil), re-contouring the landscape and replanting trees. The **WDNR** requires a bond from the operator to ensure that the reclamation process is completed within the required time frame.

1.3.2 Mineral Resource Lands Overlay (MRLO)

In April 2002, in anticipation of the depletion of Shine Pit extraction areas, Fred Hill Materials (**FHM**), the truck-based mining operator at Shine Pit at that time, applied to Jefferson County for a **Comprehensive Plan** amendment (Jeffco MLA02-235) designating 6,240 acres as a Mineral Resource Lands Overlay (**MRLO**) within Thorndyke Area South.

Subsequently, FHM reduced its application to 765 acres. On July 6, 2004, after additional SEPA programmatic (non-project) environmental analysis, the Jefferson County Board of Commissioners approved with conditions a 690-acre **MRLO** (JC Ordinance 08-0706-04) west and south of the Shine Pit. The approved **MRLO** consists of Wahl (156 acres) and Meridian (525 acres) extraction areas and a forestry service road easement (9 acres) utilized as a conveyor link ("Wahl Conveyor") crossing logged and replanted commercial forestland to the Shine Operations Hub.

See Appendix B for listing of all condition and factors surrounding the adoption of this MRLO.

While the **MRLO** environmental analysis did not include specific mining proposals, it did evaluate mining impacts and is subject to 15 conditions under Jefferson County **Ordinance** 08-0706-04 for how mining, operations and reclamation would occur under future project-specific permits issued by the **WDNR** and Jefferson County. Notably, Condition 12 of Ordinance 08-0706-04 allows larger segments (up to 40 acres) than what is allowed under Jefferson County Unified Development Code (**UDC**) for mining in forest resource lands under Jefferson County **Comprehensive Plan** and zoning.

1.4 Proposed Action

The Proposed Action is approval of the application to build a Central Conveyor and Pier to move sand and gravel from upland mining operations to a shoreline load-out facility for transport by barges and ships. As examples, the applicant cites market destinations such as Port Angeles (local), Puget Sound (regional), Vancouver, WA (intrastate) and Oregon, California and Hawaii (interstate).

The applicant has provided a project description identifying five primary components divided by Upland and Shoreline areas. These components are defined at a level of detail necessary to identify probable significant adverse impacts:

UPLAND AREA

1. Mining
2. Operations Hub
- 3a. Central Conveyor (begins')

SHORELINE AREA

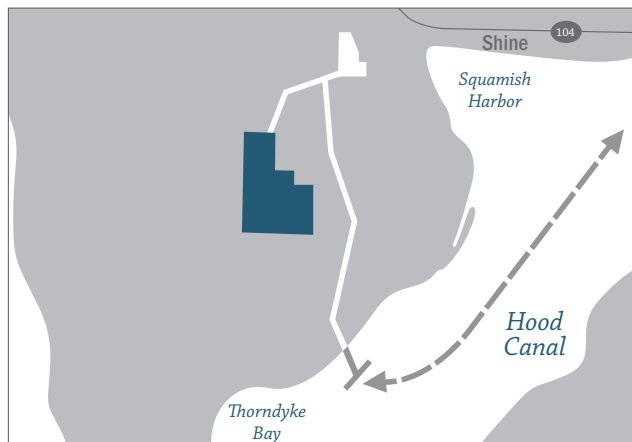
- 3b. Central Conveyor (ends')
4. Pier
5. Marine Transportation

* The Upland and Shoreline project areas are generally divided by Thorndyke Road, where an enclosed section of the Single Conveyor (part of Central Conveyor) crosses overhead.



Project Components

The proposed project's five primary components are generally divided into Upland and Shoreline areas by Thorndyke Road. Mining would occur within the 525-acre Meridian Extraction Area and transported via a Wahl Conveyor for processing at a reconfigured 100-acre Operations Hub. A four-mile Central Conveyor would carry sand and gravel to the proposed pier for marine transportation to local, regional, intrastate and interstate markets. **Source:** Applicant. **Note:** Line widths for approximate locations of conveyors and project components are enlarged for clarity.



PROJECT AREA

Thorndyke Area South: Meridian Extraction Area (525 acres), Wahl Conveyor (9 acres).

AS A PROJECT COMPONENT

Begins within the Meridian Extraction Area, loading and transporting via conveyor(s) to an Operations Hub. Extraction or “mining” ends when materials are discharged from the conveyor belt for processing at the Operations Hub.

1.4.1 Mining

The proposed Thorndyke Resource project will initially mine sand and gravel within the Meridian Extraction Area located in an approved **MRLO** (see Figure 1-5). To connect Meridian with the Operations Hub, the applicant intends to abandon and reclaim nearby forestry service road T-2900 and align it with a quarter-mile conveyor that avoids wetlands and connects with the Wahl Conveyor.

The applicant estimates that a sufficient source of sand and gravel is available within Meridian to supply marine delivery for the foreseeable future. According to Condition 12 of the **MRLO** (JC Ordinance 08-0706-04), at no time can the active mining area be greater than 40 acres, and that previously mined acreage must be either reclaimed or in the process of reclamation. (See Figure 1-6) The Washington State Growth Management Act (**GMA**) mandates that mineral resources of long-term commercial significance be identified and conserved for future use (RCW 36.70a.110). However, more rigorous environmental reviews of impacts to critical areas, wetlands, streams, groundwater and wildlife is required at such time as specific mining permits are requested.

As stated in the application, the applicant anticipates that volumes for marine delivery would range from 2 million tons in Year 1 to 6.75 million tons annually by or before Year 25. The applicant notes that this estimate is subject to market demand and the future availability of U.S.-flagged bulk carrier ships on the West Coast.

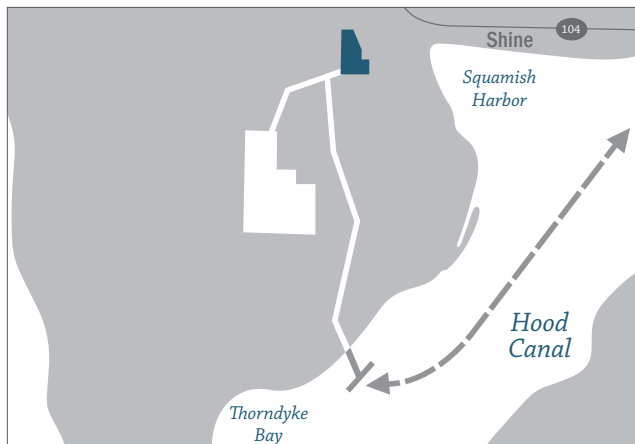


Mining would be conducted in the Meridian Extraction Area approximately 1-1/2 miles inland from former Shine Pit processing areas (shown above). Meridian is situated on an approved Mineral Resource Lands (MRL) Overlay.



Figure 1-6

Mining and Reclamation Prior to active mining, the thin layer of topsoils and vegetation is removed and stockpiled for reclamation. Once mining in a designated extraction area is completed, the land is recontoured, the surface organic layer is reapplied and trees are planted. The WDNR requires a performance security (bond) to ensure the reclamation process is completed. **Source:** Applicant photos.



PROJECT AREA

Thorndyke Area South, Shine Pit mining area (220 acres) generally; Shine Pit MRL area (144 acres) specifically.

AS A PROJECT COMPONENT

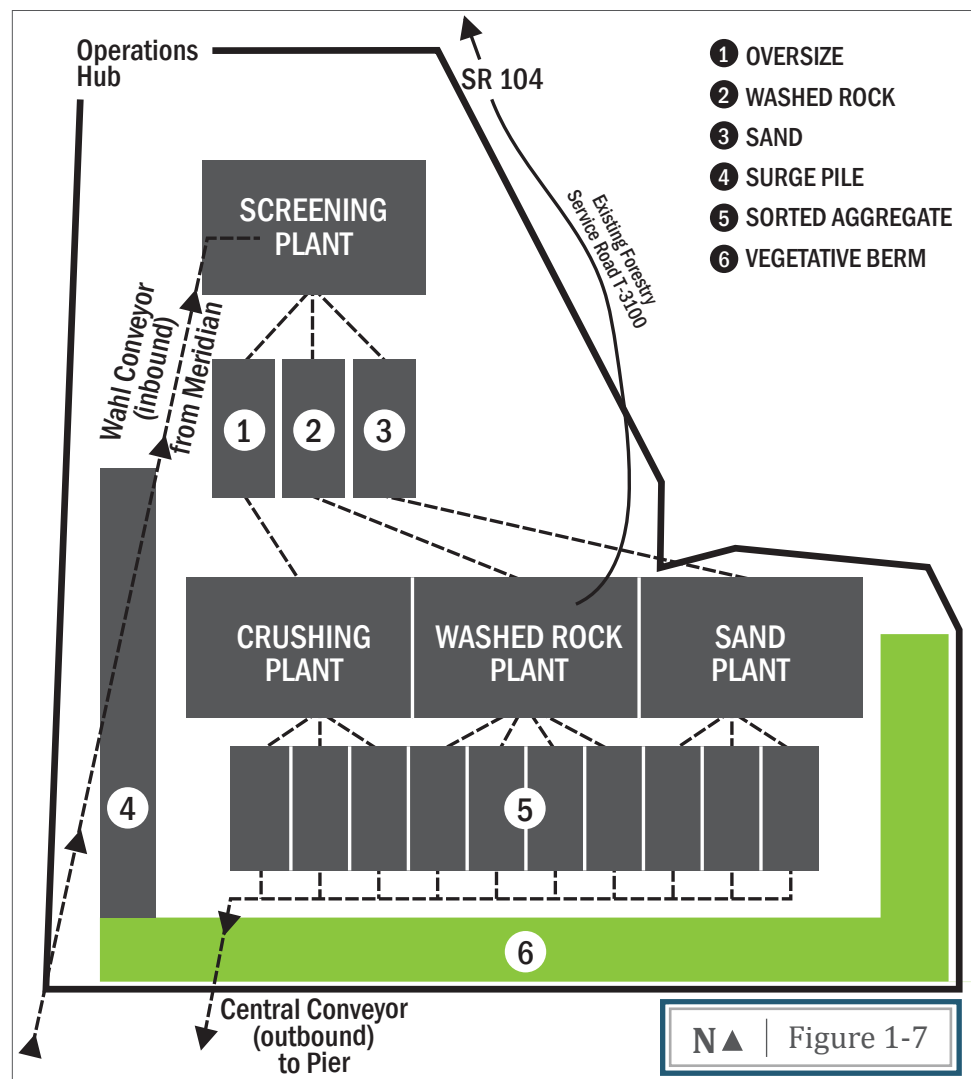
Processing begins when materials are received via conveyor from the extraction area. Ends where processed materials are placed onto the northernmost section of the Central Conveyor.

1.4.2 Operations Hub

The proposed project calls for a 100-acre Operations Hub within the 144-acre Shine Pit MRL (JC Ordinance 09-0525-95). After materials are extracted and transported via conveyor from Meridian, processed sand and gravel at the Operations Hub would be loaded onto the Central Conveyor and transported to barges and ships at the Pier.

The Operations Hub will consist of facilities to handle, process and store sand and gravel. It will include trucks and loaders, stockpile areas, portable conveyors, equipment for crushing, washing, screening and recycling. (See Figure 1-7) Per the agreement between the property owner and WSDOT, employees will continue to have access to the Shine Operations Hub from SR 104 via Rock-to-Go Road, however, hauling of sand and gravel by trucks and trailers would not be allowed.

Operations Hub Bordered in part by a 20-foot vegetative berm, the proposed Operations Hub would be reconfigured within 100 acres of the Shine Pit MRL. Raw materials from the Meridian Extraction Area (via Wahl Conveyor) would be processed and delivered to the proposed pier (via Central Conveyor) for loading onto barges and ships. Per an agreement with WSDOT, Operations Hub employees would continue to have access to/from State Route 104 via Rock-to-Go Road; however, such access is no longer used for truck delivery of sand and gravel. **Source:** Team 4 Engineering and Applicant.



N▲ | Figure 1-7

1.4.3 Central Conveyor

The proposed Central Conveyor moves processed sand and gravel to a load-out Pier on Hood Canal for transport by barges and ships. From the southwest corner of the Shine Pit **MRLO**, the conveyor route traverses designated forest resource lands southward, converting from Twin Conveyors to the Single Conveyor at transfer point #5, just north of Thorndyke Road.

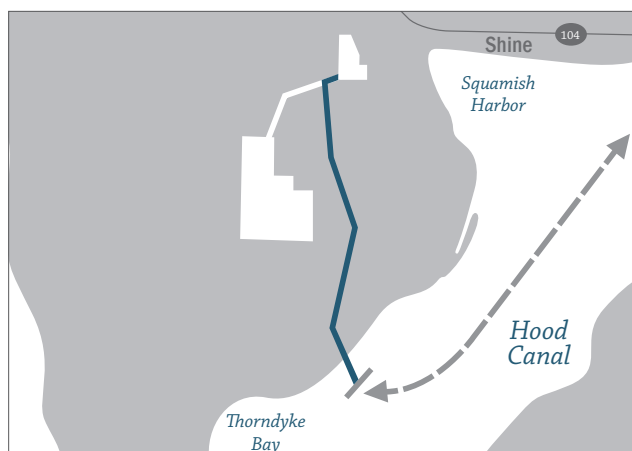
Thorndyke Road consists of two paved lanes within a broader right of way constructed with deep cut-and-fills in the vicinity of Mile Post 3. The Single Conveyor will cross 60 feet overhead within an enclosed overpass that joins Upland and Shoreline project areas. From the overpass, the Single Conveyor will continue on designated forest resource lands onto the adjacent applicant waterfront property and over the shoreline bluff (zoned Jefferson County Rural Residential [RR 1:5]). The Single Conveyor terminates at the end of the Pier. (See Figure 1-8)

The Twin Conveyors are comprised of two five-foot wide conveyors; the Single Conveyor one six-foot wide conveyor. The Central Conveyor will have a minimum two-foot ground clearance below its return belt for wildlife crossings, increasing for larger mammals to four to six feet approximately every 300 feet. At least six feet of clearance will be developed and maintained approximately every 900 feet.

The Central Conveyor route crosses commercial forestlands where logging operations have been conducted since the late 1800s. Pope Resources' motto is "Rooted in the past, growing for the future," (Pope Resources 2003). The Thorndyke Block is on its third and fourth harvest rotations.

The Central Conveyor alignment will utilize major portions of existing forestry service roads T-1950 and T-2930. The applicant intends to abandon, reclaim and replace an estimated total area of 6.3 acres of these roads and construct approximately 7.3 acres of roads (with stormwater controls) that would align more closely with the conveyor route and increase the separation from wetlands.

Conveyor belts will travel on self-lubricating rollers forming a U-shaped trough that carries sand and gravel. Failsafe sensors on each head pulley motor are designed to automatically shut down operation along the entire conveyor system in the event of a belt failure. For further specifications, see the Thorndyke Resource "Central Conveyor and Pier" Facts Sheet.



PROJECT AREA

Thorndyke Block Area South: the Central Conveyor (4.0 miles) consists of Twin Conveyors (3.3 miles) and a Single Conveyor (0.7 miles) within a 60-foot easement extending south from the Operations Hub. The southernmost Single Conveyor crosses overhead at Thorndyke Road onto the project Shoreline Area and terminates at the end of the Pier.

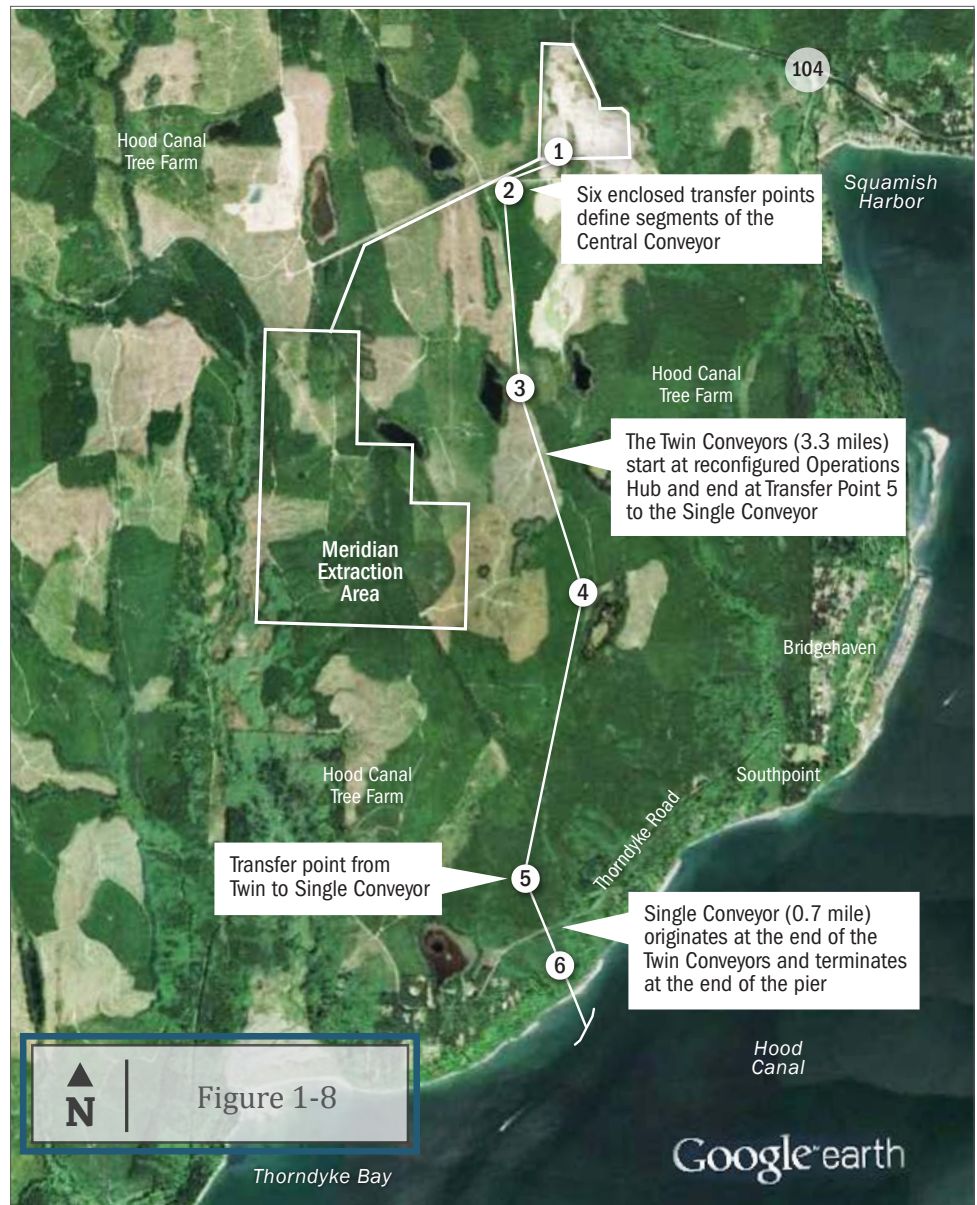
AS A PROJECT COMPONENT

Begins with processed materials being placed onto the Twin Conveyors at the Operations Hub. The Single Conveyor is connected and supported by the Pier structure near the shoreline's Ordinary High Water. Ends at the Pier load-out gantry.

Central Conveyor

The Central Conveyor includes Twin Conveyors and a Single Conveyor connected by six transfer points. Portions of the existing forestry service roads (6.3 acres) would be replaced with maintenance roads (7.3 acres) that avoid wetlands, associated buffers and provide a straighter alignment with the Central Conveyor.

Source: Applicant.



Transfer Points – Each of the six segments of the Central Conveyor will be connected by a transfer point, where sand and gravel from the incoming conveyor segment will drop into a hopper and funnel onto the next conveyor segment. The Central Conveyor will shift direction slightly at transfer points 2, 3, 4, and 5. A utility shed at each transfer point will enclose the conveyor and hopper to protect electrical equipment, contain fugitive dust, and minimize noise. These 12-by-16-foot utility sheds will include a head pulley and electric motor, unpowered tail pulley, hopper and return belt cleaning equipment.

At each of the six transfer points (#s 1, 2, 3, 4 and 5 in the Upland Area; #6 in the Shoreline Area), an automatic sweeper will be used to clean fugitive dust and sediment from the conveyor belts prior to their return loops. After discharging their loads, the

belts are designed to flip 180 degrees prior to returning, thus keeping the “load-side” facing upward to limit fugitive sediment during the belt’s return. Fugitive dust and sediment captured at the transfer points will be re-placed onto the supply feed belt as part of regular maintenance.

Covers – The Central Conveyor belts will have half-moon metal covers to keep out rain and wind as well as inhibit the escape of fugitive dust. Metal roofs/sidings/floors will be used as enclosures over Thorndyke Road and from the shoreline to the end of the Pier. Pans under the return belt will be installed at all stream crossings to contain sediment.

Enclosures – Enclosure designs will depend on the terrain and local conditions along the Central Conveyor route. As the Single Conveyor crosses Thorndyke Road approximately 60 feet overhead, the conveyor will be fully enclosed with a metal roof/siding/solid floor. In the Shoreline Area, the Single Conveyor will be contained with variations of a half-moon metal cover, pan under the return belt, and a metal roof/siding/solid or grated floor enclosures. At the load-out end of the Pier, the conveyor (approximately 150 feet) will be fully enclosed with a metal roof/siding/solid floor.



Half-moon covers (similar to above) would be utilized over most sections of the Central Conveyor to inhibit rain, wind and fugitive dust.

At the top of the shoreline bluff, a truss bridge will free-span over a nearshore wetland and associated buffer located at the base of the bluff. The applicant design does not propose support structures (pilings) placed in the wetland or upper nearshore environs. The truss bridge will support the Single Conveyor and its grated walkway, pan under the return belt, and half-moon cover. The truss bridge ends at approximately the Ordinary High Water (OHW) mark, where the Pier begins. The Pier’s initial 650 feet will be enclosed with a metal roof/siding and a grated walkway with a pan under the return belt.

Under the Return Belt – Pans or solid floors will be installed under the Central Conveyor return belts at five locales, each including access to remove dust and sediment from the pans or floors. The five locales:

1. West of Wetland C (0.4 miles), the Twin Conveyors route appears to cross various drainage swales (on some maps). If these drainage swales exist, a pan will be placed under the belts to prevent fugitive dust or sediment from falling onto the conveyor roadbed and migrating into the drainage swales.
2. At the Thorndyke Road crossing, a solid floor will contain fugitive sediment.
3. In the Shoreline area preceding the Pier, a truss bridge at the top of the bluff will have a pan placed under the conveyor belt to prevent fugitive dust and sediment from falling into Wetland B or other near-shore areas.
4. At the base of the shoreline bluff, after the truss bridge, the beginning of the Pier will have pans similarly installed under the return belt.
5. At the Pier load-out, a solid floor will contain fugitive dust and sediment, further removed by brushes and scrapers.

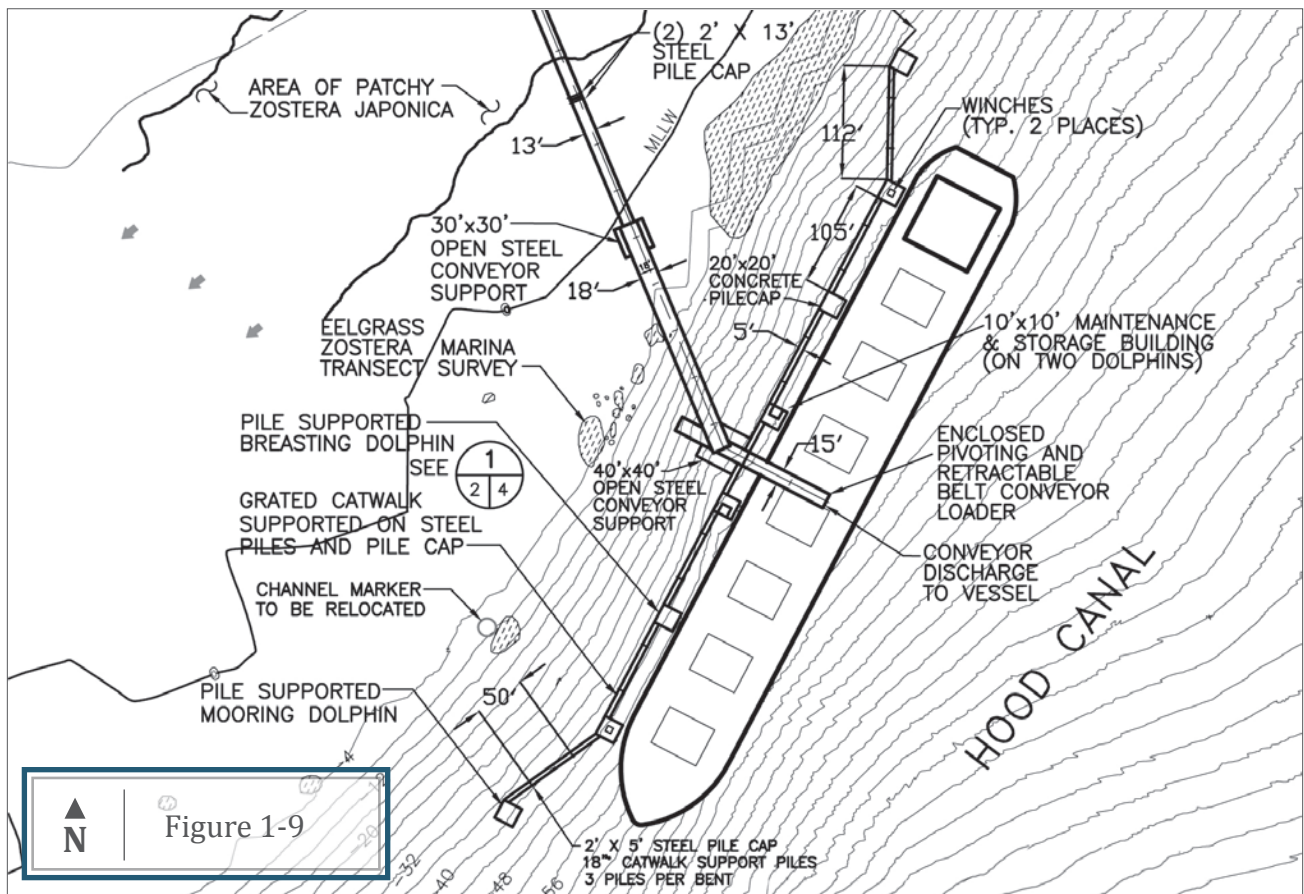
1.4.3.1 Central Conveyor Construction

Figures 1-9 and 1-10 illustrate the Applicant's preliminary designs of the Central Conveyor and Pier.

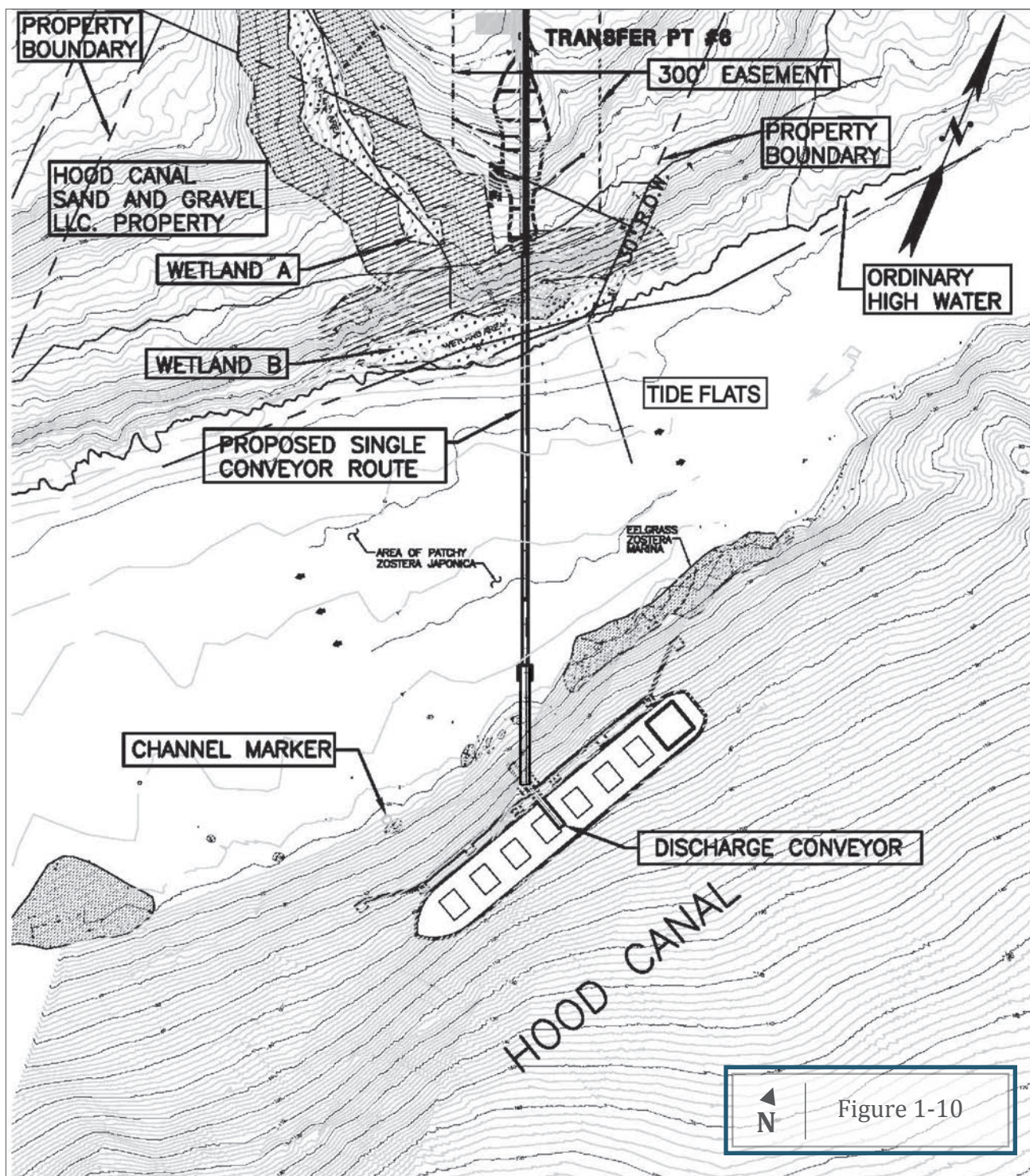
A crane will lift prefabricated sections of the Central Conveyor off flatbed trucks and lower them along a sloping route, requiring minor excavation or fill. Electrical and control wiring will be installed by trenching underneath or attaching to the conveyor adjacent to the realigned forestry service road. For elevated portions (road crossing, uneven terrain or slopes), the Central Conveyor will be supported on steel piles up to 18 inches in diameter.

As the Single Conveyor transitions from the upland plateau to the shoreline beach, its route spans general areas that include designated erosion, seismic, landslide hazard areas and landslide deposit areas mapped as geologically hazardous in Jefferson County's 1998 GMA **Comprehensive Plan** Critical Areas Map.

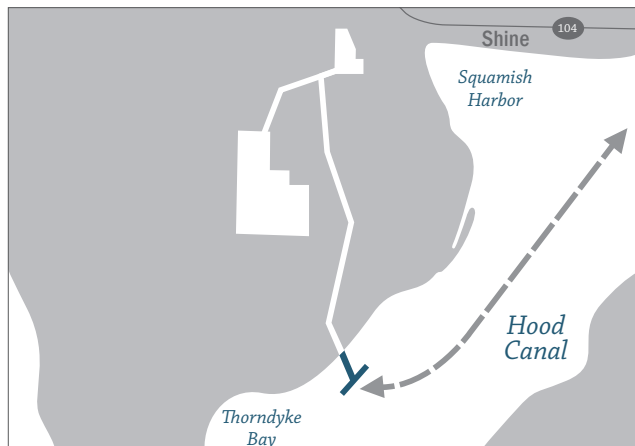
In the Shoreline Area, the Single Conveyor's specific route crosses a landslide deposit area. As a result, the applicant has preliminarily designed specialized geotechnical techniques to stabilize slopes for support. A "cut-and-drainage" system is proposed to be placed a sufficient distance from the top of the shoreline bluff to minimize natural and/or project-caused bank erosion.



Shoreline, Conveyor and Pier The conveyor spans a bluff and naturally disturbed areas to the beach (high tide), where it crosses tide flats (low tide) to the pier. The enclosed conveyor would be 13 to 18 feet wide. An enclosed pivoting and retractable loader would load sand and gravel onto barges and ships. Typical barges would be 60 feet wide by 240 feet; largest barges 100 by 400. The largest Panamax-class ships (when available on the West Coast) would be a maximum 110 feet wide by 745 feet in length (shown). Eelgrass locations were updated in 2007. **Note:** For illustration purposes only, based on preliminary designs prepared by the Applicant. The original drawing was modified to promote clarity and readability and is provided in Appendix A.



Shoreline, Conveyor and Pier (at low tide) The Central Conveyor crosses a 14.7-acre parcel of waterfront property, avoiding Wetland A and spanning over Wetland B. The conveyor terminates at the end of the proposed pier where deep water (50-75 feet) can accommodate barges and ships. **Note:** For illustration purposes only, based on preliminary designs prepared by the Applicant. The original drawing was modified to promote clarity and readability and is provided in Appendix A.



PROJECT AREA

Waterfront property comprised of bluff and shoreline, beach, undeveloped tidelands and adjoining shoreline properties. Includes a proposed transfer station #6 and 10-stall employee parking lot accessed by Thorndyke Road, both located on adjacent forestlands.

AS A PROJECT COMPONENT

Begins where the initial shoreline pilings support and connect the suspended truss bridge with the Pier structure, near the Ordinary High Water mark. From that point, Pier ends approximately 990 feet where materials discharge from the load-out gantry onto barges and ships.

1.4.4 Pier

The Single Conveyor originates at Central Conveyor transfer station #5, crosses overhead at Thorndyke Road, continuing its route on Thorndyke Area South resource lands before reaching the applicant's waterfront parcel. The loadout-only Pier facility then extends approximately 990 feet offshore to deep water for loading of barges and ships. The Single Conveyor belt is six feet wide and will be covered by 13 to 18-foot wide enclosures that include maintenance walkways.

The nearest residences to the Pier are approximately a half-mile (2,100 feet +/-) to the southwest, and 840 feet to the

northwest. The proposed Pier will be built on the Class II tidelands of the applicant-owned waterfront property and extend onto state-owned beds of navigable waters managed by the **W.D.N.R.** The waterfront property is designated Rural Lands under the Jefferson County **Comprehensive Plan** and is zoned Rural Residential. Under the Jefferson County Shoreline Master Program (1981), property within (upland of) 200 feet of the Ordinary High Water (**OHW**) Mark and tidelands are designated as Conservancy while the state-owned beds of navigable waters are designated as Aquatic.

The Pier site on Hood Canal is located approximately 2.7 miles north of the Kitsap Naval Base at Bangor Security Zone and is within a quarter-mile shoreline navigational area west (and outside of) a designated Naval Exercise Area that underwent an expanded use EIS in 2010. Federal licenses issued by the U.S. Army Corps of Engineers (**USACE**) allow the Navy to limit private and public navigation during times of Naval exercises and testing.

The waters, shores and uplands of upper Hood Canal are considered to be within the usual and accustomed hunting, fishing, and shellfish gathering general areas for the Lower Elwha, Jamestown S'Klallam, Port Gamble S'Klallam, and Skokomish nations (**Point No Point Treaty**). The Suquamish nation (**Port Madison Treaty**) also claims similar hunting and fishing rights. Due to the high bank and inter-tidal wetland at its base, the waterfront parcel has no road or footpath leading to the beach.

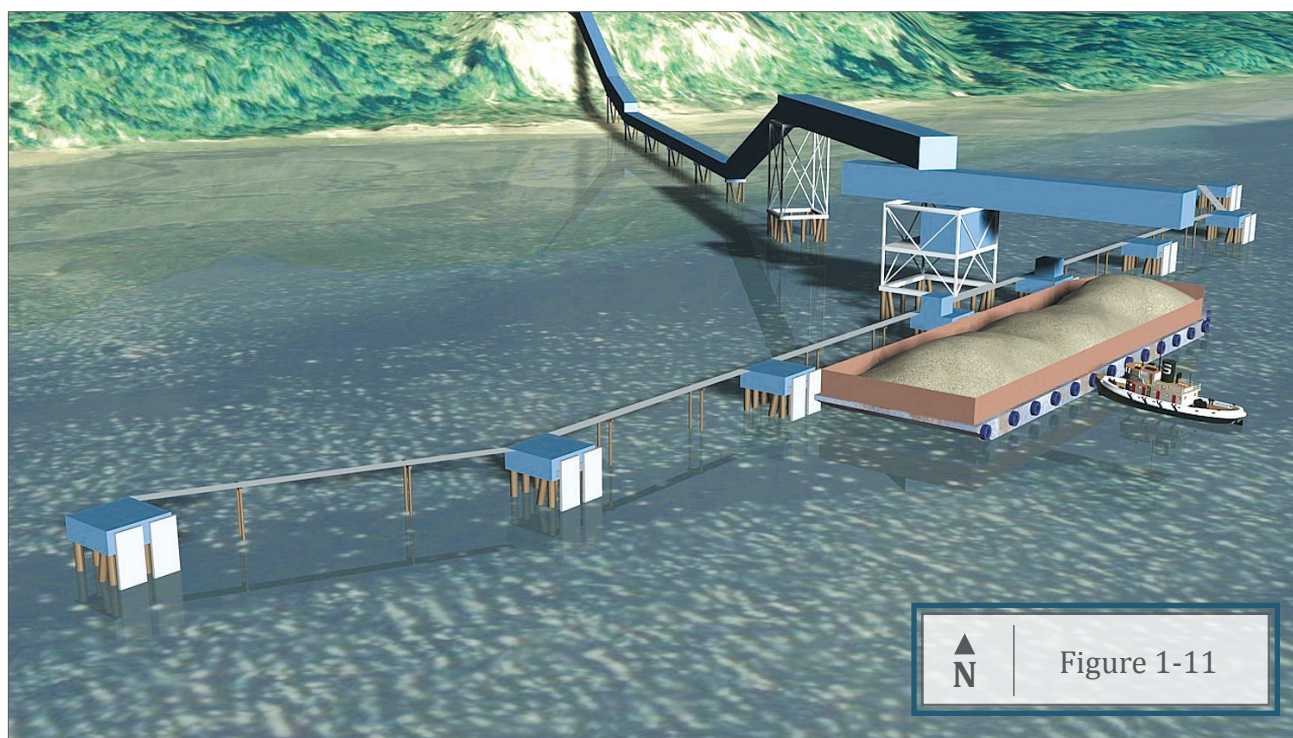
The applicant states that the Pier will be painted to blend into the existing environment and constructed in a manner minimizing visual intrusion and glare. Steel pilings will support the Pier trusses, support structures, and breasting and mooring dolphins. Eight 20-by-20-foot dolphins (six breasting and two mooring) connected by a five-foot-wide grated catwalk will be constructed in deep water relatively parallel to the shore. Two maintenance/storage buildings will be located on the centermost dolphins. (See Figures 1-9 and 1-11)

The deep water end of the proposed Pier design will consist of a stationary and retractable load-out conveyor supported on pilings and two open-steel support structures. The first structure, located approximately 650 feet from the beginning of the Pier, will support the conveyor and have an overall height of 91 feet above Mean Low Low Water (MLLW). The second structure will have an overall height of 76 feet above MLLW and support both the conveyor and the retractable (load-out) gantry. An enclosed control room with access stairways, storage area, restroom and sewage holding tank will be located on top of the second support structure. (See Figure 1-12)

Lighting of the Pier and the truss system supporting the Single Conveyor from the shoreline bluff to the beach will be minimized while still conforming to all applicable safety-related requirements of the regulatory agencies (e.g. U.S. Coast Guard, Occupational Safety & Health Administration [OSHA], and the Washington Industrial Safety and Health Act [WISHA]). Lighting of the surface will be minimized with shielded and/or directional fixtures. During non-operation hours, lights will be turned off except as needed for maritime safety requirements on the Pier structure.

See Appendix A: Original
T-ROC Application

A 10-vehicle employee parking area will be built southeast of Thorndyke Road. Workers will access the Pier via a walkway adjacent to the Single Conveyor.



Pier Illustration The pier includes eight dolphins (six breasting and two mooring) connected by a five-foot-wide catwalk. Maintenance/storage buildings would be located on the two innermost breasting dolphins. An enclosed control room with access stairways, storage area, restroom and holding tank is located within the second support structure. A pivoting, load-out conveyor with a retractable supply feed would lower and adjust during the delivery process. **Note:** This schematic block depiction is for illustration only and was provided by the Applicant based on preliminary design specifications. The original is included in Appendix A Project Fact Sheet.

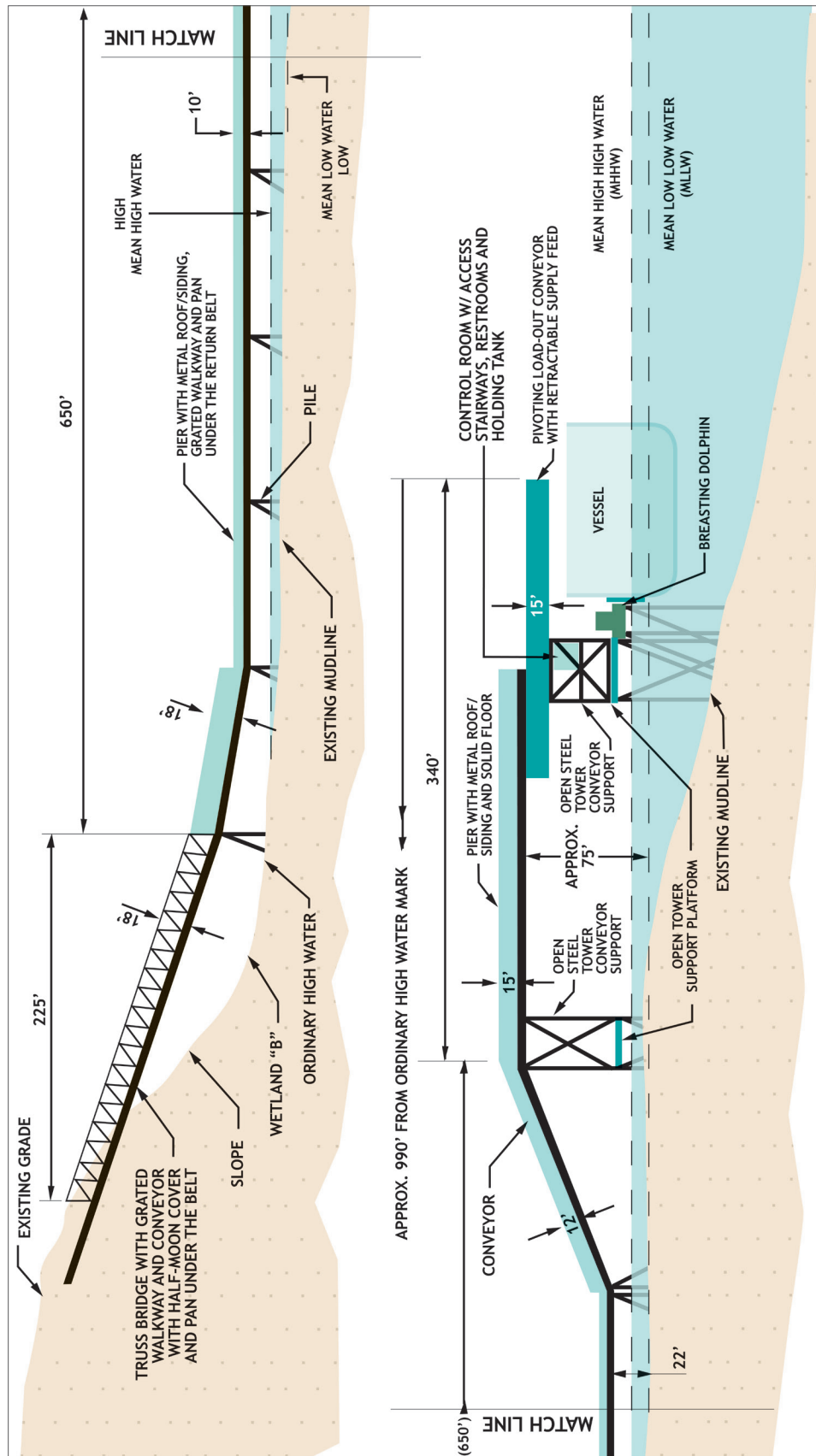


Figure 1-12

Pier Profile The proposed pier consists of a stationary and retractable load-out conveyor supported on pilings spaced at 100-foot intervals and two support platforms. The pier maintains a low profile and then rises gradually to its highest point (91 feet) for loading sand and gravel onto barges and ships. **Note:** For illustration purposes only, based on preliminary designs prepared by the Applicant. The original drawing was modified to promote clarity and readability and is provided in Appendix A.

1.4.4.1 Pier Construction

The primary, over-water Pier assembly will be constructed from barges. The largest barge will measure approximately 155 feet by 50 feet and draw approximately six feet of water when fully loaded. Steel pilings will be installed using a vibratory method of pile-driving. Prefabricated over-water conveyor trusses will then be hoisted into position using barge-mounted cranes.

The applicant proposes two alternatives for constructing the truss system supporting the conveyor from the shoreline bluff to the beach. Both would require the placement of varying amounts of construction equipment along the upper beach. Further engineering and regulatory requirements will provide guidance as to which alternative is chosen.

- **Alternative 1** – Hoist the truss up from the beach or down from the top of the slope, using a cable. Construction would require two temporary hoists, one uphill and one downhill.
- **Alternative 2** – Place the truss using a crane from the beach. A barge with a crawler (self-propelled) crane would be maneuvered at high tide alongside newly placed piling supports at an estimated elevation of six feet **MLLW**. Then, once the tide has receded, the crane (weighing approximately 165 tons) would be driven off the barge onto timber mats placed onto the beach to temporarily support the crane.

Due to seasonal restrictions protecting salmon, construction of the Pier and associated structures will take place in late summer and early fall. In-water construction will be restricted to the agency-approved work window expected to be July 16 to Feb. 15. Assuming that in-water construction activities are allowed to proceed uninterrupted during this period, construction will require approximately two months.

1.4.4.2 Pier Operations

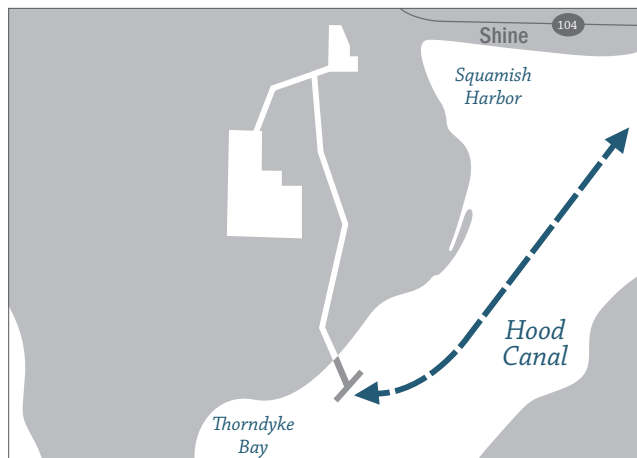
Other than loading barges and ships, Pier operations will be limited to security and maintenance requirements and include safety inspections, repairs of any damaged structures, removal of sand and gravel under conveyors, painting of corrosive surfaces, and cleaning. Security will include fencing, lighting and a combination of electronic and staffed surveillance. Specific maintenance and safety protocols will be defined through conditions applied in state and federal permits and licenses.

See more on Marine Transportation under Section 3.11

1.4.4.3 Pier Decommissioning

As part of the Jefferson County Shoreline Conditional Use application, the applicant has agreed to requirements under the Aquatic Environment Performance Standards pertaining to the cessation of the project and/or the Pier structure's useful life. The applicant will be required to post a performance bond or other surety/guarantee instrument suitable to Jefferson County to cover the cost of removal of the Pier in the event that its use is terminated for any reason. The applicant is also required to assume liability for all damages to public and private property caused by the failure of the Pier structure.

In addition, state (**Ecology, WDNR**) and federal (**USACE**) agencies with jurisdiction have the authority to require further financial assurances and specific decommissioning requirements as part of their final permit and licensing decisions for shoreline projects.



PROJECT AREA

End of the Pier north for approximately 12 miles where the mouth of Hood Canal meets Admiralty Inlet and the Puget Sound shipping lanes.

AS A PROJECT COMPONENT

Begins when incoming barges and ships leave Puget Sound shipping lanes and navigate south to Hood Canal Pier site. Includes navigating through the Hood Canal Bridge south to the Pier (there are no proposed routes south of the Pier), tug assistance, berthing and operations during the loading process. Ends where loaded barges and ships re-enter Admiralty Inlet.

1.4.5 Marine Transportation

Outgoing U.S.-flagged barges and ships will navigate the northern Hood Canal approximately 12 miles to Admiralty Inlet and the Puget Sound shipping lanes, transporting sand and gravel to local (i.e. Port Angeles), regional (i.e. Puget Sound urban centers), intrastate (i.e. Vancouver, WA) and interstate (i.e. Oregon, California and Hawaii) markets. (See Figure 1-13)

Thorndyke Resource proposes to load barges and ships up to 300 days a year, allowing 65 days annually for holidays, tribal fishing, inclement weather and other periods of non-use. The number of barges and ships

calling at the Pier will vary with market conditions. The applicant proposes that all barges will pass under the eastern span of the Hood Canal Bridge. Only ships will require a bridge opening at mid-span. In its application, the applicant stated that such openings would be conducted during off-peak vehicle traffic times.

Initially, only barges will call at the Pier. In Year 1 of Pier operations, the applicant anticipates that the volume of sand and gravel transported by barge will be 2 million dead-weight U.S. short tons (DWT). By Year 10, the volume of sand and gravel transported by barge is expected to reach 4 million tons annually.

Barge loading times range between one and eight hours, depending on barge capacities that range from 2,500 to 20,000 tons. Typical barges with a capacity of 5,000 to 7,000 tons (dwt) of sand and/or gravel can be loaded in approximately 2-3 hours. Up to two barges can be berthed at the Pier at one time; up to six barges per day.

Only U.S. flagged ships will call at the Pier. At this time, ships required for transport of sand and gravel at the proposed Pier are not available on the West Coast. The applicant anticipates that these ships will become available in approximately eight to 12 years after the Pier's construction and would be utilized subject to market demand.

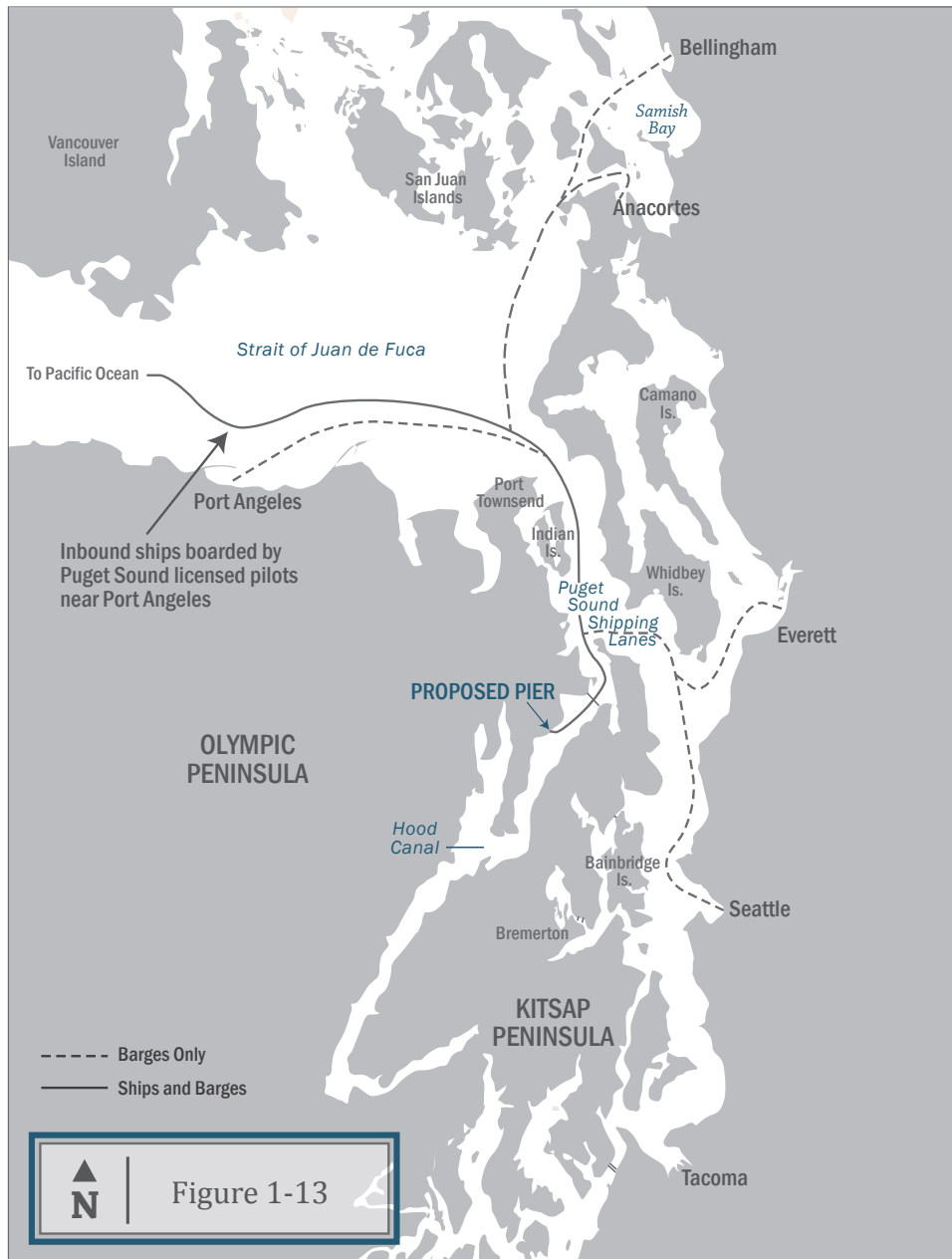
In the first year that U.S. flagged ships become available, the applicant anticipates that 600,000 tons of sand and gravel would be transported by ship (an average of less than one ship a month). By Year 25, the applicant projects that shipping volume to reach 2.75 million tons annually (an average of approximately four ships a month), all subject to market demand.

Ship loading times will range between eight and 24 hours, depending on ship capacity. Ship volumes generally range from 20,000 and 65,000 tons (dwt). The project application anticipates that up to six ships each month could be expected by Year 25.

By Year 25, it is anticipated that the combined volume of sand and gravel transported by ship and/or barge could reach 6.75 million tons annually (4 million tons via barge and 2.75 million tons via ship), subject to market demand.

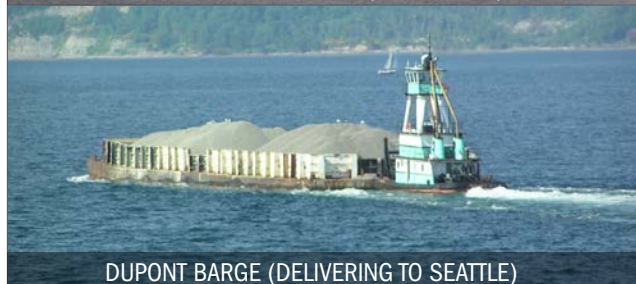
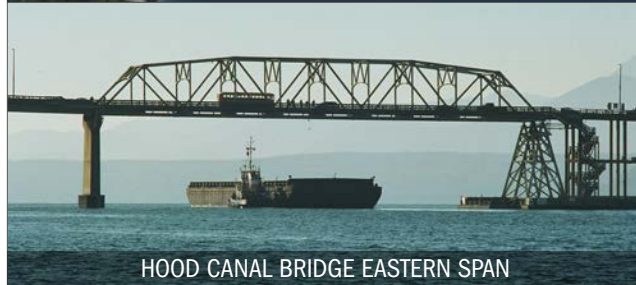
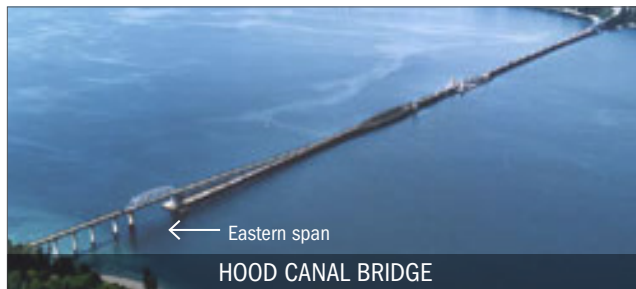
1.4.5.1 Marine Operations Plan

Prior to initiation of barging and shipping, a **Marine Operations Plan** defining specific standard procedures and protocols (called **SOC**, or “standards of care”) must be developed in coordination with the primary reviewers of the proposed operation plan, including the **USACE, Navy, Coast Guard, WDOT, Ecology, WDFW** and **Puget Sound Harbor Safety and Security Committee (PSHSSC)**.



Marine Transportation Routes

The pier would be located near the mouth of the 60-mile-long Hood Canal, approximately 12 miles south of Admiralty Inlet and the Puget Sound Shipping Lanes, and five miles south of the Hood Canal Bridge. Primary destinations include barging to Washington's major urban areas and to Port Angeles; shipping and/or barging to Oregon, California and Hawaii. Source: Applicant.



The proposed project calls for sand and gravel barges to navigate the Hood Canal Bridge via its 230-foot-wide eastern span. When available on the West Coast, U.S.-flagged, Panamax class bulk carrier ships similar to the Canadian Shipping Lines' Sheila Ann (shown at left) would call on the proposed pier via the Hood Canal Bridge's 600-foot-wide mid-span opening. Sand and gravel is loaded onto Puget Sound barges near Shelton, DuPont (south of Tacoma), and shown delivering to Seattle. **Source:** Applicant provided photos.

Elements detailed in the **Marine Operations Plan** fall into two main categories: Safety and Environmental.

The Safety element includes:

- Under-keel Clearance SOC
- Towing SOC
- Hood Canal Bridge Passage SOC (prepared separately for ships and for tugs)
- U.S. Navy Coordination SOC (including Navy exercises, Navy vessel ingress/egress to Hood Canal/Admiralty Inlet and security of Naval Base Kitsap-Bangor)
- Mooring and Departure SOC
- Tug/Escort SOC
- Pilotage requirements
- Emergency Response and Communications
- Tribal and Commercial Fishing Conflict Resolution
- Heavy Weather SOC
- SOC for Movement in Restricted Visibility
- Anchorage SOC
- Equipment Failures and Ensuring Equivalent Levels of Safety

The Environmental element includes:

- Invasive Species Prevention and Ballast Water Management
- Wastewater SOC
- Under-keel Clearance SOC
- Pier Maneuvering SOC (to address propwash)
- Vessel Noise SOC
- Vessel Lighting SOC
- Loading SOC

The **Marine Operations Plan** will include required tug operations and procedures for the safe handling of barges and ships as well as emergency response. Barges and ships will be required to report arrivals and departures under the Washington State Vessel Traffic Service (VTS), as operated currently by the Coast Guard. Marine operators calling on the Pier will also be required to follow an Environmental Management System (EMS) and plan for all operations within Hood Canal, including approach, loading and departure. Elements of the plan will be developed based on criteria identified within the USACE Section 10 permit process, such as those defined to minimize the risk of introducing invasive species.

Ships will be operated by licensed, professional harbor pilots familiar with the inland waters of Puget Sound and the Strait of Juan de Fuca, including Hood Canal. The pilot must maintain overall command and supervise the work of all officers and crew, setting the course, speed and navigational maneuvering to avoid hazards.

1.5 Alternatives to the Proposed Project

SEPA requires that the No Action Alternative be considered in an EIS. Under SEPA (WAC 197-11-440), when a proposed private project is on a specific site that does not require a rezone, which is the case with the proposed Thorndyke Resource project, the lead agency evaluates the No Action alternative and reasonable alternatives, if any, which achieve the proposal's objective on that same site. There are no reasonable on-site alternatives which will achieve the project's objective of providing a loading facility for marine transportation of gravel. Although minor design changes and mitigation measures may alter some of the project's impacts, it cannot be made smaller or significantly changed in some way that would still allow marine transportation of gravel as the applicant proposes.

Reasonable alternatives are those that could feasibly attain or approximate the proposal's objectives but at a lower environmental cost.

Reasonable alternatives are those that could feasibly attain or approximate the proposal's objectives but at a lower environmental cost.

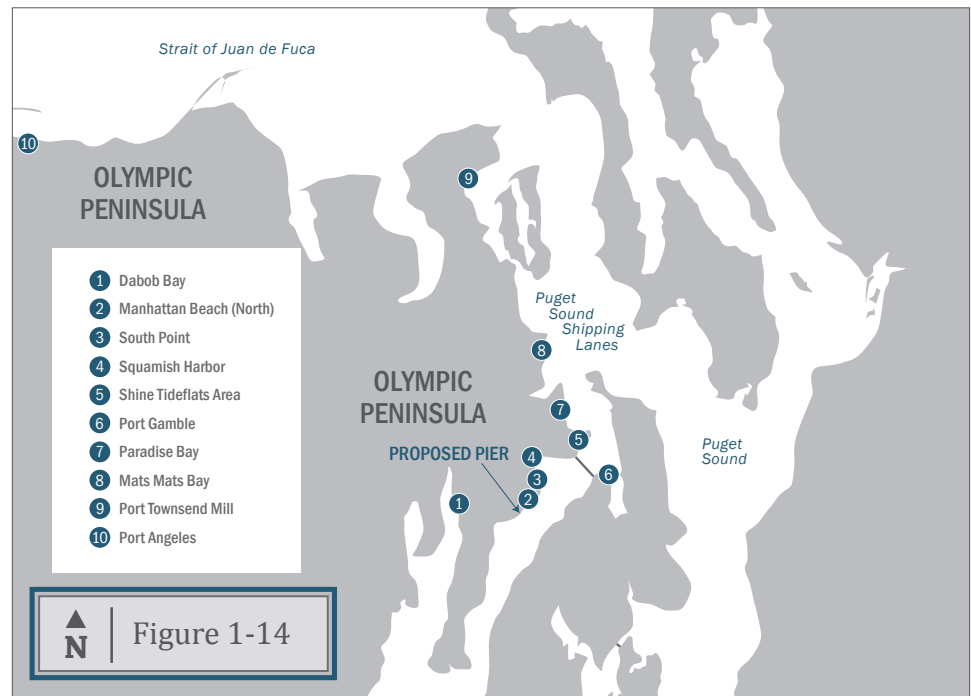
This **SEPA DEIS** evaluates the Proposed Project, No Action, plus mitigation measures which may reduce or eliminate specific adverse project impact. While there is no requirement to consider alternatives other than the No Action Alternative, the applicant has considered alternative pier sites prior to selecting the proposed Pier location, as well as project design and operational modifications.

Under **NEPA**, when the federal agency action is asked to issue a permit, alternatives can be limited to approving the permit, approving the permit with conditions, or denying the permit. In the case of the USACE Section 10 permit, public need is a primary decision factor; the USACE may, therefore, consider other locations or ways to meet the underlying public need met by the Proposed Action. In this case, the combination of circumstances needed to develop the proposed load-out facility to barge and ship sand and gravel requires a large area of designated mineral resource lands, abundant sand and gravel deposits, access to navigable waters and little nearby development. Figure 1-14 illustrates alternative sites considered.

When the only federal action is issuing a permit, the federal agency's role is to determine if the project is consistent with applicable federal regulations and to consider measures that could mitigate adverse environmental impacts. Therefore, during the **NEPA EIS** process, additional alternatives (e.g. additional mitigation measures) may be identified that could meet project objectives at the proposed site, but at a lower environmental cost.

Alternative Pier Sites

Considered The applicant reported several alternative pier locations that were considered but eliminated due to a variety of factors, including distance, required trucking fuel cost (vs. smaller conveyor), inefficiencies, traffic impacts, residential development, near-shore habitats, unsuitable slopes and/or other environmental constraints. **Source:** Thorndyke Resource. **Note:** Approximate locations show general area of site considered.



1.5.1 No Action Alternative

For the proposed Thorndyke Resource project, the No Action alternative would include these primary results:

- No construction and operation of the Central Conveyor and Pier, or marine transport of sand and gravel from the project site;
- No reconfiguration of the Shine Operations Hub to accommodate marine-based mining operations;
- Continuation and likely expansion of truck-based delivery to local markets from various local mining sites within the Hood Canal Tree Farm;
- Both truck-based mining and marine-transported sand and gravel from other sources in Puget Sound, Georgia Basin and the British Columbia coastal region would supplant the projected volumes from Thorndyke Resource.

The No Action alternative would, at least theoretically, preserve the sand and gravel resource at the mining area (Meridian Extraction Area) for future use. However, since the area is designated under the Jefferson County **Comprehensive Plan** as Mineral Resource, one can anticipate that it will eventually be developed for that purpose. Such a development would require environmental review independent of this Proposed Action.

Delaying implementation and construction and operation of a marine load-out facility would, at least temporarily, result in retention of the undeveloped shoreline. Use of the available sand and gravel resources needed for intra-state and interstate construction projects, and the economic benefits of the proposed project would, however, be deferred or eliminated.

1.5.1.1 Proposed Project Would Not Occur

Should the proposed project not be approved, construction and operation of the Central Conveyor, Pier and marine-delivery Operations Hub would not occur, nor would the MRL's rate of extraction be increased by the proposed project's plan to initially extract from Meridian for purposes of marine delivery.

1.5.1.2 Continued Growth of Existing Activities

With or without the Thorndyke Resource project, it's reasonable to expect ongoing truck-based operations within the Wahl Extraction Area and Hood Canal Tree Farm's resource lands to continue into the indeterminate future. Under the No Action alternative, sand and gravel would be extracted but at a slower rate than what would be provided by marine bulk transportation.

1.5.1.3 Trucking vs. Marine Transportation to Local Markets

Should the proposed project not be developed, sand and gravel would continue to be trucked from the Hood Canal Tree Farm to local and/or regional areas (i.e. Port Angeles and central/north Puget Sound). Additionally, with fewer barges serving Puget Sound urban markets, it's reasonable to estimate that there would be increased imports from Canadian sources, and that truck transportation would be increasingly relied upon to deliver sand and gravel from Cascade Mountain foothills deposits to those urban markets.

1.5.1.4 Increased Mining and Transportation from Other Sources

Sand and gravel is a basic construction commodity with historical market demands. Should the Proposed Action not be approved, it is reasonable to anticipate that the estimated sand and gravel tonnage that Thorndyke Resource would have delivered by barges and ships (2 million tons in Year 1 to 6.75 million tons annually by Year 25, subject to market demand) would instead be extracted, processed and transported from existing and new mines in Puget Sound, the Georgia Basin and British Columbia coastal area (Canada).

Without the proposed project, extracting and processing from other sources would impact the rate of both the depletion of existing mines and development of new mines to meet market demands.

Transporting volumes comparable to the proposed project from other sources would have separate environmental costs depending on the truck, barge, ship and/or rail delivery method of transportation. These costs or considerations could impact current import levels from Canada, local and regional job creation, commerce, economies, and county and state tax revenue generation.

1.5.2 Pier Sites Considered by Applicant

The applicant has considered numerous site, design and operational sites. The following alternate sites include those contained within the project application in 2003, and those reviewed through iterative discussions with Jefferson County staff during initial environmental review of the project.

1.5.2.1 Pier Sites Considered But Eliminated

See Figure 1-14 Alternative Sites Considered.

The applicant first searched for sites with existing piers and/or sites that were environmentally, technically and legally suitable within a commercially viable distance from the source of sand and gravel. Selection criteria included a relatively direct conveyor route from the Operations Hub to a shoreline site featuring a suitable depth for barges and ships with a minimum of environmental and/or engineering challenges to develop a Pier capable of loading sand and gravel onto barges and ships.

Several sites were considered but eliminated because they could not achieve project objectives at a lower environmental cost than the proposed site.

Port Gamble – The Port Gamble industrial waterfront area and its abandoned sawmill located on the Kitsap side of the Hood Canal featured existing docks. However, due to shallow waters, the site would have required dredging and/or an extended pier to cross an area of relatively high native eelgrass density.

Establishing a conveyor route across Hood Canal Bridge would have required extraordinary engineering and securing multiple public and private easements from Shine Pit to Port Gamble. Alternatively, trucking sand and gravel for approximately six miles across existing highways and roads (and the Hood Canal Bridge) would create significant transportation-related impacts, including traffic congestion and increased risk of motor vehicle accidents.

Trucking to a load-out facility is costly and counter to the project's primary economic and environmental objectives. Loading each 20,000-ton barge would be equivalent to 625 trucks-with-trailers (or 1,250 trips across the Hood Canal Bridge); a single bulk carrier ship more than 2,000 trucks-with-trailers (or approximately 4,000 bridge trips).

Port Townsend Mill – This site featured an active pulp mill and barge loading/unloading facility on Port Townsend Bay, approximately 20 miles from Shine Pit. A conveyor route would have involved obtaining numerous private and public easements and/or crossing of State Hwy 104 as well as environmentally sensitive areas, including various creeks and streams. As an alternative to building a conveyor, trucking would have greatly increased traffic on local and state roads to/from Port Townsend.

Port Angeles – An active port close to West Coast shipping lanes, its distance from Shine Pit represented a prohibitive trucking-to-shipping operation along with the environmental costs of increased trucking.

Mats Mats Bay – Located on the Olympic Peninsula side of Hood Canal and north of the Hood Canal Bridge, Mats Mats Bay contained an active basalt quarry and a pier for loading quarried rock onto barges. However, water depths were only adequate for smaller barges and would have required dredging and/or expanded pier construction to achieve project objectives. Transporting sand and gravel from Shine to Mats Mats Bay would have required several miles of conveyor, and involved obtaining numerous private and public easements, crossing of State Hwy 104 as well as environmentally sensitive areas, including various creeks and streams. As an alternative to building a conveyor, trucking would have overwhelmed local and state roads, particularly in Mats Mats’ relatively high-density residential area.

Paradise Bay – This site was considered because of its location north of the Hood Canal Bridge. However, the area had a relatively high-density residential development, lacked deep-water access, and had a northern-facing, unprotected shoreline. The conveyor route would have involved obtaining numerous private and public easements and/or crossings of environmentally sensitive areas, including various creeks and streams.

North of the Hood Canal Bridge on west shore, Shine “tideflats” – One alternative considered was constructing a conveyor route along SR 104 to a new pier north of and perpendicular to the Hood Canal Bridge western span. Numerous structural engineering issues were associated with attempting to incorporate a pier with the bridge, including the engineering requirements with loading a ship or barge at this location. Lack of adequate space for the pier, exposure to harsh weather, high currents, wave conditions, and the visual impact for people traveling over the bridge and/or living near the bridge would have been greater than those of the proposed pier site.

Waters adjacent to the beach at Shine tideflats typically has high currents of 10 to 12 knots. The beach is particularly exposed during storm and high tide conditions. This site would have required displacement of several small-lot residences, would be highly visible to a large number of people, and is adjacent to a state parkland.

South Point – This location would have required less conveyor construction (two miles vs. four miles) by connecting the Shine Pit processing hub through commercial forestlands to the old South Point ferry dock next to the Bridgehaven community. A tunnel would have been constructed under county roads to emerge at the existing ferry dock location. Due to the deep near-shore draft at this site, the pier length would have been shorter as well, approximately 50 feet.

However, preliminary geology reviews of the high-bank bluff revealed that any structure (i.e. tunnel underground, conveyor on top, even residences) would most likely have caused a significant landslide within the immediate area. Four recent landslides were apparent. In addition, the conveyor route would have required crossing wetlands and/or tributaries that made up the upper portion of Shine Creek and/or Manhattan Beach Creek.

Other significant factors included the proximity to a well-established residential community in Bridgehaven and Trails End. This alternative became moot when WSDOT re-purchased the property for use during reconstruction of the Hood Canal Bridge. (Prior to considering the current proposed site, the applicant had signed a purchase-and-sell agreement for the ferry dock site.)

Manhattan Beach (North) – This site featured a shoreline almost entirely reachable by commercial forest lands without significant wetland or stream crossings. However, the shoreline was not as isolated, had more waterfront residents, and was situated in a way that would have made it more difficult for vessels to navigate the Pier. In addition, diving surveys discovered extensive native eelgrass beds on the two waterfront parcels with the foremost potential as pier sites.

Dabob Bay – Located on the west side of the Coyle Peninsula, Dabob Bay was remote, deep and allowed for shoreline pier development with relatively few land use conflicts. However, conveyor routes to the shoreline would have required crossing high bluffs and steep slopes. Marine transportation routes would have extended 10 to 15 miles further south into Hood Canal, requiring barging and shipping in front of Kitsap Naval Base Bangor's Operations Area.

Squamish Harbor – This location was economically favorable, significantly reducing the length of the conveyor from Shine Pit to the shoreline. However, the potential conveyor route would have required crossing the upper portion of Shine Creek and/or Manhattan Beach Creek as well as several tributaries and feeder wetlands. While the wetland and stream impacts may have been mitigated, to reach adequate water depths a pier would have extended a mile or more offshore through the middle of Squamish Harbor and its populated community, dramatically increasing the visual and operational impacts.

Pier Site Selected – The applicant has identified the following factors in support of proposing the current Pier site and Shoreline Area conveyor route as its preferred alternative:

- Pier location and Shoreline Area conveyor route have little existing development or use. Structures avoid wetlands, significant stream crossings or impacts to designated Fish and Wildlife Habitat Conservation Areas (**FWHCAs**).
- Given beach dynamics, the Pier design is not expected to significantly interfere with the natural sediment transport regime (littoral drift).
- Available north-south Pier alignment won't cause biologically significant shading to native eelgrass beds.
- No native eelgrass beds are anticipated to be removed.
- Prevailing wind patterns and tidal currents are conducive to berthing operations.

CHAPTER 2

Decision-Making and Scoped Issues



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2.0 Introduction

The decision-making process for the Proposed Action requires compliance with the State Environmental Policy Act (**SEPA**) before issuance of local and state permits. The core purpose of **SEPA** is to establish uniform requirements which will “encourage productive and enjoyable harmony between man and his environment; promote efforts which will prevent or eliminate damage to the environment and biosphere; stimulate the health and welfare of man; and, enrich the understanding of the ecological systems and natural resources important to the state and nation” (RCW 43.21C.010).

Scoping (WAC 197-11-408) is the process by which a lead agency such as Jefferson County narrows the scope of an Environmental Impact Statement (**EIS**) to the probable significant adverse environmental impacts, including reasonable alternatives and mitigation measures that would avoid or minimize adverse impacts, enhance environmental quality, or achieve project objectives at a lower environmental cost.

Scoping is based upon the lead agency’s review of the application and public comments from individuals, citizen groups, individuals with special expertise, and local, state, tribal and federal governments. The lead agency identifies the substantive issues and then discusses and analyzes their direct, indirect and cumulative impacts/effects in Chapter 3 of this Draft Environmental Impact Statement (**DEIS**).

2.1 Overall SEPA Process

SEPA review is an open, public process, allowing multiple opportunities for review and comment on the environmental impacts of a Proposed Action. The specific requirements under the **SEPA** process are set forth in:

- **SEPA** (RCW 43.21C)
- **SEPA** Rules (WAC 197-11)
- Jefferson County Unified Development Code (**UDC**) (Title 18.40.700)

There are additional factors beyond the **EIS** to be considered in evaluating the proposed project. The following **SEPA** text describes the overall decision framework under **SEPA**:

“SEPA contemplates that the general welfare, social, economic and other requirements and essential considerations of state policy will be taken into account in weighing and balancing alternatives and in making final decisions. However, the environmental impact statement is not required to evaluate and document all of the possible effects and considerations of a decision or to contain the balancing judgments that must ultimately be made by the decision-makers. Rather, an environmental impact statement analyzes environmental impacts and must be used by agency decision-makers, along with other relevant considerations or documents, in making final decisions on a proposal (WAC 197-11-448).”

In addition to Jefferson County's decisions under its local jurisdiction, other state and federal agencies need to approve, approve with conditions, or deny permits for the private project. Other agencies and tribes, which do not have applicable permit applications, may provide specialized expertise and/or otherwise participate in the **EIS** by commenting on the **DEIS**, particularly regarding environmental impacts and/or mitigation measures within their areas of expertise or concern.

The following government agencies and tribes may be included in the review process under **SEPA**.

FEDERAL

- U.S. Environmental Protection Agency (**EPA**)
- U.S. National Ocean & Atmospheric Administration (**NOAA**) – National Marine Fisheries Service (**NMFS**)
- U.S. Fish & Wildlife Service (**USFWS**)
- U.S. Department of Homeland Security (**DHS**)
- U.S. Department of Transportation – Federal Highway Administration (**FHWA**)
- U.S. Army Corps of Engineers (**USACE**)
- U.S. Department of the Navy (**Navy**)
- U.S. Coast Guard (**Coast Guard**)

TRIBAL

- Jamestown S'Klallam Tribal Nation
- Lower Elwha S'Klallam Tribal Nation
- Port Gamble S'Klallam Tribal Nation
- Skokomish Tribal Nation
- Suquamish Tribal Nation

STATE

- Washington State Department of Ecology (**Ecology**)
- Washington State Department of Fish and Wildlife (**WDFW**)
- Washington State Department of Natural Resources (**WDNR**)
- Washington State Department of Archaeology and Historic Preservation (**WDAHP**)
- Washington State Department of Transportation (**WSDOT**)
- Washington State Olympic Region Clean Air Agency (**ORCAA**)

LOCAL

- Jefferson County Department of Community Development (**DCD**)
- Jefferson County Department of Public Works (**DPW**)
- Jefferson County Sheriff Department (**Sheriff**)
- Jefferson County Public Utility District #1 (**PUD #1**)
- Jefferson County Fire District #3 (**FD #3**)

2.1.1 NEPA

Although federal agencies may be involved in the **SEPA** process, permits and various federal licenses will require a separate, independent environmental review conducted pursuant to the requirements of the National Environmental Policy Act (**NEPA**).

Because of the proposed project's pier component, the USACE Regulatory Branch, which has jurisdiction over navigable waters of the U.S., will administer the **NEPA** review and exercise authority granted under the Clean Water Act (**CWA**) (Engineering Section 404) as well as the Rivers and Harbors Act of 1899 (Engineering Section 10).

2.1.2 Coastal Zone Management Determination

The project's proposed pier also requires compliance with the Washington State Coastal Zone Management (**CZM**) program, whose enforceable policies pertain to any land use, water use or natural resource of the coastal zone. The **CZM** program requires Ecology to determine whether the project complies with various state laws, including those relevant to this proposed project:

- **SEPA** (RCW 43.21C);
- Shoreline Management Act (**SMA**) (RCW 90.58), including Jefferson County's local shoreline master program (JCC 18.25);
- Clean Water Act (**CWA**) (RCW 90.48);
- **Clean Air Act** (RCW 70.94).

The **CZM**'s federal "consistency" process affords the public, local governments, state agencies and tribes an opportunity to review federal actions likely to affect Washington's coastal resources or uses. Any authorization, certification, license, permit or other form of permission for the proposed pier will require federal consistency review and approval.

A federal agency cannot issue a consistency approval unless Ecology concurs that the project is consistent with the **CZM** program. The applicant must prepare a Coastal Consistency Determination (**CCD**) for Ecology describing the project, its impacts on coastal resources, and its consistency under **CZM** laws.

The applicant will submit Section 10 and 404 applications to **USACE** which, as part of its process, will request a consistency review by **Ecology**. Within the federal review process **Ecology** will issue a 401 Water Quality Certification under authority granted to the state under **CZM**.

2.1.3 JARPA

To coordinate various federal, state and local agencies with jurisdiction, the Joint Aquatic Resources Permit Application (**JARPA**) was created to help facilitate the **SMA** (RCW 90.58). The intent of the **SMA** is to preserve the quality of water and aquatic habitat, encourage water-dependent shoreline land uses, and preserve the public's opportunity to enjoy shorelines. The **SMA** governs uses and activities on marine shorelines, lakes and rivers. The area subject to **SMA** jurisdiction extends 200 feet landward from the ordinary high water (**OHM**) mark or to the edge of any associated floodplain or wetland.

2.1.4 Context of EIS Analysis and Decisions

The **EIS** identifies those aspects of the project that have a probable significant risk of an adverse environmental impact, and evaluates the extent to which those impacts can be mitigated or are unavoidable. The conceptual stage evaluation of an **EIS** is in contrast to the final detailed design stage required for subsequent construction and operational permits.

Both **SEPA** and **NEPA** recognize that major decisions usually take place within the context of a series of decisions, rather than single, isolated decisions. Environmental review and decision-making for the proposed Thorndyke Resource project take place within three general **SEPA** contexts at the **EIS** level: decisions already made, decisions ready for action, and decisions not ready to be made. In this **DEIS**, those contexts are reflected specifically as prior actions, approvals under review and subsequent approvals necessary to implement this action.

2.1.5 Prior Actions Relevant to Thorndyke Block

Decisions and actions within the Thorndyke Block of the Hood Canal Tree Farm, in which the project is proposed, are relevant to several components of the project:

- Jefferson County designation of its portion of the Hood Canal Tree Farm as Long Term Commercially Significant Forest Lands (Jefferson County Ordinance 01-0121-97), including the Thorndyke Block (21,901 acres), where surface mining is an allowed and outright permitted (“yes”) use (Jefferson County Unified Development Code (**UDC**) 18.15.040, Table 3-1);
- prior approval and operation of the basalt Shine Quarry (now known as the Mason Quarry; MLA 04-00314);
- prior mining and processing at the Shine Pit (Jefferson County **DCD**, BLD 09-00368 et al);
- prior approval of an asphalt plant and its operations at the Shine Pit (Jefferson County **DCD** ZON 98-00041);
- prior approval, expansion and operation of the Seton Pit (Jefferson County **Ordinance** 14-1312-02);
- designation of the 690-acre Mineral Resource Lands Overlay (**MRLO**) within commercial forestlands, to be set aside for mineral resource extraction with 15 conditions (Jefferson County **Ordinance** 08-0706-04);
- approval and construction of “Beltline” forestry service road located on Wahl Easement between Shine Pit and Meridian and Wahl extraction areas (**WDNR** FPA 2604058) within the 690-acre MRL;
- adding and changing certain conditions for the 156-acre Wahl Extraction Area within the 690-acre MRL (Ordinance 08-0706-04) and designating as Mineral Resource Lands an additional 18 acres (Wahl Processing Hub), where Miles Sand and Gravel conducts its truck-based mining operations (Jefferson County **Ordinance** 08-1213-10);
- reconfiguring forestry service road T-1000 to the north for delivery of sand and gravel, asphalt and concrete by accessing State Route 104 (Jefferson County **DCD** BLD 11-00063);
- Pope Resources and WDOT agreement restricting use of Forest Service Road T-3100 (Rock-To-Go Road) between the Shine Operations Hub and SR 104;

- approval of mining within Wahl Extraction Area (**WDNR** reclamation permit 70-013024, Jefferson County DCD BLD 11-00171);
- approval of an asphalt and concrete batch plant at the Wahl Processing Hub (Jefferson County **DCD** ZON 13-00006);
- approval of Iron Mountain Quarry 142-acre basalt quarry (Jefferson County **DCD** BLD 10-00054).

2.1.6 Proposed Actions Under Review

Actions ready for decision following completion of the **SEPA** process include the following state and county permits and actions:

- Conditional Use Permit (**CUP**), Jefferson County (MLA 03-155 Z03017)
- Shoreline Conditional Use Permit, Jefferson County (S03007)
- Shoreline Substantial Development Permit, Jefferson County
- Hydraulic Permit Application (**HPA**), Washington Department of Fish and Wildlife (**WDFW**)
- Washington Department of Natural Resources Aquatic Division, Harbor Area Lease, Bedlands Lease and Use Authorization
- Washington Department of Ecology, 401 Coastal Management Zone Water Quality Certification

2.1.7 Subsequent Approvals Necessary to Implement Proposed Action

A DEIS reviews the environmental impacts of private proposals at the conceptual stage. Following this review, design-level permits and licenses will be required to build and operate the Proposed Action's five components: (Upland) Mining, Operations Hub and Central Conveyor; (Shoreline) Pier and Marine Transportation.

Further environmental review will be included in these required permits and licenses:

- Section 10 and 404 permits, **USACE**;
- Safety Identification Registration, U.S. Mine Safety and Health Administration (**MSHA**);
- Ground Water Appropriation Rights Permit, **Ecology** Water Resources Division;
- National Pollutant Discharge Elimination System (**NPDES**) General Sand and Gravel Stormwater Permit, Emergency Spill Response Plan, **Ecology** Water Quality Division;
- Forest Practices approvals, including forestry service roads, **WDNR** Timber Division;
- New Source Construction Approval and Contaminant Source Registration, Olympic Air Pollution Control Agency (**ORCAA**);
- Stormwater and Building permits, Jefferson County (**DCD**);
- On-Site Sewage System Permit, Group B (Class IV) Public Water Supply System Approval, Jefferson County Department of Health Environmental Health and Water Quality (**JCHD**);
- Right of Way Access Permit, Jefferson County Department of Public Works (**DPD**).

Final engineering plans and approvals will be required for the County permits and many of the foregoing permits. In some cases, the final authority for certain aspects of the project is the County and in other cases, one of the other agencies. Details are set forth in Chapter 3.

2.2 Public Involvement and Making a Decision

See Section 2.3 for the scoping process.

The public participates in making decisions under **SEPA** and its primary vehicle, the **EIS**. In its 2003 application, the applicant requested that the proposed project undergo an **EIS**. Public comment periods follow various stages of the **SEPA** process, including this Draft **EIS**, which takes public comments from individuals, organizations and local, state, federal and tribal governments. The **DEIS** scoping process is the first formal opportunity for public comments.

This **EIS** provides a basis upon which agencies and officials will make their judgments. This **DEIS** does not represent a project decision, nor does **SEPA** require that an **EIS** be an agency's only decision-making document. Beyond the **EIS**, the Shoreline Management Act (**SMA**), Washington State Growth Management Act (**GMA**), Jefferson County **Comprehensive Plan** and its implementing regulations (**UDC**), and others represent decision factors to the Hearing Examiner and **Ecology** decision-makers.

2.2.1 Draft Environmental Impact Statement (DEIS)

A **DEIS** represents the second formal opportunity (following initial formal scoping) for public participation in the decision-making process. Jefferson County will solicit comments, including those addressing the adequacy of **DEIS** analyses and conclusions regarding probable significant adverse environmental impacts, study methodologies, reasonable alternatives and possible mitigation measures. The comment period is 30 days with a possible 15-day extension (WAC 197-11-455(6)(7)).

2.2.2 Final Environmental Impact Statement (FEIS)

Jefferson County will make formal responses to each comment received following the public comment period of the **DEIS**. The county evaluates the merit of each comment before the Responsible Official makes their final determinations. These considerations and others are part of a published **FEIS** signed by the Responsible Official and distributed to **Ecology** and all agencies with jurisdiction, including anyone who commented on the **DEIS**. The **DEIS** and **FEIS** identify potential mitigation measures. The Hearing Examiner (or other authority issuing a decision on the merits of the various permits) will determine which mitigation conditions are actually imposed.

After a minimum of seven days (WAC-197-11-460(5)), a public hearing on the Jefferson County application will be held in front of the County Hearing Examiner, where formal testimony will be taken from the **DCD** (including its staff report), the applicant, public, and other interested agencies and parties.

2.2.3 Making a Decision on Proposed Action

Various final decisions on the Proposed Action will be made by the Jefferson County Hearing Examiner and the state departments of **Ecology**, **WDFW**, and **WDNR**; as well as the **USACE**.

Upon the closing of the public hearing and comment period, the Hearing Examiner will make a final decision on the Conditional Use Permit (**CUP**) whether to approve, approve with conditions, or deny.

The Hearing Examiner will make formal recommendations to **Ecology** on the Shoreline Conditional Use and Shoreline Development permits. **Ecology** will review the permits, determine if they comply with **SMA**, and then may approve, deny or modify the Hearing Examiner recommendations, which would become additional binding conditions of approval for the Proposed Action.

The final decisions on the Hydraulic Permit Approval (**HPA**) and the Harbor Area Lease/Bedlands Lease and Use Authorization will be made by WDFW, and WDNR, respectively. The **USACE** will require compliance with the National Environmental Policy Act (**NEPA**). Following a federal review by the **USACE**, the final decision on the 401 Water Quality Certification will be made by **Ecology**.

2.3 Scoping

Public comment and review are essential components of the environmental review process. As an early “screen” in the **EIS** process, scoping collects and sorts public comments to arrive at relevant and substantive issues and concerns for further study, narrowing the scope of an **EIS** to the probable significant adverse environmental impacts and reasonable alternatives, including mitigation (WAC 197-11-408).

Scoping is the responsibility of the lead agency, which will determine the scope of the **EIS** and prepare it accordingly (WAC 197-11-408(6)). To ensure that every **EIS** is concise while addressing the significant environmental issues, the lead agency responsibilities include working with other agencies to identify and integrate environmental studies, eliminating from detailed study those impacts that are not significant, revising the scope of the **EIS** if warranted, and avoiding duplication or delay by integrating the scoping process with the existing planning and decision-making process.

Substantive issues and environmental impacts deemed for further discussion are analyzed by project component under the following natural and built environmental elements and topics in Chapters 3 and 4 of this **DEIS** (RCW 43.21C.110 [1][d] and [f], as provided in WAC 197-11-444) and listed below.

- 3.1 Air
- 3.2 Earth, including Geology and Soils
- 3.3 Marine Shoreline
- 3.4 Water, including Surface Water and Groundwater
- 3.5 Marine Plants and Animals
- 3.6 Terrestrial Plants and Animals
- 3.7 Threatened and Endangered Species
- 3.8 Land and Shoreline Use, including Recreation,
Consistency with Plans and Policies
- 3.9 Noise
- 3.10 Aesthetics, Light and Glare
- 3.11 Transportation
- 3.12 Public Services and Utilities
- 3.13 Historic, Archaeological and Cultural Resources

2.3.1 Applicant Pre-Scoping

Prior to the county's formal scoping process, the applicant produced and submitted a 96-page Draft Pre-Scoping document (December 2006) that included a project description, maps, figures and over 90 "preliminary issues and concerns to be addressed" gathered from various project tours, environmental studies, briefings, consultations and presentations conducted by the applicant. The document also gleaned from issues and concerns made during the 2002 public comment period for the Jefferson County **Comprehensive Plan** Amended Environmental Analysis for Adoption of the Mineral Resource Land Overlay (**MRLO**) (MLA 02-235) for Fred Hill Materials published in May, 2004.

The applicant's Draft Pre-Scoping document was distributed to agencies, tribes and the general public before and during the formal **EIS** scoping period conducted by Jefferson County **DCD** in 2007.

2.3.2 Jefferson County Formal Scoping

The Jefferson County **DCD** initiated public scoping by submitting notice on Aug. 20, 2007 to **Ecology's** **SEPA** Register and by issuing a legal notice on Aug. 22, 2007 in the Port Townsend Leader, the newspaper of record for **SEPA** actions within Jefferson County. Scoping notice was also covered by the Peninsula Daily News (based in Port Angeles) and Kitsap Sun (based in Bremerton).

The **DCD** conducted formal scoping from Aug. 22, 2007 to Oct. 5, 2007, advertising and posting notices for an open house and soliciting public comments, issues and concerns about the Proposed Action. The **DCD** staff along with its third-party consultant, GeoEngineers, Inc. (*see following 2.3.2.1*) took public comments and answered questions while hosting an Open House at Fort Worden Commons in Port Townsend on Sept. 27, 2007. At the back of the room, the applicant provided graphics, maps, Powerpoint images and copies of its pre-scoping document. Comments were gathered from 4 p.m. and concluded formally at 9 p.m. All written comments received were published on the Jefferson County **DCD** website.

2.3.2.1 Third-Party Consultant

In 2005, Jefferson County **DCD** issued a Request for Qualifications (**RFQ**) for a third-party consulting team to iteratively review impacts and assist the county in preparing the **EIS**, including the scoping process. Ultimately, the County selected GeoEngineers, Inc. (**GEO**), a firm with multiple regional offices, including Tacoma and Seattle, WA. **GEO's** core **EIS** management oversees a technical team of environmental professionals in the physical, biological and human environmental areas.

GEO assisted Jefferson County in its public scoping, including capturing comments, reviewing and independently synthesizing and organizing comments, letters and emails in accordance to elements of the environment (e.g., Air, Earth, Water).

2.3.2.2 *Communications Protocol*

Jefferson County prepared protocols outlining channels of communication between the County, **GEO**, and applicant. The protocols require a Jefferson County representative coordinate contact between the applicant, **GEO** and its technical team while allowing for iterative and deliberative discussions and information exchanges between the County, its consultant and the applicant, including meeting and teleconference times.

2.3.2.3 *Additional Agency Consultations*

After the formal scoping period, the applicant and Jefferson County continued consultations with agencies with jurisdiction, including the following key meetings:

- State Agency Meeting, Feb. 1, 2008, **Ecology's** Lacey Office (**Ecology**, **WDFW**, **WDNR** Aquatics Division, **WDNR** Geology Division)
- **USACE** Meeting, Jan. 28, 2008 at **USACE** Seattle Office
- Federal Agency Meeting, April 15, 2008 at **USACE** Seattle Office (**USACE**, **USFWS**, **NMFS**, **Navy**, **Ecology**, **WDNR**)
- **USACE** Meeting April 14, 2014 at project site
- Federal Agency Meeting, June 11, 2014 at **USACE** Seattle Office (**USACE**, **EPA**, **Ecology**, Jefferson County, US Navy, Regional Tribal Representatives)

Information gathered at these meetings was incorporated into this **DEIS** to reflect the environmental review needs of all agencies that will be making permitting decisions.

2.4 Issues and Concerns

2.4.1 County Scoping and Gap Analysis

All environmental issues identified by the public and agencies during the scoping period were catalogued, considered and sorted by relevance by Jefferson County. **SEPA** does not require analyses of impacts or concerns which are remote, speculative or non-substantive (WAC 197-11-782). Discussion and analyses of insignificant impacts (see Chapter 3) is either not required or shall be brief and limited, noting why more study is not required (WAC 197-11-402(3)).

Issues were defined as part of a gap analysis of studies provided, including an iterative review with the applicant, vetting and updating certain studies (i.e. traffic, noise, biological evaluation) since the county's formal scoping and public comment period. Jefferson County directed **GEO** to conduct the gap analysis of applicant studies, including issues addressed, methods used, currency and adequacy of information, to determine if technical information submitted by the applicant adequately addressed issues identified through scoping. Application documents represented a body of technical studies and background documents relative to specific aspects of the project in addition to other technical studies available from the earlier MRL application and **EIS**.

The county has analyzed a wide range of environmental resource areas including but not limited to those substantive issues receiving further discussion in Chapter 3. Potential interference with Naval Base Kitsap operations and/or tribal treaty fishing rights will require further analysis under the upcoming NEPA review conducted by the USACE.

Certain issues, which are uniquely within the jurisdiction of federal agencies, including Hood Canal bridge openings and potential bridge collisions, and concerns about interference with Naval Base Kitsap operations and tribal treaty fishing rights, will be addressed in the USACE federal permit process, including review under NEPA. Compliance with the terms and conditions of applicable federal permits will be required as a condition of approval of the project.



Scoped concerns included marine transportation impacts on bridge traffic and upland mining on wetland areas. **Left:** Vehicles back up on Hood Canal Bridge as the mid-span opens. **Source:** Applicant. **Below:** Young Douglas firs just north of designated Wetland P within the Meridian Extraction Area. **Source:** GeoEngineers.



Based on the proposed project components and their impacts on multiple elements of the environment, the county recommends the following scoped, key issues for detailed analysis (WAC 197-11-408(1)):

2.4.1.1 Construction and Operation of the Proposed Pier on Hood Canal

This includes associated shorelands and neighboring residential areas, notably:

- Aesthetics, light and glare;
- Natural shoreline processes;
- Ambient and underwater noise levels related to humans, wildlife and habitats;
- Nearshore habitat, marine mammals and threatened/endangered species;
- Existing and future shoreline land use.

2.4.1.2 Marine Transportation on Hood Canal

- Air quality and related emissions from navigation, berthing and loading activities;
- Adverse impacts from fuel leaks, oil spills and invasive species;
- Noise relating to Pier operation and loading activities.

2.4.1.3 Marine Transportation effect on Hood Canal Bridge traffic

- Traffic back-ups resulting from Hood Canal Bridge openings (assuming up to 12 project-related openings per month);
- Barge/ship allisions with the Hood Canal Bridge.

2.4.1.4 Upland Mining on Geohydrology

- Impact of mining within the MRL (Meridian Extraction Area) located in Thorndyke Area South of the Hood Canal Tree Farm;
- Quantitative and qualitative impacts to surface and groundwater, including wetlands, streams, and aquifers.

2.4.2 Summary Table of Impacts and Mitigations

A summary of the potential impacts and required Mitigation Actions and Applicant-Proposed Mitigations for both the Proposed Project and the No Action Alternative begins on the following page. This summary table is not intended to be a substitute for the complete discussion of environmental elements in Chapter 3, or the discussion of collective and cumulative effects in Chapter 4.

Table 2-1 Impact and Mitigation Summary

Element		Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
3.1 Air				
Construction	Upland Air Quality	Temporary, localized pollutant emissions in the form of dust and greenhouse gases from equipment exhaust.	Compliance with ORCAA regulations requiring reasonable precautions to control and minimize dust emissions. Maintaining all motorized equipment to achieve peak performance and for consistency with ORCAA regulations, to reduce the amount of emissions generated and minimize air quality impacts from equipment exhaust. Shutting off motorized equipment, rather than idling, during extended periods of non-use.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Marine Air Quality	Tugs/barges used in construction will generate diesel exhaust. Diesel generators can emit carbon dioxide and PM2.5. Marine transport likely to require occasional openings of the Hood Canal Bridge, with associated traffic delays. Additional vehicle idling may result in a temporary increase in local pollutants.	Vessels will be compliant with EPA standards, thereby reducing the likelihood of impacts to air quality from marine based diesel engines. Bridge openings to be restricted to overnight off-peak travel hours.	N/A
Operations	Meridian, Operations Hub, Central Conveyor	Clearing, grading, extraction and transfer of materials by loaders and conveyors within the proposed Meridian Extraction Area may create fugitive dust. Particulate emissions may also occur from wind erosion of exposed material, periodic land clearing and slash burning. Wind and motion along the conveyor length, agitation of the aggregate at each of the six transfer points, and vehicle traffic on the associated maintenance road may generate fugitive dust. Greenhouse gas emissions will occur directly from equipment, vehicles and vessels that use diesel and gasoline. Infrequent vegetation clearing and associated burning associated maintenance activities will also contribute to greenhouse gas emissions.	All proposed mining related activities that may impact air quality to be reviewed by ORCAA. If impacts are determined to be excessive, options for emission controls will be evaluated and implementation required. Mineral processing prohibited within the Meridian to reduce dust generation. Transportation of aggregate between Meridian and Operations Hub to be via conveyor (vs. trucks) to minimize dust, fine particulates. Mechanical equipment, movement of materials, and stockpiles located within the Operations Hub must be consistent with WDNR best management procedures and ORCAA requirements. 20-ft high vegetated berm along south and southeast sides of Operation Hub to further contain potential fugitive dust. The sand and gravel transferred by conveyor to the Pier typically contains low concentrations of dust and particulates. Central Conveyor system and transfer points to be covered or enclosed along entire route. Thorndyke Road crossing to be fully enclosed. Water sprayers to be used to dampen dust from the sand and gravel on the uncovered Little Wahl and Wahl conveyors. Wetting material at Conveyor loading and Central Conveyor transfer points. Dust to be removed from the returning conveyor belts by sweepers at transfer points. Pans to be placed under conveyor belt at transfer points and specific locations where seasonal streams are crossed. Controlling the drop height of material at the pier load-out. On-site electrical power to be supplied by Jefferson County PUD #1 (vs. use of diesel generators). Vehicle traffic along the unpaved conveyor access road to be limited to daily maintenance, repair trips and monitoring of the conveyor.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project, although the Central Conveyor would not be constructed. Transporting the same volume of aggregate via truck would result in significantly increased emissions compared to marine transport.

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations cont'd	<p>Tugs and ships will generate diesel exhaust.</p> <p>Tugs and ships underway may occasionally leave visible plumes that linger for several minutes, contributing to brownish haze.</p> <p>Operation of marine vessels will contribute to the global atmospheric load of carbon dioxide, increase atmospheric concentrations of greenhouse gases.</p> <p>Marine transport would require opening of the Hood Canal Bridge which could cause some traffic delays. Some engines may be left running and additional idling may result in a temporary increase in local pollutants.</p>	<p>Operations over shoreline and water conducted in enclosed environment.</p> <p>Vessels involved in marine transportation will comply with EPA standards, reducing the likelihood of impacts to air quality from marine diesel engines.</p> <p>Provision of onshore power to vessels during loading activities to minimize generation of diesel emissions.</p> <p>Marine transport will replace a multitude of deliveries by truck and trailer combinations. Marine vessel transport will represent significant reduction in carbon dioxide and diesel PM2.5 generation compared to truck transport of similar volume of aggregate.</p>	N/A
3.2 Earth, including Geology and Soils			
Meridian Extraction Area	Construction of the Little Wahl 2000' conveyor corridor requires abandoning, realigning portions of FS Road T2900, including some land clearing and grading.	<p>Temporary erosion control methods implemented through approved TESC Plan, to include efficient channeling of surface water runoff; minimizing the extent of disturbed areas; applying erosion preventing slope cover and channel liners; and constructing trench dissipaters, diversion ditches or levees.</p> <p>Seismic slope stability for cut areas to be addressed during final design and slope construction. Measures may include improved drainage, flatter slope angles, and slope benching.</p> <p>Abandoned portions of the FS Road 2900 will be regraded and revegetated, thus limiting the impact to geology and soils.</p>	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
Construction	Operations Hub	Erosion control measures - see above	Location of any future Hub unknown at this time.
	Central Conveyor	<p>Prior to construction, a geotechnical and hydrogeological design level study will be required. Study to include subsurface explorations and stability analyses, especially in areas identified as landslide hazard. Study required before issuance of any building permits.</p> <p>Erosion control measures – see above</p> <p>Conveyor will be set back at least 50 feet from the top of the steep slope areas in the north portion of the alignment.</p> <p>Construction cut slopes will be re-vegetated and stabilized.</p> <p>Cut slopes associated with construction may generally be built at lesser grades than existing slopes or may be supported by retaining structures, lessening the potential for erosion.</p> <p>Preliminary design incorporates significant soil cuts in the bluff area to stabilize the area.</p> <p>Seep water and stormwater would be collected at various sources in the vicinity of the conveyor and tight lined downslope.</p>	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations	Meridian Extraction Area	Applicant limited to opening up maximum 40-acre segments or in accordance with WDNR's best management practices. Reclamation to occur for each segment as mining is complete. Mining depth limited to no deeper than 10-feet above the elevation of the seasonal high groundwater table. Mine operator to post performance bond to assure reclamation. BMPs would keep both the stockpiled top soils and exposed soils from eroding. Permanent erosion control measures, including regular inspection and maintenance of slopes and disturbed areas, to ensure the surficial stability of cut slopes and disturbed areas. Required NPDES Permit will regulate stormwater control and release.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Operations Hub	No Mitigating Measures proposed.	N/A
	Central Conveyor	Once construction cut slopes have been re-vegetated and stabilized, potential for erosion would be reduced. No Mitigating Measures proposed.	N/A
3.3 Marine Shorelines			
Construction	Turbidity and Sediment	Permits and licenses from USACE, WDFW, and Jefferson County required prior to any construction. Project proponent to complete design level studies for the pier and over water conveyor delivery system. Each study borehole would be backfilled with grout and wave action will likely cover each borehole area with sediment. Activities would be regulated for stormwater discharges, turbidity and spills as a result of in-water work under this program. Coastal zone management certification required through Ecology. Piles to support the pier would be installed during the summer or early fall during the approved fish "work window" to avoid fish migration. Piles to be installed in portions of the sand flat area during low tide conditions. Local currents will disperse suspended sediments from pile driving and barging operations at a moderate to rapid rate. No shoreline armoring is proposed as part of the project.	N/A
	Metals/ Organotins	No Impacts anticipated No Mitigating Measures proposed	N/A
	Petroleum hydrocarbons	Potential for fuel spills during construction Fueling of vessels will not occur onsite, any spill or leak would be limited to that contained within the tug or ship BMPs will be implemented in marine areas to minimize the risk of fuel spills and other potential sources of contamination. Develop a spill prevention response plan that includes provisions for onsite containment equipment prior to any construction activities.	N/A
	Nutrients, Bacteria, and Exotic Species	No Impacts anticipated No Mitigating Measures proposed	N/A
	Dissolved Oxygen	No Impacts anticipated No Mitigating Measures proposed	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations	Turbidity and Sediment Structures may block wave energies thereby impacting long shore transport of sediment Prop wash due to intermittent and ongoing boat/barge traffic. Increased stormwater runoff from pier facility and conveyor in the nearshore area. Incidental spills of gravel from the conveyor and pier structure.	Final design, orientation of the pier must ensure that long shore sediment transport will not be obstructed, and that waves will not be deflected in a manner that causes the sediments near the surface of the seabed on either side to accumulate or be scoured away by tidal action. Final design will minimize alterations to drift cell dynamics. Assuming that propeller depth will be 75 feet, boat orientation and other boat and operating specifics, scouring impacts from propeller wash would likely be short term, localized and have no significant adverse impact. Runoff will be minimized by a design feature that would geotechnically stabilize the lower portion of the single conveyor route along the shoreline bluff. A cut and drainage system will be placed to minimize bank erosion capturing runoff.	N/A
	Metals/ Organotins	Leaching of metals and tributyltin from coatings on boat/barges in direct contact with the water column.	N/A
	Petroleum hydrocarbons	Oil and gasoline/diesel spills due to accidents. Incidental oil and gasoline/diesel leaks and contaminated rainwater runoff from boat/barges. Increased discharge of petroleum or exhaust products from idling automobile traffic on Hood Canal Bridge during bridge closures for barge/boat traffic.	N/A
	Nutrients, Bacteria, and Exotic Species	Release of greywater from vessels with resulting inputs of nitrogen/phosphorus and bacteria into Hood Canal	N/A
	Dissolved Oxygen	Release of greywater from vessels with resulting inputs of nitrogen and phosphorus into Hood Canal which is already limited for dissolved oxygen concentrations.	N/A
3.4 Water, including Surface Water and Groundwater			
Construction	Lakes and Streams	Surface waters may be impacted by uncontrolled erosion of soils exposed during land clearing, grading and construction activities along the four mile central conveyor.	N/A
	Stormwater	Potential for sediment laden runoff during construction of Central Conveyor. Stormwater from the construction sites may be contaminated with sediment, high pH (greater than pH 7), phosphorus, petroleum products and other pollutants from historical contamination or natural soil conditions.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Construction cont'd	Groundwater	Potential contamination from spills and leaks during construction.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Wetlands	Approx. 475 sq. ft. of wetland impact from construction of the central conveyor Approx. 61,849 sq. ft. of wetland buffer impact from construction of the central conveyor. Surface waters may be impacted by uncontrolled erosion of soils exposed during land clearing, grading and construction activities along the four mile central conveyor.	N/A
	Lakes and Streams	Impervious surfaces send stormwater directly into streams, leading to damaged streambeds. Stormwater contaminants could theoretically flow overland from extraction activities and reach Thorndyke Creek. At times of prolonged heavy precipitation, a more rapid travel time between the surface and groundwater table may temporarily alter the flow in Thorndyke Creek, potentially resulting in flash events.	N/A
Operations	Stormwater	Pavement and other impervious surfaces send stormwater directly into streams and wetlands. Sediment laden stormwater runoff can enter groundwater.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Groundwater	Potential spills and leaks during mining operations and at the Hub. Sand and gravel mining that alters water flows into wetlands, surface and ground waters may impact aquifer recharge. At times of prolonged heavy precipitation, a more rapid travel time between the surface and groundwater table may temporarily alter the flow in Thorndyke Creek, potentially resulting in flash events.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Wetlands	No Impacts from operations are anticipated	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
3.5 Marine Plants and Animals	Marine Vegetation	<p>Any piles driven through patches of <i>Z. japonica</i> eelgrass will destroy or displace eelgrass immediately under pile footprints.</p> <p>Grounding barges could destroy eelgrass due to excessive sediment compression.</p> <p>Accidental fuel spills could potentially coat eelgrass fronds or other macrovegetation and inhibit photosynthesis and growth.</p>	N/A
	Fish and Marine Mammals	<p>Pile driving produces waterborne noises that may injure or cause behavioral disturbances to fish and marine mammals.</p> <p>Fish may alter their normal behavior, which includes minor startle response and avoidance of project construction activities.</p> <p>Injuries or avoidance of fish resulting from pile driving could have an indirect impact to marine mammals which rely on those fish in their diet.</p> <p>Species will likely be temporarily displaced from the pier footprint during the two month construction period.</p> <p>Food resources may be reduced until benthic and epibenthic invertebrates have the chance to recolonize.</p> <p>Construction disturbances over the intertidal zone could impact marine animals and their habitats near the lower end of the single conveyor as it approaches the 990 foot pier that extends to water depths of approximately -50 feet MLLW.</p>	N/A
	Shellfish and Benthic Species and Habitats	<p>Temporary disturbance of benthic resources within the intertidal zone are typical when work barges are used as a platform to construct the overwater conveyor through grounding or from use of spuds/anchors.</p> <p>Permanent loss of benthic and epibenthic fauna will be small and limited to areas where piles are placed.</p>	N/A
	Seabirds	<p>Pile driving produces waterborne noises that may injure or cause behavioral disturbances to seabirds, especially diving birds.</p> <p>Injuries to, or avoidance by, fish (including forage fish) resulting from pile driving could have an indirect impact to seabirds which rely on those fish in their diet.</p>	N/A
Construction		<p>Update previous macrovegetation studies to locate vegetation prior to construction, to more accurately define potential eelgrass impacts and determine any required mitigation.</p> <p>Eelgrass is seasonal and likely shifts in the project area due to currents and wave action.</p> <p>Alignment and depth of the pier were chosen to directly avoid impacts to native eelgrass (<i>Z. marina</i>).</p> <p>Grounding of barges during construction activities will be avoided when possible. BMPs will minimize the risk of fuel spills and an agency approved spill prevention and response plan will be developed.</p> <p>Agency approved in-water work windows will be adhered to minimize impacts to juvenile salmon.</p> <p>Vibratory hammer to be used for the majority of pile installation. Bubble curtain to be used when proofing with an impact hammer.</p> <p>Use of a soft start approach to pile driving to encourage fish to move away from the area.</p> <p>If required, conduct a pre-construction forage fish survey at the location of the proposed pier alignment.</p> <p>Required monitoring of marine mammals during pile driving will reduce the potential for exposure to noise.</p> <p>If pinnipeds are spotted within the injury zones, pile driving would cease until the animals have left the respective zones.</p>	
		<p>Impacts will be temporary and limited to 2-month in-water work construction period.</p> <p>After in-water work, daily tidal inundations will quickly restore bottom habitats to their pre-construction grade.</p>	N/A
		<p>Data from Hood Canal Bridge pile driving indicated no significant impacts to seabirds as a result of that impact pile driving.</p> <p>A marbled murrelet monitoring program will likely be required and all work will stop when a marbled murrelet is spotted within the project area.</p> <p>A soft start and a bubble curtain will be used when pile driving.</p>	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations	<p>Accidental fuel spills could potentially coat the eelgrass fronds or other macrovegetation and inhibit its photosynthesis and growth.</p> <p>In the pier and pier approach area, accidental aggregate spills along the overwater portions of the conveyor may bury existing eelgrass resources. It is probable that there will be a negligible reduction in Z. japonica eelgrass productivity as a direct result of shadows cast by the conveyor.</p> <p>The shadow from the northern mooring dolphin and from the outer support tower will reach adjacent native eelgrass beds in the early morning hours.</p>	<p>BMPs will minimize the risk of fuel spills and an agency approved spill prevention and response plan will be developed.</p> <p>The enclosed design of the conveyor in all overwater marine areas minimizes the potential aggregate spill impacts.</p> <p>Barge aggregate spills, if they occur will not impact marine macrovegetation since the barges are moored in deep water.</p> <p>The alignment of the conveyor was designed to avoid the native eelgrass. During major growth periods of eelgrass, shadows from the conveyor and pier are not expected to reach the large patch of native eelgrass north and east of the pier except in the early morning.</p> <p>Given the height and width of the pier and average sun angle, shading from the pier will traverse marine water along the pier alignment throughout each day and remain over any specific eelgrass patch for a maximum of one to two hours each day.</p> <p>Because of the low sun angle in the early morning, light refraction off the water surface will be great and the amount of photo synthetically active radiation reaching the bottom/ eelgrass will likely be below the threshold for photosynthesis with or without the project structures.</p> <p>Conveyor support structure and service walkway to have open steel girders and grated decking to minimize shading effects.</p>	N/A
	Fish	<p>Juvenile salmon are reluctant to migrate beneath piers and floats where there are sharp contrasts between open, lighted areas and darker areas beneath piers.</p>	N/A
	Marine Mammals	<p>Operational noise and activities may cause some behavioral avoidance or attraction as specimens approach the facility.</p> <p>An increase in ships and barges in Hood Canal could increase the potential for marine mammal collisions.</p>	N/A
	Shellfish and Benthic Species and Habitats	<p>Overwater conveyor could impact marine resources and habitats over the intertidal and shallow subtidal zones, altering drift cell processes and longshore sediment transport.</p> <p>Changes in sediment grain size profiles could alter the existing benthic community and epibiota.</p> <p>If sand and gravel is spilled at discharge points, sand and gravel would be added to the beach and in deeper water, spilled sand and gravel could alter the nature of the benthic fauna and epibiota in localized areas.</p>	N/A
	Seabirds	<p>No impacts anticipated</p>	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
3.6 Terrestrial Plants and Animals			
Construction	<p>Plants</p> <p>New gravel surfaced service roads would be constructed to align closer to the conveyor route, requiring some clearing of vegetation and possibly grading. Construction of the Central Conveyor will also involve clearing of vegetation along the conveyor alignment.</p> <p>Staging areas for the conveyor construction may also involve vegetation clearing.</p>	<p>Construction of the central conveyor will be completed primarily from existing gravel forestry service roads.</p> <p>Direct clearing for the access road and conveyor supports would be small scale, localized and not likely to impact wildlife given the undisturbed vegetation in surrounding areas.</p> <p>Staging areas will utilize recently cleared lands from timber harvesting where possible.</p>	N/A
Construction cont'd	<p>Animals</p> <p>Construction activities may result in short term avoidance by bald eagles during the two month construction window.</p> <p>During removal of vegetation, some bird nests may be lost.</p> <p>Some amphibians, reptiles and terrestrial mollusks may be lost during construction activities.</p> <p>Noise associated with construction activities along the central conveyor may result in short term avoidance by wildlife species.</p> <p>Construction noise may temporarily disrupt feeding and migration and result in short term avoidance by birds and other wildlife in the area.</p> <p>Animals that occur within such localized areas or that use surface waters nearby may be negatively affected by possible contamination (accidental oil and grease spillage). Effects may include mortality, illness, stress or disruption of the reproduction cycle.</p>	<p>Efforts will be made to minimize the removal of trees during construction to reduce loss of habitat.</p> <p>Vegetation similar to that removed will be allowed to reestablish in some areas, limiting wildlife impacts.</p> <p>Displaced animals and birds will likely return to the area once construction is complete.</p> <p>Proper implementation of BMPs and quick cleanup will prevent or minimize any potential effects of spills.</p>	N/A
Operations	<p>Plants</p> <p>Mining to incrementally remove existing habitat.</p> <p>Shading of vegetation under the Central Conveyor.</p> <p>Central Conveyor shading may affect the types or vigor of surrounding replacement vegetation.</p> <p>Vegetation on the bluff under the approach to the Pier to be removed and replaced.</p>	<p>Mining to occur in segments not exceeding 40 acres, with reclamation and replanting of cleared and mined areas once mining in that segment is complete.</p> <p>Disturbed upland habitat along the central conveyor will be restored through replanting of native vegetation.</p> <p>Abandoned portions of forestry service roads will be realigned and re-vegetated.</p> <p>Vegetation under the Pier approach would transition to a shrub dominated area to minimize maintenance.</p>	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project, although the Central Conveyor would not be constructed.
	<p>Animals</p> <p>Increased noise during extraction and processing activities at Meridian and Operations Hub.</p> <p>Impediment to wildlife migratory patterns and increased noise from the Central Conveyor.</p> <p>Slower, less mobile animal species may expire.</p> <p>Noise from the conveyor may cause altered behavior and avoidance of terrestrial wildlife and birds.</p> <p>Noise can also affect vocal communications of birds within zones where noise levels are elevated above ambient levels.</p>	<p>Operations Hub would be located within area previously used as a processing center. Wildlife and birds are likely to be acclimated to these longstanding noise conditions.</p> <p>Activities would be conducted per the Ecology administered NPDES general sand and gravel permit and county stormwater permit conditions.</p> <p>Central Conveyor to have a minimum 2-foot ground clearance for wildlife crossings, with 4-foot ground clearance crossings every 300 feet, and 6-foot ground clearance crossings every 900 feet.</p> <p>Animals may cross under the conveyor or move into habitat away from the structure to avoid noise disturbance.</p>	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
3.7 Threatened and Endangered Species			
In-Water Noise	<p>Pile driving and work vessel activity during construction may cause short term disturbance of salmonids, rockfish, marbled murrelets and steller sea lions.</p> <p>Noise can disturb and/or injure: marbled murrelets, salmonids, rockfish, and steller sea lions.</p> <p>Based on studies outline in the BE for the project Puget Sound Chinook, Hood Canal summer run chum, Puget Sound steelhead and Coastal Puget Sound bull trout may alter their normal behavior including minor startle response and avoidance of the immediate project area as a result of the project construction activities.</p> <p>Although adult and juvenile rockfish are unlikely to be affected from vibratory pile driving, it is possible that small numbers of larval yelloweye rockfish, canary rockfish and bocaccio could be affected.</p> <p>Pile driving could cause short term behavioral disturbance to marbled murrelets over a distance of 1.3 miles</p> <p>If steller sea lions enter the disturbance zone during the project pile driving and removal activities may cause a startle response or interruption of foraging from project related noise not yet attenuated to the disturbance threshold.</p>	<p>Work to be conducted during the agency regulated in-water work window when the fewest juvenile salmonids are expected in the project area.</p> <p>Use of a soft start approach to pile driving to encourage fish to move away from the area.</p> <p>Use of a vibratory hammer for a majority of pile installations.</p> <p>As required, use of a bubble curtain or equivalent during pile driving to decrease noise levels.</p> <p>Adherence to agency approved marbled murrelet construction monitoring plan.</p> <p>Adherence to a federal agency approved marine mammal construction monitoring plan.</p>	N/A
Upland and Over Water Noise	<p>The 2-month construction activity may result in short term avoidance by bald eagles, but breeding and nesting activity is not expected to be affected.</p> <p>Increased noise levels may temporarily disrupt foraging behavior of bald eagles in the project vicinity.</p> <p>Noise can also affect vocal communications of birds within zones where noise levels are elevated above ambient levels.</p>	<p>Potential effects would be temporary, highly localized and cease once construction is complete.</p>	N/A
Marine Water and Sediment Quality	<p>Turbidity may exceed background levels within the immediate vicinity of construction and could exceed turbidity criteria for state water quality standards.</p>	<p>Depending on tidal stage, local currents will disperse suspended sediments from pile driving operations at a moderate to rapid rate, making it unlikely to directly affect juvenile or adult salmonids or listed rockfish that may be present.</p> <p>Hollow steel piles will be used for pier construction will not introduce or leach contaminants into site sediments.</p>	N/A
Prey Resources	<p>Project construction within the footprint of each pile to remove approx. 734 sq. ft. of potential benthic and epibenthic prey resource substrate for listed salmonids.</p> <p>Piles driven through eelgrass patches would destroy or displace eelgrass immediately under pile footprints. The loss of eelgrass productivity reduces support for epiphytic zooplankton, a prey source for juvenile salmon.</p> <p>Grounding of work barges would disrupt the bottom layer that could alter the localized nature of benthic biota.</p> <p>Pile driving and work barge activities during pier construction may result in short term and localized disturbances to forage fish, a prey species for salmonids, marbled murrelets and steller sea lions.</p> <p>The project may also affect upland prey resources for listed species.</p>	<p>Loss of benthic habitat would be partially offset by pilings with a vertical hard substratum habitat upon which invertebrate and algal colonization will occur.</p> <p>Alignment and depth of pier chosen to directly avoid impacts to native eelgrass.</p> <p>No forage fish spawning areas have been documented in proximity of the pier alignment. WDFW may require pre-construction forage fish survey to ensure nominal impacts to forage fish spawning.</p> <p>BMPs will be used to control site erosion, reducing any potential turbidity effects.</p> <p>Location of pilings and construction techniques will minimize any impacts to the disturbed Wetland B which reduces impacts to wetland prey resources for upland species.</p>	N/A
Benthic Habitat	<p>Grounding of work barges during construction of the overwater portions of the pier would disrupt substrate.</p> <p>Dropped anchors, used to hold position, would likely impact benthic habitat.</p>	<p>The preferred method of construction would try to avoid grounding of barges.</p>	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Construction cont'd	Essential Fish Habitat Actions may have short term highly localized impacts to the EFH of several federally managed species commonly found in nearshore littoral areas. These species will likely be temporarily displaced from the pier footprint during the construction period. Food resources may be reduced until benthic and epibenthic invertebrates have the chance to recolonize. Permanent loss of benthic and epibenthic fauna will be small and limited to areas where piles are placed.	In-water construction activities will be limited to a 2-month period. Permanent loss of benthic or epibenthic habitat will be minimized.	N/A
	Designated Marine Critical Habitat Temporary avoidance by salmon of the construction area, ceasing once construction is completed. Potential to affect only nearshore marine habitat (PCE) for Chinook and Summer run chum salmon. Potential to affect proposed freshwater spawning habitat, freshwater rearing habitat, freshwater migration and nearshore marine habitat (PCEs) for steelhead. Project has the potential to affect only water quality (PCE) for adult and juvenile rockfish.	In-water construction to take place during the approved work windows outside of the juvenile salmon outmigration period. Pier was designed to avoid interference with the natural littoral drift of sediment and natural processes affecting recruitment and productivity of food sources (benthic, epibenthic and zooplankton communities) along the Toandos Peninsula. Mitigating measures identified under Earth and Groundwater will minimize impacts to Thorndyke Creek.	N/A
Operations	In-Water Noise No impacts anticipated.	No Mitigating Measures are proposed.	N/A
	Upland and Over Water Noise When approached by vessels, marbled murrelets and other seabirds will either swim or fly away from the vessel's path or dive under water. Noise generated by over water operation, like offloading activities, could result in minor disturbance to flight behavior between marine waters and upland areas.	No Mitigation measures are proposed.	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations cont'd	<p>Mining will not have an effect on water quality. Operations hub will have no effect.</p> <p>There is a potential for the central conveyor to have a spillage of sand and gravel into a stream.</p> <p>Incidental spills of gravel from the conveyor and pier structure.</p> <p>Leaching of metals and tributyltin from coatings on boat/barges that are in direct contact with the water column. Prop wash due to intermittent and ongoing boat/barge traffic.</p> <p>Increased stormwater runoff from pier facility and conveyor in the nearshore area.</p> <p>Incidental oil and gasoline/diesel leaks and contaminated rainwater runoff from boat/barges.</p> <p>Increased discharge of petroleum or exhaust products from idling automobile traffic on Hood Canal Bridge during bridge closures for barge/boat traffic.</p> <p>Release of greywater from vessels with resulting inputs of nitrogen and phosphorus into Hood Canal which is already limited for dissolved oxygen concentrations.</p> <p>Release of greywater from vessels with resulting inputs of nitrogen/phosphorus and bacteria into Hood Canal.</p>	<p>Elevated conveyor would span local drainages and be equipped with pans under the return belt at specific locations to minimize potential of spillage. Transported sand and gravel will be relatively free of fine materials, minimizing potential for turbidity.</p> <p>Strong currents and tidal exchanges in project area would also reduce potential for accumulation of metals and organotins within the water column and substrate.</p> <p>No antifouling paint will be applied onsite.</p> <p>Assuming that propeller depth will be 75 feet, boat orientation and other boat and operating specifics, scouring impacts from propeller wash would likely be short term, localized.</p> <p>Runoff will be minimized by a design feature that would geotechnically stabilize the lower portion of the Conveyor route along the shoreline bluff. A cut and drainage system proposed to minimize bank erosion, capturing runoff.</p> <p>Fueling of vessels will not occur onsite, any spill or leak would be limited to that contained within the tug or ship.</p> <p>A MOP to be prepared, including standard procedures and protocols covering safety and environmental elements addressing fuel spill prevention and response plan.</p> <p>Only treated sewage or greywater may be discharged within 3 miles of shore.</p> <p>All tugboats and ships will hold and dispose of their sewage and greywater in accordance with applicable federal and state rules and regulations.</p> <p>Discharge of greywater by vessels associated with this project to be prohibited.</p> <p>Federal law requires vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore before they are allowed to discharge ballast into waters of the state, minimizing the risk of introducing exotic species or potential deleterious effects to listed species.</p>	N/A
	<p>Reduction in prey abundance and disruption of juvenile salmonid migratory behavior may result from the shadowing effects from large over water structures built on nearshore habitats</p> <p>Operation of the pier is expected to result in negligible effects on the spawning success of pacific sand lance,</p> <p>Negligible amount of riparian vegetation to be removed during construction.</p>	<p>Effects will be minimized by utilizing open steel girders and grated decking for the maintenance walkway.</p> <p>Pier shading will move throughout the day further minimizing impacts.</p>	N/A
	Benthic Habitat	<p>Incidental spills of gravel from the conveyor and pier structure.</p>	N/A
	Essential Fish Habitat	<p>Potential spillage of sand and gravel from barges.</p>	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations cont'd	Minimal effects to nearshore migratory corridors will occur due to shading, localized decreases in benthic and epibenthic productivity may temporarily reduce food abundance for juvenile salmon, steelhead or juvenile rockfish. Artificial lighting at night can alter the feeding, schooling, predator avoidance and migratory behaviors of fish.	Pier was designed to avoid interference with the natural littoral drift and natural processes affecting recruitment and productivity of benthic epibenthic and zooplankton communities. Permanent loss of benthic habitat will be small and partially replaced by new hard pile substrates. Lighting of the conveyor and pier across marine habitats would be restricted to the minimum required to conform to applicable safety requirements. Direct lighting of the water surface would be minimized with shielding. Pier lighting would be turned off except as required for loading operations, maritime safety and navigation.	N/A
3.8 Land and Shoreline Use, including Recreation and Consistency with Plan and Policies			
Construction	Meridian Mining	Construction noise likely "noticeable" to bordering rural residences.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Operations Hub	Construction noise likely "noticeable" to bordering rural residences.	N/A
	Central Conveyor	Increased noise from construction during the quietest hour of the permitted construction period could be considered beyond "substantial" to the nearest rural residences at southern end of conveyor. Noise during construction of crossing over Thorndyke Road may be considered "disturbing" to nearby rural residents.	N/A
	Pier	Increased noise from construction during the quietest hour of the permitted construction period could be considered beyond "substantial" to the nearest residences and shoreline summer cabin. Short-term spikes in noise, such as pile-driving impact testing, would be considered beyond "substantial"	N/A
		Hours of construction further limited to starting 1 hour past sunrise or 7:00 a.m., whichever is later. In-water portion of Pier construction period estimated to last 2-3 months.	N/A
Operations	Meridian Mining	Use of designated mineral resource land within commercial tree farm for surface mining. Adjacent rural residences would not see the mining area, and operational noise levels would not exceed day or night maximum levels.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Operations Hub	Operation of 100-acre Operations Hub at previous Shine Hub. Portions of Operations Hub are visible to adjacent and more distant rural residences. Operational noise levels would not exceed permissible day or night maximum levels, but could be "noticeable" to the nearby residence on a warm, summer night.	N/A
	Central Conveyor	Use of 4-mile corridor within commercial tree farm for an aggregate conveyor. Conveyor visible at a distance to rural residences as it leaves the Hub and climbs a ridge, and at the crossing of Thorndyke Road. Noise from Transfer Point #6 may impact the residence along Groves Way.	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Construction cont'd	Pier Conversion of undeveloped shoreline property to resource-based industrial use. Introduction of resource-based activity, with associated noise, light and glare, into rural residential area and along shoreline. Initially, only barges to utilize Pier. After 8-10 years, up to 6 Panamax class ships to call on Pier per month, based on market demand. At maximum use, Pier to be used up to 24-hours per day, 300 days per year. Visual impacts and auditory impacts from conveyor and gravel loading to those using the shoreline for recreation.	Barge loading times range from 1-8 hours, typical barges loaded in 2-3 hours. No more than 2 barges to be berthed at Pier at one time, and no more than 6 barges/day. Ship loading times range between 8 and 24 hours. No barges to be loaded when ships are present. Protocols to be established to minimize the lighting necessary on the pier for loading, and on-board lighting of ships. Existing recreational use of the project shoreline is limited. The recreational experience along the beach will be changed, but will not be prohibited. Approval of Jefferson County Zoning Conditional Use Permit and Shoreline Conditional Use Permit required.	N/A
	Marine Transportation Increase in tugs, barge and ship traffic in northern Hood Canal. At times, marine vessels may be audible to shoreline residences.	No Mitigating Measures proposed.	N/A
3.9 Noise			
Construction	Occupational Noise No Impacts are anticipated	Construction workers required to follow occupational noise standards, protocols and BMPs, including state regulations, MSHA, and OSHA standards for workplace exposure to sound. Construction worksites to comply with all applicable federal and state occupational noise rules and regulations.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Environmental Noise Increased noise levels generated from the various construction activities that would occur within Meridian, Operations Hub and along the conveyor route would most likely be noticeable to bordering residences. Under a worst case scenario construction of the final section of the central conveyor and the pier would generate a sufficient increase in noise levels that nearby residents would consider the noise to be disturbing.	State and County noise rules and regulations exempt construction activities from compliance with the maximum permissible environmental noise levels during weekday daytime work hours. Use of construction equipment that is in good working order, especially properly maintained noise muffling systems. Staging work efficiently to minimize the days needed to construct. Restricting all construction activities to the hours of 7 a.m. to 7 p.m. weekdays only – no work at night or on the weekends. Further restrict the daily start of any construction activities for building of the pier to one hour past sunrise or 7 a.m., whatever time is later.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Occupational Noise Noise generating activities would occur at the Meridian Extraction Area during extraction and conveying of sand and gravel to the Operations Hub, processing at the Operations Hub, conveying the sand and gravel via the Central Conveyor to the Pier, and during loading on to barges and ships for maritime delivery.	All work related activities of the action are subject to the rules and regulations of at least one of federal and state occupational safety regulatory agency.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
Operations	Meridian Mining Noise levels projected to be in compliance with applicable maximum day and night noise levels.	Mining area located within commercial tree farm, removed from developed residential areas.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Operations Hub Noise levels projected to be in compliance with applicable maximum day and night noise levels. Projected noise levels likely below those from previous Shine Pit mining activity in this area. Noise level only considered "noticeable" at nearby residence only under certain conditions such as a warm, summer night.	20-foot earthen berm to be constructed between Hub and residences to southeast.	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations cont'd	Central Conveyor For upland portion of conveyor, noise levels projected to be in compliance with applicable maximum day and night noise regulations. For shoreline portion of conveyor, noise levels projected to be in compliance with applicable maximum day and night noise regulations.	Central conveyor design considerations, include covering or enclosing the central conveyor along its entire route, reducing conveyor noise levels. County SMP noise restrictions allow a maximum of 50 dBA at 100 feet away from the source of the sound.	N/A
	Pier Noise levels projected to be in compliance with applicable maximum day and night noise regulations. Activities generating noise will be periodic, but frequent. Generally, loudest source of noise project to be at end of Pier, with loading of sand and gravel. Under certain weather conditions, the project-related noise may be audible to residences on the east side of Hood Canal.	County SMP noise restrictions allow a maximum of 50 dBA at 100 feet away from the source of the sound. Activities exceeding this standard would require approval of a Shoreline Permit Variance. Final 450-foot of Pier structure to be fully enclosed, attenuating noise. The Pier would only be used up to 300 days annually. Establishing continuous noise monitoring at the nearest residential receptors to the pier to identify actual noise generated from the project. Possibly restricting the use of a back up alarms and whistles prior to startup of the conveyor during nighttime operations.	N/A
	Marine Transportation Sound generated from vessel operation may be audible to nearshore receptors.	Maximum of 6 ships per month would call on the Pier.	N/A
3.10 Aesthetics, Light and Glare			
Construction	Meridian Extraction Area Construction activities not visible to adjacent residences.	No Mitigation Measures Proposed	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Operations Hub Construction activity visible from rural residences at varying distances from the project site.	Construction activities limited to the hours of 7:00 a.m. to 7:00 p.m., minimizing the need for night lighting. Visible portions of construction activity would temporary, limited in duration. (see above)	N/A
	Central Conveyor Construction activity visible as conveyor leaves Hub and climbs ridge, and at Thorndyke Road crossing.		N/A
	Pier Construction activity visible to adjacent residents and, at a distance, to those having views of this shoreline.	Construction activities restricted to the hours of 7:00 a.m. or one hour past sunrise (whichever is later) to 7:00p.m., minimizing the need for night lighting. In-water work limited to 2-3 month time frame.	N/A
	Meridian Extraction Area Located outside of local public view sheds. Active mining and recently reclaimed areas visible in the distance from viewpoints on Mt. Walker. Lighting from the project during night work limited to lights on heavy equipment used to extract sand and gravel. Also, a downward directed portable light at the hopper feeding the Wahl Conveyor.	Ridgelines located west and east of the Meridian Extraction Area completely screen the operation from surrounding rural residences.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations cont'd	<p>Operations Hub</p> <p>Stockpiles expected to be the most visible component to surrounding residences and travelers on SR 104.</p> <p>Visible from portions of Shine and its overlooking hillside, shoreline and bluff homes located across Hood Canal, the Hood Canal Bridge, and Salisbury Point Park.</p> <p>Residences along Squamish Harbor, looking west would be able to see portions of the proposed Operations Hub as could travelers on SR 104.</p> <p>Residences located higher on the hillside across SR 104 and bluff above Squamish Harbor would be on able to peer from a distance into the Hub, as would westbound travelers on the hill portion of Shine Road.</p>	<p>20-foot high, vegetated earthen berm to be constructed on the southeastern HUB property line. Patches of fast growing deciduous trees and conifers to be planted on berm to provide screening.</p> <p>Structures to be painted in low reflective natural colored material to help blend in to the surrounding area.</p> <p>Processing area would not directly obstruct views and would make up only a small portion of existing views, with relatively low overall prominence.</p> <p>Views of the Olympic Mountains from SR 104 may be somewhat obstructed, but not blocked by fleeting glimpses of Hub activities.</p> <p>Squamish Harbor area residences are primarily oriented away from the Hub and toward the water, so primary waterfront views would be unaltered.</p> <p>Project components would not block the mountain views.</p> <p>In compliance with US National Park Service Interim Design Guidelines for Outdoor Lighting, all outdoor lighting at the Hub would be of the type and design, minimizing glare leaving the site.</p>	N/A
	<p>Central Conveyor</p> <p>Becomes visible when it leaves the Hub and ramps up to the forested ridge, and as it crosses Thorndyke Road.</p> <p>Location of existing forested road is visible to some surrounding residences and travelers on SR 104.</p> <p>Linear shape of the conveyor may detract from the natural setting in the middle ground and associated background views of Olympic Mountains.</p>	<p>Structures to be painted in low reflective natural colored material to help blend in to the surrounding area.</p> <p>Landscape plan to be submitted with the grading plan for the cut area at top of shoreline bluff, to reduce visual contrasts.</p> <p>Approximately 90 % of the 4-mile long central conveyor to be located on upland private forest lands, not visible to adjacent properties.</p> <p>Where visible, low proportion of the field of view and tends to blend into the background of surrounding tree farm.</p> <p>No outdoor lights proposed for Central Conveyor.</p>	N/A
	<p>Pier</p> <p>Visible from many areas throughout northern Hood Canal.</p> <p>At night, loading ships would generate light and glare. Visibility of the lighting can be increased by both the reflective nature of water as well as the unobstructed views water provides.</p> <p>Tug lighting is variable and spotlights are typically used at arrival and departures.</p> <p>Pier would begin to be visible from Manhattan Beach.</p> <p>Pier would be on the peripheral southern view of 15 shoreline residences on Manhattan Beach north of the pier.</p> <p>On Kitsap shoreline, Pier would be within the lines of sight for many shoreline and bluff residences. Pier could detract somewhat from views of the Olympic Mountains but the distance across the Canal reduces the overall visual footprint. Views at night would be changed as well.</p> <p>Pier would convert the existing natural setting within Manhattan Beach to a built maritime setting: the pier would add a noticeable overwater structure. Project would introduce lighting to a currently dark area.</p> <p>Loading would create point and wash lighting in an area with currently little lighting.</p>	<p>Pier to be painted a color that best blends into the visual environment.</p> <p>Type, orientation and design of the pier structure to minimize glare leaving the site.</p> <p>Specific lighting requirements would be developed in consultation with US Coast Guard to provide navigational safety lighting.</p> <p>Nighttime lighting would be minimal when not in use and limited to that required for navigation, safety and security.</p> <p>Lighting for the loading would be on the overhead load out gantry and directed downward.</p> <p>On the Jefferson County shoreline, South Point would block the view of the pier from residences in Bridgehaven and north, including all but the eastern most edge of Suquamish Harbor.</p> <p>Pier would not be visible from the closest residences to the southwest.</p> <p>Protocols to be established to minimize the lighting necessary on the pier for loading, and on-board lighting of ships.</p>	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations cont'd	<p>Increase in tug, barge and ship traffic would be a notable visual change on Hood Canal.</p> <p>Vessels traveling close to shore may be a new sight that would dominate views over several minutes, replacing open water, sky and the opposite shoreline as the major visual component.</p> <p>Marine traffic can create visible plumes from stack emissions. During temperature inversions, emissions can be trapped at view level, resulting in lingering lines of plumes and eventually brownish haze.</p>	Most of the time, prevailing winds and upward rise would disperse emissions to the point of not being visible.	N/A
3.11 Transportation			
Construction	Marine Vehicle Traffic	Expected that in-water work would stop to make way for Tribal fishing.	N/A
	Vehicle Traffic	<p>Openings of the Hood Canal Bridge to be restricted to evening, off-peak travel hours.</p> <p>Increased construction traffic will not decrease existing levels of service.</p>	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Marine Vehicle Traffic	<p>Preparation of a marine operations plan (MOP) in consultation with the Coast Guard, USACE, Navy, WSDOT, Ecology, WDFW, Puget Sound Harbor Safety and Security Committee, and Jefferson County.</p> <p>A spill containment boom, a small tender capable of operating the boom and other safety and maintenance equipment will remain on site.</p> <p>Potential impacts and mitigating measures related to bridge allisions to be addressed in the federal permitting and NEPA process.</p> <p>Potential impacts and mitigating measures related to interference with Tribal fishing or U.S. Navy vessel traffic to be addressed in the federal permitting and NEPA process.</p>	N/A
Operations	Vehicle Traffic	<p>All tugboats and barges calling on the Pier proposed to cross under the Bridge's eastern fixed span, not requiring a Bridge opening.</p> <p>All ships calling on the Pier to limit travel through the Bridge draw-span to overnight, off peak vehicle travel hours.</p> <p>Employee start times are to be staggered rather than concurrent, and if necessary, employees can also access the Meridian Extraction Area through Wahl Lake Road.</p>	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
3.12 Public Services and Utilities			
Construction	Mining and Operations Hub	<p>Fire suppression equipment, portable sanitation facilities and temporary construction stormwater controls would be required to be provided at every construction site.</p> <p>Construction would follow all applicable design and industry construction standards and occupational safety rules.</p>	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Marine Transportation and Pier Operations	<p>Coast Guard regulations require all contractors involved with Pier and nearshore construction to have trained workers and equipment necessary to respond to emergencies.</p> <p>Fire suppression equipment, portable sanitation facilities and temporary construction stormwater controls would be required to be provided at every construction site.</p> <p>Construction would follow all applicable design and industry construction standards and occupational safety rules.</p>	N/A

Element	Proposed Project Potential Impacts	Proposed Project Mitigating Measures	No Action Alternative – Impacts
Operations	Mining and Operations Hub Low probability that additional emergency incidents would contribute significantly to the annual call volume for fire, rescue or emergency medical responses by FD No. 3 or other public service providers. New demands on telecommunications and water for the Operations Hub, the on-site septic system and stormwater controls at Meridian and Hub anticipated to be minimal.	Implementation of the occupational safety rules and regulations required by federal and state agencies including worker training and required availability of onsite fire, rescue and emergency medical response equipment previously have been instrumental in minimizing incidents that might have required an emergency response. If upgrades to any component of the PUD's power grid is necessary, costs would be the responsibility of the applicant. Public and private utilities to be installed, used and maintained in compliance with applicable state, county or utility regulations.	Any future surface mining within Meridian would result in impacts similar to the mining portion of the proposed project.
	Marine Transportation and Pier Operations Additional emergency incidents not anticipated to contribute significantly to the annual call volume for fire, rescue or emergency medical responses by Fire District No. 3 or other public service providers.	Implementation of the occupational safety rules and regulations required by the various federal and state agencies including worker training and required availability of onsite fire, rescue and emergency medical response equipment have been instrumental in minimizing incidents that might have required an emergency response. Coast Guard regulations require all contractors involved with Pier and nearshore construction to have trained workers and equipment necessary to respond to emergencies. The applicant has agreed to install automatic fire suppression systems at the control, power and equipment rooms located at the end of the Pier. Firefighting, rescue and emergency medical equipment to be stationed within reach of the pier operators. A tender available for both rescue and placement of spill containment, would also be stationed on mooring dolphin. Preparation of MOP in consultation with the U.S. Coast Guard, USACE, Navy, WSDOT, Ecology, WDFW, Puget Sound Harbor Safety and Security Committee, and Jefferson County.	N/A
3.13 Archaeological and Cultural Resources			
Construction	Construction activities to include ground disturbance within commercial tree farm and on Hood Canal shoreline.	Archeological and cultural resource assessments prepared for the proposed project found a low probability that historic properties would be encountered or disturbed. Distance and nearby vegetation would screen recorded historic properties from indirect impacts. None of the proposed project operations are visible from the nearest identified archaeological site (45JE287) near Shine Creek. Preparation of an Unanticipated Discovery Plan. If any discoveries of historic resources were to occur, permitted events in the immediately area would cease, and the area would be secured. Local Tribes and the State Office of Archeology and Historic Preservation would be notified.	N/A
Operations	Area occupied by the pier in the intertidal and nearshore waters of Hood Canal is within the usual and accustomed fishing and shellfish harvesting area of the signatory tribes to the Point No Point Treaty of 1855. Activities associated with transit, navigation and loading of tugs, barges and ships may affect tribal fishing and shellfish harvesting areas.	Beaches in the project vicinity would remain accessible to tribal undertakings. Regarding use of the Pier, up to 65 days will be allotted annually in consideration of tribal fishing, holidays, inclement weather and periods of non-use. Potential impacts to Tribal fishing and shellfish harvesting, and impacts to the Tribal Canoe Journey will be addressed in the federal permitting and environmental review (NEPA) process.	N/A

CHAPTER 3

Environmental Elements/Topics



3.1 Air

3.2 Earth

Including Geology and Soils

3.3 Marine Shorelines

3.4 Water

Including Surface Water and Groundwater

3.5 Marine Plants and Animals

3.6 Terrestrial Plants and Animals

3.7 Threatened and Endangered Species

3.8 Land and Shoreline Use

Including Recreation, Consistency
with Plans and Policies

3.9 Noise

3.10 Aesthetics, Light and Glare

3.11 Transportation

3.12 Public Services and Utilities

3.13 Archaeological and Cultural Resources

3.0 Introduction

Under SEPA, probable significant adverse impacts on both the natural and built environment must be analyzed (RCW 43.21C.110 [1][d] and [f], WAC 197-11-4140 (6)(e); WAC 197-11-144).

In Chapter 3, each of the 13 environmental elements or topics listed below includes an overview of applicable federal, state and local regulatory requirements, along with a narrative analysis of the affected environment, and direct and indirect impacts resulting from construction and operation of the proposed project.

While substantive issues identified under Jefferson County's formal scoping process (see Chapter 2) receive further analyses in Chapter 3, discussion of insignificant impacts is brief, limited to a summary of impacts and/or notes why more study is not warranted (WAC 197-11-402(3)). Natural and built environmental elements and topics for this DEIS are from those specified in WAC 197-11-444:

- 3.1 Air
- 3.2 Earth, including Geology and Soils
- 3.3 Marine Shoreline
- 3.4 Water, including Surface Water and Groundwater
- 3.5 Marine Plants and Animals
- 3.6 Terrestrial Plants and Animals
- 3.7 Threatened and Endangered Species
- 3.8 Land and Shoreline Use, including Recreation,
Consistency with Plans and Policies
- 3.9 Noise
- 3.10 Aesthetics, Light and Glare
- 3.11 Transportation
- 3.12 Public Services and Utilities
- 3.13 Archaeological and Cultural Resources

Following Chapter 3, Chapter 4 then provides a comprehensive analysis of four key issues identified in the December 16, 2013 Jefferson County **SEPA** Scoping Letter. Chapter 4 also addresses Mitigating Measures, and Unavoidable Adverse Impacts as a whole, as well as the No Action Alternative and Cumulative Impacts.

NOTES

- Terms and acronyms highlighted in **BOLD** are identified in the glossary included in this DEIS.
- For reader's convenience, key reports used in consideration of each particular environmental element are listed at the end of each sub-chapter. The complete list of references can be found after Chapter 4 of this document, or are available online.
- Copies of all chapters, appendices, reports and references are available for review and download on www.jeffersonco-treis.info or www.co.jefferson.wa.us/commdevelopment/FHMhome.htm.
- Copies of all chapters, appendices and reports are also available for review through the Jefferson County Department of Community Development; which is the depository of the official record.

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3.1 AIR

Air quality can affect human health and well-being, as well as environmental quality, wildlife, and aesthetics. Contaminants in air can affect on-site workers, equipment, and facilities; local residents and businesses; regional receptors; and the global climate. Exhausts generated by vehicles and vessels transporting those materials to market can generate pollutants that affect local and regional air sheds and the global atmosphere. The evaluation of impacts to air quality in this **DEIS** focuses on two main activities of the proposal:

- extraction, handling, and movement of aggregate within the project area (upland); and,
- transportation of aggregates by barges and ships to local, regional, intrastate, and interstate markets (marine).

Extraction, handling, and transportation of aggregate materials (sand and gravel) generate dust that can affect local air quality. This dust, called “particulate” or “particulate matter” is defined as any airborne finely divided solid or liquid material with an aerodynamic diameter smaller than 100 micrometers.

3.1 1 Regulatory Overview and Permits

Because of the public health concern, fine respirable particulates are regulated by federal, state, and local statute. Air quality is regulated at the federal level by the U.S. Environmental Protection Agency (**EPA**) under the Clean Air Act (USC Title 42, Chapter 85); at the State level by the Washington Department of Ecology (**Ecology**) under the Washington Clean Air Act (RCW 70.94); and at the local level by the Olympic Region Clean Air Agency (**ORCAA**) under the Regulations of the Olympic Region Clean Air Agency (ORCAA 2012), and Jefferson County and East Jefferson Fire Rescue by agreement with **ORCAA**. Although **EPA** and **Ecology** have an oversight role, **ORCAA** is the agency with primary responsibility regarding regulatory and permitting compliance.

3.1 1.1 Federal

Under its authority granted by the Clean Air Act, the **EPA** has established National Ambient Air Quality Standards (**NAAQS**) for the nation. **NAAQS** defines the maximum concentration of seven criteria pollutants of concern to the health and welfare of the general public. Washington State has adopted the federal **NAAQS** with the exception of Sulfur Dioxide (SO_2) for which Washington has more stringent criteria, and Total Suspended Particulates (**TSP**) for which there currently is no federal standard. Federal and comparable State standards are presented in Table 3.1-1. **ORCAA** standards comply with **NAAQS** and Washington State standards (Keyport 2010).

Table 3.1-1 National and State Ambient Air Quality Standards

Pollutant	Averaging Period	National Standards		Washington State Standards	Details
		Primary	Secondary		
Ozone	8-hour	0.075 ppm	0.075 ppm		The 3-year average of the annual 4th highest daily 8-hour maximum is not to be above this level.
	1-hour (Daily Maximum)			0.12 ppm (235 mg/m ³)	Not to be above this level on more than 1 day in a calendar year.
Particulate Matter (PM _{2.5})	Annual (Arithmetic Mean)	12.0 ug/m ³	15.0 ug/m ³		The 3-year average from a community-oriented monitor is not to be above this level.
	24-hour	35 ug/m ³	35 ug/m ³		The 3-year average of annual arithmetic mean concentrations at each monitor within an area is not to be above this level.
Particulate Matter (PM ₁₀)	Annual (Arithmetic Mean)			50 ug/m ³	Not to be above this level more than once in a calendar year.
	24-hour	150 ug/m ³	150 ug/m ³	150 ug/m ³	Not to be above this level more than three days over 3 years with daily sampling.
Carbon Monoxide	8-hour	9 ppm (10 mg/m ³)		9 ppm (10 mg/m ³)	Not to be above this level more than once in a calendar year.
	1-hour	35 ppm (40 mg/m ³)		35 ppm (40 mg/m ³)	Not to be above this level more than once in a calendar year.
Nitrogen Dioxide	Annual (Arithmetic Mean)	0.053 ppm (100 ug/m ³)	0.053 ppm (100 ug/m ³)	0.05 ppm (100 ug/m ³)	Not to be above this level in a calendar year.
	1-hour	0.100 ppm			The 3-year average of the annual 98th percentile of the daily maximum 1-hour average at each monitor is not to be above this level.
Sulfur Dioxide	Annual (Arithmetic Mean)	0.03 ppm		0.02 ppm	Not to be above this level in a calendar year.
	24-hour	0.14 ppm		0.10 ppm	Not to be above this level more than once in a calendar year.
	3-hour		0.5 ppm (1300 ug/m ³)		Not to be above this level more than once in a calendar year.
	1-hour			0.40 ppm	Not to be above this level more than once in a calendar year.
	1-hour			0.25 ppm	Not to be above this level more than twice in a consecutive 7-day period.
	1-hour	75 ppb			The 3-year average of the annual 98th percentile of the daily maximum 1-hour average is not to be above this level.
Lead	Rolling 3-month Average	0.15 ug/m ³	0.15 ug/m ³		Not to be above this level.
	Quarterly Average	1.5 ug/m ³	1.5 ug/m ³		
Total Suspended Particulates	Annual (Geometric Mean)			60 ug/m ³	Not to be above this level.
	24-hour			150 ug/m ³	Not to be above this level more than once in a calendar year.

Source: http://www.ecy.wa.gov/programs/air/Nonattainment/WA_Stds_April2010.pdf

Areas not in compliance with the **NAAQS** may be declared “nonattainment areas” by the **EPA**: geographic areas designated by **EPA** as exceeding a **NAAQS** for a given criteria pollutant (40 CFR Part 81). An area is nonattainment only for the pollutants for which it has been designated nonattainment. Areas in compliance with the **NAAQS** are defined as being “in attainment”. Areas that have been reclassified from nonattainment to attainment are designated as attainment/maintenance areas. Areas that lack the monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are treated as attainment areas for regulatory purposes.

The **EPA** adopted standards (EPA 2008) to reduce emissions of diesel $PM_{2.5}$ and nitrogen oxide (NO_x) from marine diesel engines. This three- tiered program aims to:

- Tighten emissions standards for existing large marine diesel engines when they are remanufactured (Tier 2, 2008);
- Set near-term engine-out emissions standards, referred to as Tier 3 standards (2009), for newly-built marine diesel engines; and,
- Set longer-term standards, referred to as Tier 4 standards (scheduled for 2014), for newly-built marine diesel engines that reflect the application of high-efficiency after-treatment technology.

The **EPA** estimates a 90 percent reduction in PM and 80 percent reduction in NO_x from emissions from Tier 4 standards compared to engines meeting Tier 2 standards (EPA 2008).

On August 1, 2012, the **EPA** and Environment Canada established a North American Emission Control Area (ECA) of 200 nautical miles around the US and Canadian coasts. The objective of the ECA is to reduce emissions from ships that might be harmful to coastal environments. All vessels operating within the ECA must now use Low Sulfur Fuel Oil (LSFO) which has a limit of 1 percent sulfur. On January 1, 2015, the allowable sulfur content further reduces to 0.1 percent.

3.1 1.2 State

ORCAA operates air monitoring sites for $PM_{2.5}$, ozone, and carbon monoxide (CO) in Jefferson County at Port Townsend, and regulates air contaminant emissions through its permitting program. Specific emission standards and prescribed control measures are delineated in a construction permit and/or operating permit. **ORCAA** also regulates outdoor burning and defers the outdoor burning permit program to local fire protection authorities, conservation districts, or counties. Within the project area, burning permits are administered by East Jefferson Fire Rescue.

The State of Washington Surface Mine Reclamation Act (Ch. 78.44 RCW) requires a site-specific reclamation plan to specify Best Management Practices (**BMPs**) for control of dust and erosion, and for monitoring. The Washington State Department of Natural Resources (**WDNR**) requires site-specific reclamation plans to minimize windborne dust from disturbed areas after mining is complete.

In Washington State, **Ecology** has issued guidance to its staff for determining which projects should be evaluated for greenhouse gas emissions under the State Environmental Policy Act (**SEPA**). Projects that would annually generate 10,000 metric tons or more (above and beyond current emissions), of new carbon dioxide equivalent (CO_{2e}) would need to be at least qualitatively evaluated. Ten thousand metric tons is the equivalent of the emissions produced by 2,092 passenger cars in one year. **Ecology** anticipates the majority of projects would not meet this threshold. Projects exceeding 25,000 metric tons CO_{2e} annually should be quantitatively evaluated (Ecology 2011).

3.1 1.3 County

Jefferson County's approval of the Wahl-Meridian Mineral Resource Lands Overlay (**MRLO**) through the Ordinance 14-1213-02 (**Ordinance**), requires mining to be in compliance with **ORCAA** regulations and **BMPs**, and dust to be controlled through watering or other methods acceptable to the **SEPA** official. The maximum disturbed area may not exceed 40 acres. Section 18.20.240(2)(f) of the Jefferson County Code further prohibits the use of equipment or material which produces "... dust, smoke, odor... to the detriment of surrounding property owners."

Jefferson County also regulates Critical Aquifer Recharge Area, in which the Proposed Project lies, requiring documentation of compliance with **ORCAA** permit requirements (Jefferson County 2004).

The County's goals and policies are discussed in Section 3.8 Land Use

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Section 3.8 Land Use. The following goals and policies are applicable to the Proposed Project's impacts on air quality:

ENVIRONMENTAL ELEMENT GOAL

- ENG 6.0 Protect air quality from the adverse impacts of land use and development and improve it where it is degraded.

ENVIRONMENTAL ELEMENT POLICY

- ENG 6.2 Land use activities that create or compound air quality problems should be avoided or mitigated.

The Proposed Project will require a Conditional Use Permit and a Shoreline Conditional Use Permit. In its recommendation on the Conditional Use Permits, the Hearing Examiner must consider whether the proposed use will "introduce noise, smoke, dust, fumes, vibrations, odors, or other conditions or which unreasonably impact existing uses in the vicinity of the subject site." (JCC 18.40.530(1)(d)). In its recommendation on the Shoreline Conditional Use Permits, the Hearing Examiner must consider whether the proposed is consistent with certain performance standards, including:

- Industrial developments shall comply with all federal, state, regional, and local requirements regarding air and water quality. No pollution of air by fly-ash, dust, vapors, odors, smoke, or other substances shall be permitted that are harmful to

health, animals, vegetation, or other property, or that can cause excessive soiling. (SMP Performance Standard 3).

- Industrial facilities shall be so located, designed, and operated to eliminate all unnecessary noxious odors. (SMP Performance Standard 11).

Jefferson County and the City of Port Townsend have jointly resolved to address energy use and climate change. These jurisdictions have established a Climate Action Committee to develop strategies for reducing the City's and County's carbon footprint (PT-JeffCo 2011). Strategies include government actions and practices that would reduce energy use and thus reduce greenhouse gas emissions.

3.1 2 Affected Environment

The local climate and landscape influence air quality. The Proposed Project is located within the Georgia Basin/Puget Sound Airshed (see Figure 3.1-1). The site is situated in a maritime temperate climate region. The average annual high temperature is approximately 60°F (15.6°C), ranging between an average summer maximum of 75°F (23.9°C) and an average winter maximum of 45°F (7.2°C) (WRCC 2013). The average annual low temperature is approximately 43°F (6.1°C), ranging between an average summer minimum of 53°F (11.7°C) and an average winter minimum of 34°F (1.1°C). Subfreezing temperatures and snow are rare. The area averages approximately 54 inches (137.2 cm) of rain a year, with the majority of precipitation falling in the late fall and winter months. Winds in the area are most frequent and strongest from the south-southwest, followed by winds from the south. Average wind speed is approximately 7 mph (11.2 kph); however, during intense storm events winds can gust in excess of



Georgia Basin/Puget Sound Airshed

The "Basin" has become the focus of regional efforts for environmental protection and restoration, including air and water quality, salmon habitat, and river and marine ecosystems. Primary regional air pollution issues include ozone, fine particulate matter (PM), and visibility. **Source:** Environment Canada

30 mph (48.3 kph) (WRCC 2013). Temperature inversions and associated stagnant air patterns occasionally trap pollutants and create visible haze and poor air quality. **ORCAA** occasionally issues burn bans within Jefferson County during such inversions. Typically, precipitation and predominant winds channeled up Hood Canal quickly dissipate the low level of emissions.

3.1 2.1 Existing Ambient Air Quality

The project area is in attainment for all criteria air pollutants, including **TSP** and PM_{10} , and existing air quality is considered very good (MFG 2004). **ORCAA** $PM_{2.5}$ monitoring data from the Port Townsend monitoring station (station closest to the project site) shows zero days with unhealthy air quality between 2001 and 2012, and has not recorded levels above the applicable $PM_{2.5}$ standard during this period. In the project vicinity, traffic from State Route 104 is the primary source of air pollutants, such as CO. Other pollutant sources include marine vessels, wood stoves, outdoor burning, forestry and mineral extraction operations (ORCAA 2012).

3.1 2.2 Odors

Nuisance odors are subject to **ORCAA** regulations and enforcement actions. No odor-related complaints have been received in the project vicinity within the last seven years (ORCAA 2012).

3.1 2.3 Off-Site Receptors

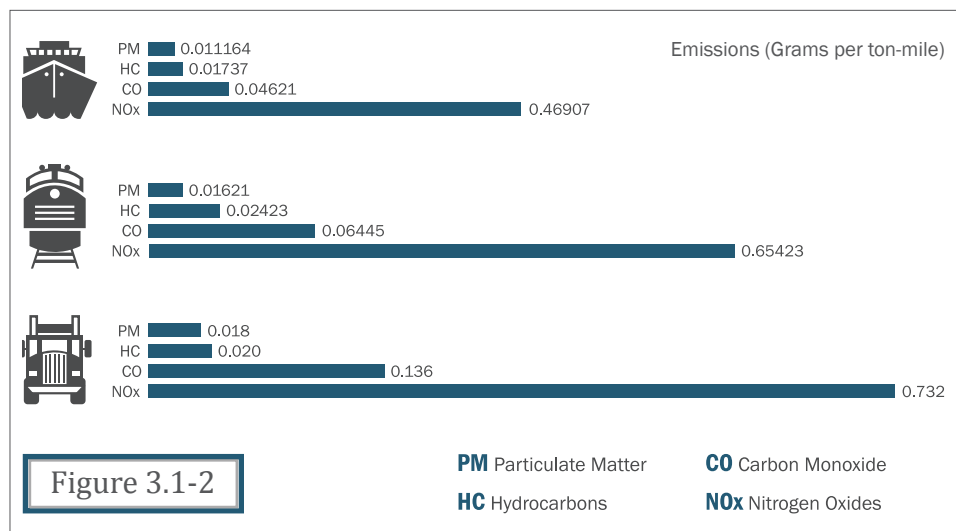
See Section 3.8 Land Use for figures depicting these locations.

Existing land uses within the area surrounding the Meridian Extraction Area, Operations Hub, and proposed Central Conveyor are limited to mining operations, commercial tree farming, and scattered residences. The residence closest to the Meridian Extraction Area is located on Thorndyke Road, approximately 2 miles south of the southern border of the extraction area. For the Central Conveyor and Pier, the nearest residence considered an “off-site receptor” is a summer cabin located approximately 840-feet northeast of the Proposed Central Conveyor and 1,140-feet southwest of the Proposed Pier (Enviroanalysis 2011). Communities along the Hood Canal shoreline near the Proposed Project include the rural residential developments of Eaglecrest, Bridgehaven and Shine community. Industrial development is located on the east side of Hood Canal at the Naval Base Kitsap-Bangor (NBK Bangor).

3.1 3 Proposed Action: Direct and Indirect Impacts

Typically, the only pollutants emitted by sand and gravel operations in sufficient quantities to be a potential air quality concern are particulates in the form of fugitive dust (MFG 2004). Larger particulates (Total Suspended Particulate (**TSP**)) are not considered a health risk. These particles, if inhaled, are expired. However, they may be considered nuisances that may unreasonably interfere with the use and enjoyment of property, settling on plants, cars, and houses, and getting carried into interior spaces. Respirable particulate matter less than 10 microns (PM_{10}) and equal to or less than 2.5 microns ($PM_{2.5}$) in diameter constitute a public health concern. These microscopic particles can collect in the lungs of humans and wildlife causing lung damage that may lead to chronic diseases such as emphysema, chronic bronchitis, and cancer (Ecology 2001).

Air quality may also be affected by combustion of fuels (primarily diesel but also gasoline) used by machinery during extraction, processing, and transportation of aggregate materials. The primary greenhouse gas, carbon dioxide (CO₂), is generated by fuel combustion and emitted into the atmosphere. Operation of machinery to excavate, process and convey sand and gravel may directly or indirectly generate CO₂. Transportation of aggregate to markets, either by truck or vessel, also results in CO₂ emissions (See Figure 3.1-2).



Emissions Associated with Bulk Transport Carriers

The emission comparison between barges, trains and trucks show that fewer air pollutants are generated by barges. **Source:** National Waterways Foundation (Modal Comparison of Domestic Freight Transportation Effects 2012)

Ecology has identified diesel exhaust as the air pollutant most harmful to public health in Washington State (Ecology 2006). Seventy percent of the cancer risk from airborne pollutants is from diesel exhaust. It makes healthy people more at risk for respiratory disease and worsens the symptoms of people with health problems such as asthma, heart disease, and lung disease.

Diesel exhaust contains a complex mixture of gaseous pollutants and fine particles that include over forty cancer-causing substances. Toxic microscopic particles in diesel exhaust (diesel PM_{2.5}) pose the most serious risk from diesel exhaust because of both the toxic nature of the particles and the fact that they can be breathed deeply into the lungs where they remain lodged. The harmful components of PM_{2.5} from diesel exhaust are more toxic than other forms of PM_{2.5} such as wood smoke. Recent research shows that diesel PM_{2.5} can cause very serious health effects even at levels much lower than air quality standards allow (Ecology 2006).

See Table 3.1-1 for more information on this research.

3.1 3.1 Construction

Construction of the Proposed Project would include clearing of vegetation (approximately 11.6 acres) and limited excavation and grading to modify existing forest service roads and to create new alignments for the Proposed Central Conveyor corridor. Construction will also include assembly of the "Little Wahl", Wahl Conveyor (corridor previously prepared) and the Central Conveyor, assembly of processing equipment and structures at the Operations Hub and construction of the Pier. Clearing and excavation specific to mining activities are considered part of normal operations.

Construction activities will result in temporary, localized pollutant emissions in the form of dust and greenhouse gas from equipment exhaust as well as nitrogen oxides (NO_x), carbon monoxide (CO), and hydrocarbons (HC). Construction of the upland portion of the Proposed Action is expected to last for approximately a year. Construction of the Pier and associated structures is expected to take approximately two months. The construction contractor(s) will comply with **ORCAA** Section 9.05 Regulation I which requires reasonable precautions to control and minimize dust emissions. Dust and greenhouse gas emission control measures during construction may include:

- Applying water or dust suppressants to exposed earth during dry weather;
- Washing vehicles and truck wheels;
- Preventing dirt, mud, and other debris from accumulating on public roadways by stabilizing construction entrances and cleaning road surfaces;
- Maintaining all motorized equipment used during construction to achieve peak performance, reduce the amount of emissions generated, and minimize air quality impacts from equipment exhaust; and,
- Shutting off motorized equipment, rather than idling, during extended periods of non-use (MFG 2004).

3.1 3.2 Operations

Aggregate extraction, processing, and conveyor systems would be located within a commercial tree farm and rural waterfront property on Hood Canal. Within the Proposed Project site, the sand and gravel that would be transferred by the Proposed Conveyor system to the marine load-out facilities typically contain low concentrations of dust and particulates. Samples collected from the Wahl-Meridian extraction areas contained materials that are generally coarse and contain low amounts of fine particulates with less than 5 percent silt content by weight (GeoResources 2003). Excavated sand and gravel from the project area are generally damp, and do not naturally generate dust. The Conveyors will be covered or enclosed throughout their entire length to reduce exposure of the sand and gravel to wind.

Greenhouse gas emissions will occur directly from equipment, vehicles and vessels that use diesel and gasoline. Infrequent vegetation clearing and associated burning associated with maintenance activities also will contribute to greenhouse gas emissions. It is anticipated that required electrical power will be provided by Jefferson County PUD #1. Emissions associated with vehicles used as part of the project must be consistent with federal regulations. Emissions associated with individual pieces of equipment are analyzed and regulated through **ORCAA**. Vessel emissions are regulated by the **EPA**. Because of the existing regulatory standards, the applicant anticipates that the project will not exceed 25,000 metric tons CO₂ annually—the maximum permitted under most current **Ecology** guidelines.

3.1 3.2.1 Meridian Extraction Area

Unless effectively managed, clearing, grading, extraction, and transfer of materials by loaders and Conveyors within the proposed Meridian Extraction Area may create fugitive dust. Particulate emissions may also occur from wind erosion of exposed

materials, periodic land clearing and slash burning. The incremental increase in mining operations from the Proposed Project may result in a proportional increase in emissions of fugitive dust, PM_{10} , and $PM_{2.5}$, but would remain within regulatory limits.

Potential air quality impacts may occur during mining activities (extraction and conveyance) at the Meridian Extraction Area and along the Wahl Conveyor and Central Conveyor corridors. To reduce potential impacts to air quality, the **Ordinance** prohibits truck transportation of extracted materials from mining areas to the Operations Hub because constant haul-truck traffic on unpaved roads during dry periods generates excessive fugitive dust and contributes to fine particulate air pollution. Continuous watering of the road would minimize dust, but is impractical. In addition, using trucks to haul material to the Operations Hub and would contribute to vehicle emissions, so transportation of extracted aggregate will be via Conveyor between the Meridian Extraction Area and the Operations Hub. The **Ordinance** also prohibits mineral processing within the Meridian Extraction Area. These imposed limits will result in reduced dust generation within the Meridian Extraction Area and along the route between the active mining area and Operations Hub.

All proposed mining-related activities that may impact air quality will be reviewed by **ORCAA**. All mining activity is subject to reasonable performance standards and review of off-site air quality impacts. In situations where impacts are determined to be excessive to off-site receptors, options for emission controls will be evaluated and implementation required. Typical emission controls implemented in mining operations include watering of dust generating surfaces where necessary (JeffCO MLA 2004).

Because the Meridian Extraction Area is located within a Critical Aquifer Recharge Area, Jefferson County requires that, prior to commencing mining operations, the project proponent submit documentation from **ORCAA** verifying that the operation is in compliance with **ORCAA** permit requirements (JeffCo MLA 2004). Air pollution emissions are not located near any sensitive land uses.

Limits imposed on mining activities by Jefferson County and **ORCAA** will guard against air quality impacts to both on-site and off-site receptors. With the use of adequate air quality control measures such as dust suppression through watering, and proper operation and maintenance of mining equipment and the Wahl Conveyor, significant air quality impacts or generation of nuisance odors from mining activities are not anticipated. Because of the distance from the mining to the nearest residential uses (2.0 miles), no impacts to these land uses are anticipated. Depleted mining areas are subject to site-specific reclamation plans required by **WDNR**; these plans will minimize windborne dust.

3.1 3.2.2 Operations Hub

Mechanical equipment, movement of materials, and stockpiles located within the Operations Hub must be consistent with **WDNR** Best Management Procedures and **ORCAA** requirements. Aggregate transport to and from the processing area will be by electrically powered Conveyors rather than diesel-powered trucks. Also, electrical power, historically generated on-site with diesel generators, is now supplied by Jefferson County Public Utility District #1. Generators may still be used as backup or auxiliary power.

Activities at the proposed Operations Hub will be covered under an operations permit issued by **ORCAA**. The permit will cover required emission control measures and monitoring requirements. It is anticipated that operations will be compliant with operation permits and will not violate air quality or odor standards.

A 20-foot-high vegetated berm will be constructed on the south and southeast (prevailing wind) sides of the Operation Hub and is expected to further contain potential fugitive dust.

3.1 3.2.3 *Central Conveyor*

The proposed Central Conveyor is capable of transporting 3 to 6 tons of sand and gravel per hour. Wind and motion along its length, agitation of the aggregate at each of the six transfer points, and vehicle traffic on the associated maintenance road may generate fugitive dust. The probability of fugitive dust emissions will primarily be a function of the material's moisture content and its exposure to variable speeds of wind (MFG 2004).

See detailed Project Description, Chapter 1 for more information.

Air emissions from the Conveyor are not anticipated to be significant due to design, operational, and environmental features. Water sprayers will be used to dampen dust from the sand and gravel. These sprayers will be located at the beginning of the Conveyor and at transfer points. The Conveyor and transfer points will be covered or enclosed throughout the entire length. Dust will be removed from the returning Conveyor belts by sweepers at the transfer points. Additionally, pans will be placed under the Conveyor belt at transfer points and specific locations where seasonal streams are crossed. The Thorndyke Road crossing will be fully enclosed to capture any material that might fall from the returning Conveyor. These measures will effectively reduce fugitive dust and sediment. Workers will periodically remove spilled material as needed from the pans and floors and place it back onto the supply-feed belt (per **WDNR BMP**). Much of the central Conveyor will run through or adjacent to forested terrain which will provide additional screening from wind. Vehicle traffic along the unpaved access road will be limited to daily trips to conduct maintenance and repairs and to monitor the performance of the Conveyor. Depending on weather conditions, dust suppression may be required.

It is unlikely that the activities described above will cause significant air quality impacts. The closest residential receptor, a summer cabin, is at the shoreline, and is approximately 840-feet to the northeast of the Central Conveyor.

3.1 3.2.4 *Pier*

Dust emissions from the load-out process are a function of the fineness and moisture content of the sand and gravel, ambient wind speed, and drop height. The Conveyor along the proposed Pier will be enclosed, shielding the sand and gravel from wind erosion. This will considerably limit the generation of fugitive dust. Dust emissions from material being dropped from the Conveyor during load-out operations will be controlled by design features including an adjustable loading arm with a vertical chute that will minimize drop height to 15-feet or less.

Operations at the Proposed Pier are not anticipated to increase nuisance odors. It is unlikely that the activities described above will cause significant air quality impacts.

The closest residential receiver is at the shoreline, approximately 840-feet from the closest point of the Proposed Pier. The load-out chute would be located approximately 1,400-feet waterward of this residence.

3.1 3.2.5 *Marine Transportation*

Tugs and ships will generate diesel exhaust during arrivals, departures, berthing, and operations in the vicinity of the Proposed Pier; and during transport of aggregates to local, regional, intrastate, and interstate markets. Depending on atmospheric conditions, such emissions will have a temporary limited effect on local air quality due to the number of tugs and ships involved and the distances between these sources and nearby residential receptors. The closest residential receptor, a summer cabin, is approximately 840-feet from the Pier. While the main engines of tugs or ships will not run while berthed at the Pier, ships may operate their diesel generators. Primary emissions from marine diesel engines are NO_x and diesel $\text{PM}_{2.5}$; secondary diesel emissions include ozone and CO (Starcrest 2007).

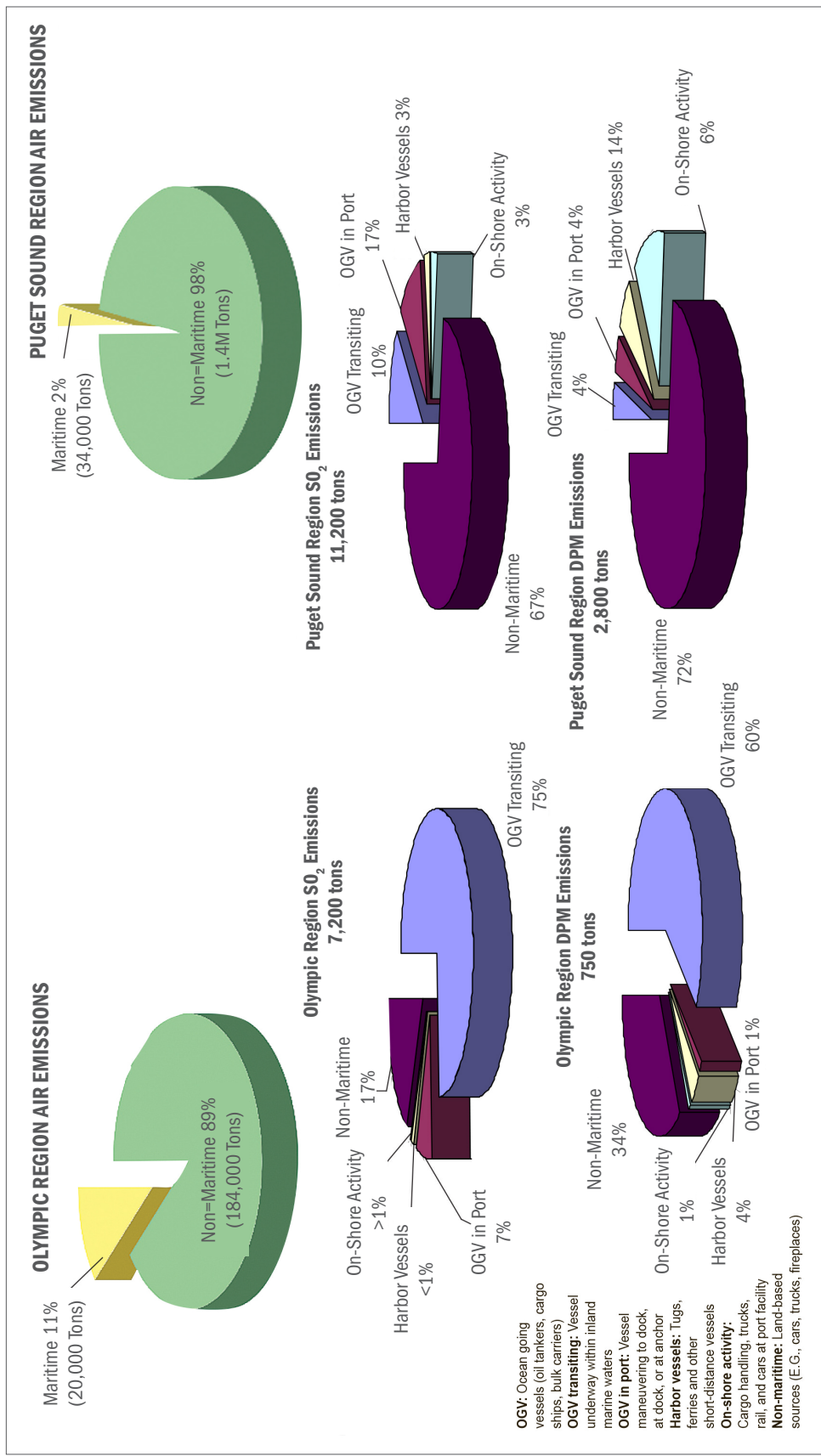
Within Hood Canal and the immediate vicinity of the proposed Pier, prevailing winds will typically dissipate the tugboat and ship emissions. Occasionally, during calm winds and temperature inversions, tugboats and ships underway may leave visible plumes that may linger for several minutes and contribute to a brownish haze resulting from the cumulative effect of all emission sources including marine vessel traffic, residential sources, and vehicular traffic.

The EPA has promulgated rules intended to reduce air contaminant emissions from non-road diesel engines, including marine-based diesel engines. EPA's Tier 1, Tier 2, Tier 3, and Tier 4 (interim Tier 4 and final) emission standards for non-road diesel engines require compliance with progressively more stringent standards for hydrocarbon, CO, diesel $\text{PM}_{2.5}$, and NO_x (Starcrest 2013). These standards, which began to take effect in 2007, are resulting in significant benefits by reducing particulate matter from new and existing engines (EPA 2010). Vessels involved in marine transportation associated with the Proposed Project will be compliant with these standards, thereby reducing the likelihood of impacts to air quality from marine based diesel engines. Additionally, low sulfur Diesel and Ultra Low Sulfur Diesel fuel requirements now imposed by the EPA and Environment Canada for the 200 nautical miles around the US and Canadian coasts will reduce air quality impacts from marine vessels operating in these waters (EPA 2010).

The Puget Sound Maritime Air Forum commissioned a 2011 Puget Sound Maritime Air Emissions Inventory in order to better understand the nature, location and magnitude of emissions from maritime-related operations within the U.S. portion of the Puget Sound/Georgia Basin International Airshed (See Figure 3.1-3). This inventory focused on diesel engines. A baseline inventory was completed in 2005, and updated in 2013. Over-all, maritime-related emissions decreased from 2005 to 2013; this reduction included the categories related to ocean-going vessels and harbor vessels. Much of the progress was attributed to investments in cleaner technology, cleaner fuels, more efficient systems of operation, and mandatory engine and fuel standards (Starcrest 2013).

Marine Air Emissions Most of Western Washington's air pollution comes from non-maritime sources (cars, trucks, fireplaces), but maritime sources (ships, tugs ferries, dock equipment) produce relatively high amounts of sulfur (SO_2) and diesel particulate matter (DPM). Ships transiting the Strait of Juan de Fuca give the rural Olympic region a higher proportion of maritime SO_2 and DPM than in the urban Puget Sound region. **Source:** Puget Sound Maritime Air Emissions Inventory, 2007. Data presented has been modified.

Figure 3.1-3



Operation of marine vessels for delivery of aggregate from the Proposed Project will contribute to the global atmospheric load of CO₂. Increases in atmospheric concentrations of greenhouse gases, primarily CO₂, have been implicated in global warming. Marine transport of aggregate by tugs with barges and ships, however, will replace a multitude of deliveries by truck and trailer combinations. For example, a typical barge load will replace 150 truck-with-trailer loads and a typical ship load will replace over 2,000 truck-with-trailer loads. It is expected that marine vessel transport of aggregate from the Proposed Project site will represent a significant reduction in CO₂ and diesel PM_{2.5} generation compared to roadway transport (FHM 2006). This is supported by an evaluation of the effects of various modes of freight transport on the environment conducted by the Organisation for Economic Co-operation and Development (OECD 1997), in which it was shown that contaminants generated per equivalent weight of freight was greater for trucks when compared with marine transport.

**Table 3.1-2. Air Emission Factor Ranges for Trucks and Marine
(in grams/tonne-km)**

Pollutant	Truck	Marine
Carbon Monoxide (CO)	0.25 - 2.40	0.018 - 0.20
Carbon Dioxide (CO ₂)	127 - 451	30 - 40
Hydrocarbon (HC)	0.30 - 1.57	0.04 - 0.08
Nitrous Oxides (NO _x)	1.85 - 5.65	0.26 - 0.58
Sulfur Dioxide (SO ₂)	0.10 - 0.43	0.02 - 0.05
Particulates (PM ₁₀ & PM _{2.5})	0.04 - 0.90	0.02 - 0.04
Volatile Organic Carbon (VOC)	1.10	0.04 - 0.11
Source: OECD 1997		

Peak vessel activity from the Proposed Project is anticipated at no more than six round trips (or 12 individual transits) by ship per month and six barge and tugs per day, a very small percentage of the overall 250,000 commercial vessel traffic monitored by the U.S. Coast Guard each year for Puget Sound waters (Coast Guard 2013).

Marine transport by ships would, as noted, require approximately 12 openings of the Hood Canal Bridge per month. The timing of the openings would be limited to off-peak hours of vehicular traffic (Heath 2011), but may still result in some minor traffic delays. Many vehicle engines may be turned off while in line; however, some engines may be left running especially if air conditioning or heating is needed. The additional idling may result in a temporary increase in local pollutants, but given the projected length of any back-ups. It is anticipated this increase will be minor and pollutant levels will continue to be well below the national and state ambient air quality standards.

See Section 3.11
Transportation and Figure
3.11-4 for more information.

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3.2 EARTH, including Geology and Soils

In terms of the greater geographic region, the Proposed Project is bordered by Dabob Bay to the west and Hood Canal to the south and east. The project's primary upland components are located on and adjacent to one of the north-south trending ridges that typify this region of the Upper Coyle Peninsula north of the Toandos Peninsula area of Eastern Jefferson County.

Construction and operation of the proposed sand and gravel extraction, processing, conveyor transport and Pier load-out facility may impact local geology and soils, topography and geologic hazards.

3.2 1 Regulatory Overview and Permits

The Proposed Project is subject to federal, state and county regulations pertaining to surface mining and building permits.

3.2 1.1 Federal

The Mine Safety and Health Administration (**MSHA**) is the primary enforcement agency governing the project's mining operations. The **Mine Act** mandates periodic mine inspections; development of and compliance with health and safety standards; oversight by **MSHA** of mine accident investigations, violations and complaints; and review of mine operating plans, and education and training programs. In particular, Section 115 of the **Mine Act** requires mine operators to have an approved health and safety training program with new miner and ongoing training requirements, including instruction in proper mining practices to avoid slope failure and geologic hazard recognition.

3.2 1.2 State

Surface mining is regulated by the Washington Department of Natural Resources (**WDNR**) under the **Surface Mining Act**, which requires a permit application and reclamation plan. The intent of the law and associated regulation is to ensure that every surface mine (except those exempted by regulation) is thoroughly reclaimed in accordance with a mine sequence plan. The **WDNR** is responsible for seeing that reclamation follows completion of surface mining (Norman 2000). As part of the reclamation plan, a site- specific geotechnical report is typically required to recommend mine sequencing, maximum and minimum slope angles, and design level plans for reclaiming slope areas.

3.2 1.3 County

Mine-siting and operations are regulated by Jefferson County through the Uniform Development Code (**UDC**.) Under the **UDC**, the Proposed Project's Upland Area lies in part within Commercial Forest (CF 1:80) and Rural Residential (RR 1:5) zoning districts.

The Jefferson County Planning Department has determined the Proposed Project is appropriately characterized as a "Mineral Processing Activity Accessory to Extraction," a conditional use per Table 3-1 of the **UDC** requiring approval of a Conditional Use Permit (**CUP**). The County Hearing Examiner will determine whether to approve the **CUP**, approve it with conditions, or deny it, based on the following criteria:

1. The conditional use is harmonious and appropriate in design, character and appearance with the existing or intended character and quality of the development in the vicinity of the subject property and with the physical characteristics of the subject property;
2. The conditional use will be served by adequate infrastructure including roads, fire protection, water, wastewater disposal, and storm water control;
3. The conditional use will not be materially detrimental to uses or property in the vicinity of the subject parcel;
4. The conditional use will not introduce noise, smoke, dust, fumes, vibrations, odors, or other conditions or which unreasonably impact existing uses in the vicinity of the subject site.
5. The location, size, and height of buildings, structures, walls and fences, and screening vegetation for the conditional use will not unreasonably interfere with allowable development or use of neighboring properties.
6. The pedestrian and vehicular traffic associated with the conditional use will not be hazardous to existing and anticipated traffic in the vicinity of the subject parcel;
7. The conditional use complies with all other applicable criteria and standards of this Code and any other applicable local, state or federal law; and more specifically, conforms to the standards contained in Sections 4 and 6 of this Code;
8. The proposed conditional use will not result in siting of an incompatible use adjacent to an airport or airfield.
9. The conditional use will not cause significant adverse impacts on the human or natural environments that cannot be mitigated through conditions of approval.
10. The conditional use has merit and value for the community as a whole.
11. The conditional use is consistent with all relevant goals and policies of the Jefferson County **Comprehensive Plan**; and,
12. The public interest suffers no substantial detrimental effect. Consideration shall be given to the cumulative effect of similar actions in the area.

See Appendix B for more information about the specific measures in the MRLO.

The proposed Meridian Extraction Area is located within the Wahl-Meridian Mineral Resource Land Overlay (**MRLO**) district approved in 2004 by Ordinance 08-0706-04 (**Ordinance**). The Ordinance includes 15 specific measures to address environmental impacts of mining in the **MRLO**. Jefferson County Type 1 Stormwater Permit is required for Meridian Extraction Area to address mining operational requirements and ensure consistency with both the ordinance and the **UDC** Mineral Extraction and Processing Performance Standards.

Building permits from Jefferson County necessary to construct the various Conveyors and structures associated with the Proposed Action would trigger review under Jefferson County's Critical Areas regulations. Critical areas regulations pertaining to earth resources include Geologically Hazardous Areas (JCC 18.22.160). Determination of Geologic hazards are based on review of Article V of the JCC 18.22 Critical Areas and an understanding of the geologic materials at a site by qualified geological professionals, along with a review of previously published documents. The geologic hazard types are evaluated consist of Landslide Hazard Areas (JCC 18.22.160.2a), Erosion Hazard Areas (JCC 18.22.160.2b) and Seismic Hazard Areas (JCC 18.22.160.22c).

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Section 3.8. The following goals and policies are applicable to impacts of the Proposed Project on earth and geological matters:

LAND USE ELEMENT GOAL

- LNG 14.0 Preserve the functions and values of critical environmental areas and protect development from the risks of environmental hazards.

LAND USE ELEMENT POLICIES

- LNP 14.1 Ensure that land use decisions are based on land use ordinances which are in compliance with the Critical Areas Ordinance and all applicable state and federal environmental laws.
- LNP 14.2 Allow residential, commercial, and industrial development in a manner that minimizes risk from flooding, earth movement, shoreline erosion, and other natural hazards.

ENVIRONMENT ELEMENT GOAL

- ENG 5.0 Allow development along shorelines which is compatible with the protection of natural processes, natural conditions, and natural functions of the shoreline environment.

ENVIRONMENT ELEMENT POLICIES

- ENP 5.6 Manage shoreline hazard areas such as unstable bluffs and erosion and coastal flood hazard areas to protect public safety and public and private property.

ENVIRONMENT ELEMENT GOAL

- ENG 9.0 Ensure that landslide and erosion hazard areas are appropriately designated and that measures to protect public health and safety are implemented for hazardous areas.

ENVIRONMENT ELEMENT POLICIES

- ENP 9.1 Review standards to minimize adverse impacts to public health and safety and to public and private property for areas where risk may occur from hazards such as landslides, erosion, subsidence, and other impacts associated with geologic hazards.

- ENP 9.3 Land uses in geologic hazard areas should be allowed only when appropriate mitigation is provided to protect public safety and the environment.
- ENP 9.4 Establish a preference for the use of landslide mitigation measures which are compatible with natural conditions, including setbacks, appropriate siting, drainage control, buffers, and bioengineering solutions.
- ENP 9.6 Promote best management practices to minimize landslide risk in land use regulations related to septic systems, drainage, forest practices, agricultural practices, industry, and other development.

ENVIRONMENT ELEMENT GOAL

- ENG 10.0 Minimize seismic risk to life and property on new and existing structures.

ENVIRONMENT ELEMENT POLICIES

- ENP 10.1 Continue to promote development which is designed to avoid or minimize seismic risk in land use regulations, including best management practices related to septic systems, drainage, industry, and other development.

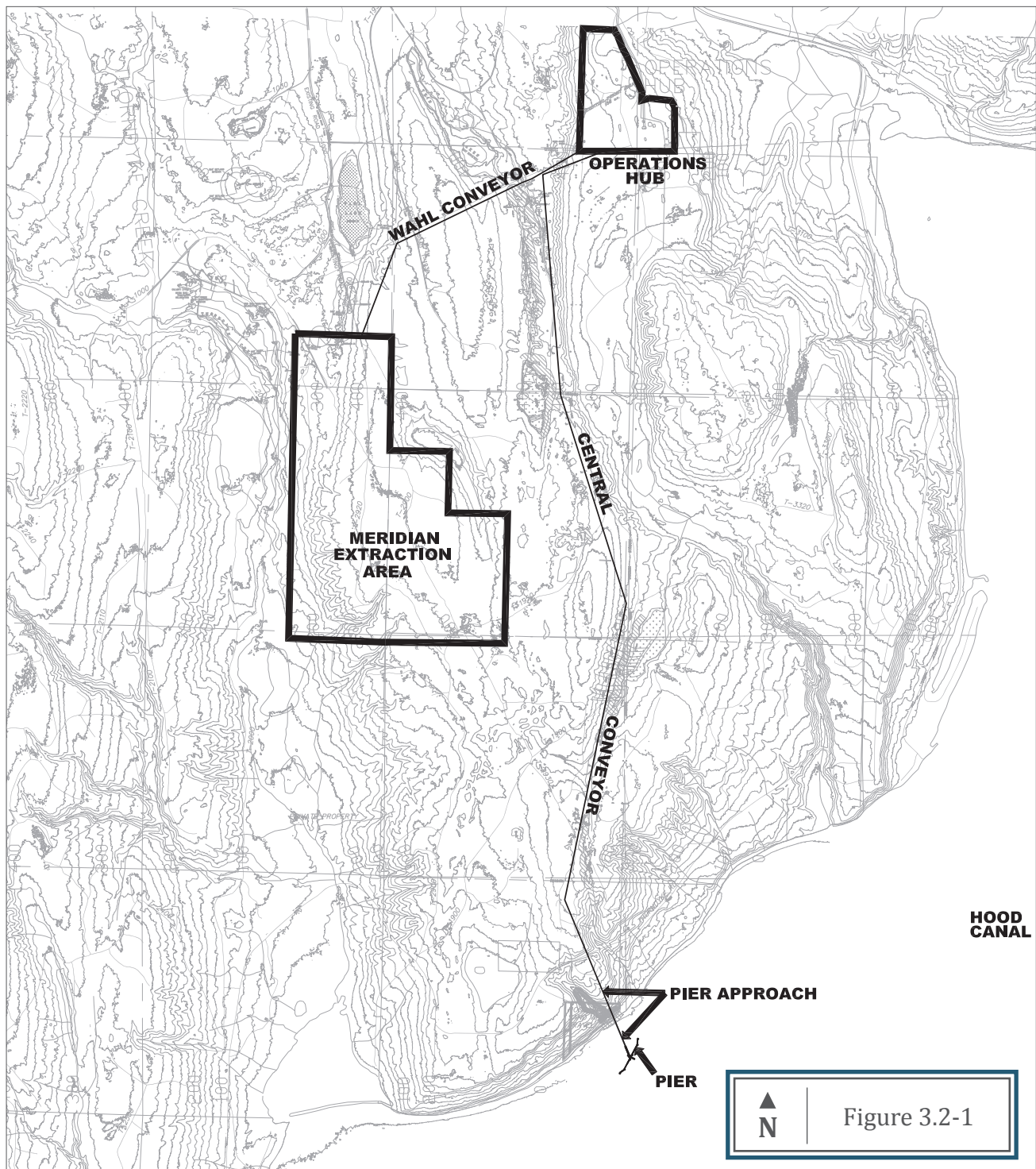
3.2 2 Affected Environment

Surficial geologic conditions in the study area are primarily the result of the ice advance and retreat of the Vashon Stade of the Fraser glaciations some 10,000 to 15,000 years ago. A climate similar to present conditions characterized the non glacial interval immediately preceding the Vashon Stade. Erosion of previous glacial deposits and deposition of non glacial sediments occurred during such non glacial periods.

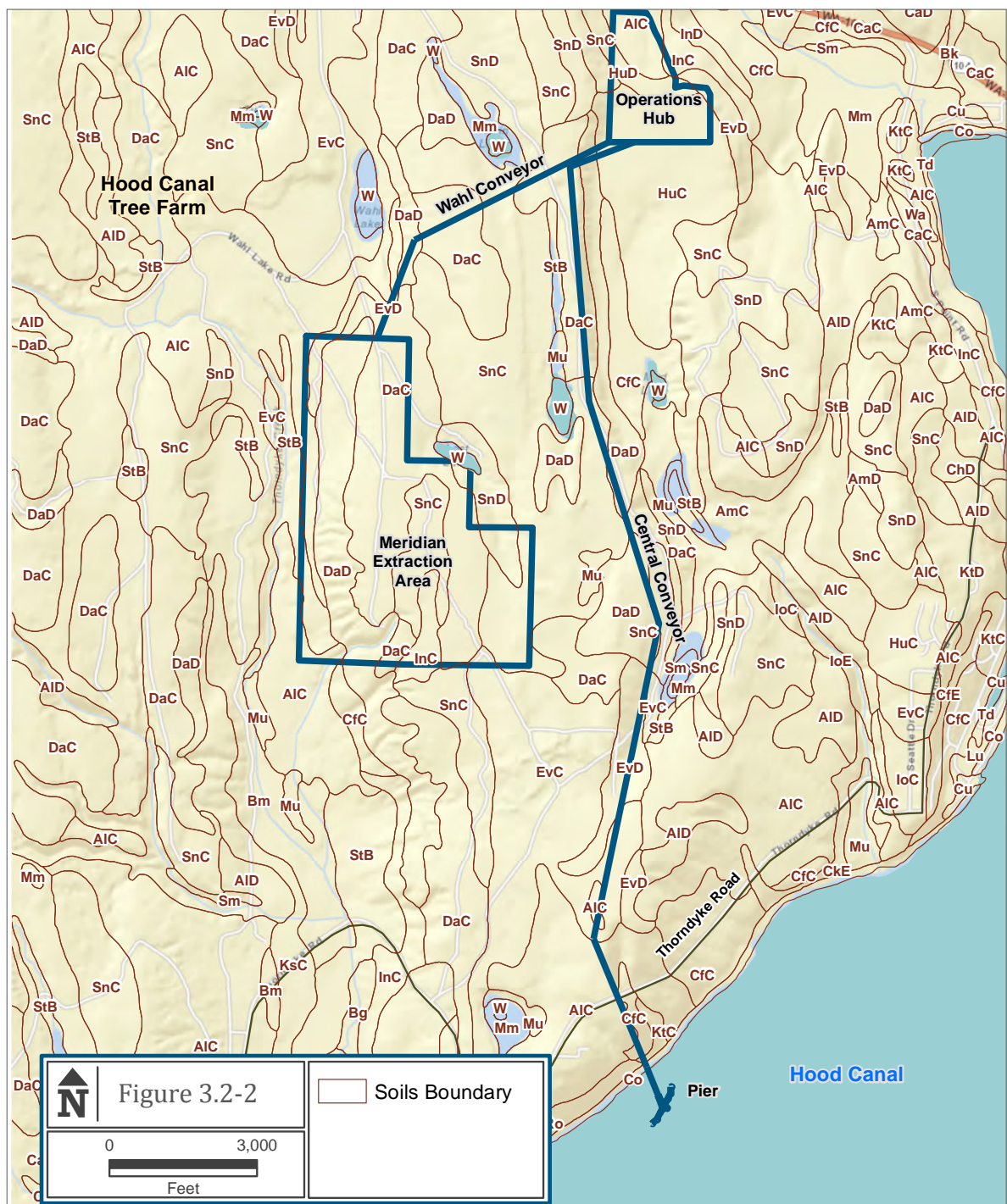
Erosion and deposition during and following the Vashon glaciation has produced the current topography (See Figure 3.2-1). Topography within the site region comprises north-south oriented ridges separated by relatively broad valley areas. Streams, such as Thorndyke Creek, occupy some of the valley areas (Birdeye 1976). Steep slopes formed from a combination of wave cutting and landslides generally exist along the peninsula border with Hood Canal (Anchor 2003).

The interpretation of surficial soils within the project area is based on review of the U.S. Department of Agriculture, U.S. Soil Conservation Service Classification map for the Jefferson County area (NRCS 2003; SCS 1975). The distribution of surficial soils is generally related to the parent geologic units. The distribution of mapped soils at and near the study area is shown in NRCS Soils Map (Figure 3.2-2).

Descriptions of the various geologic units and surficial soils within each of the project element areas presented in the following sections are based on GeoEngineers' interpretation of geologic mapping at the site and site-specific boring log data included in the GeoResources documents reviewed (GeoResources 2002; GeoResources 2009). The approximate distribution of geologic units at the Proposed Project site is shown in a geology map (See Figure 3.2-3).



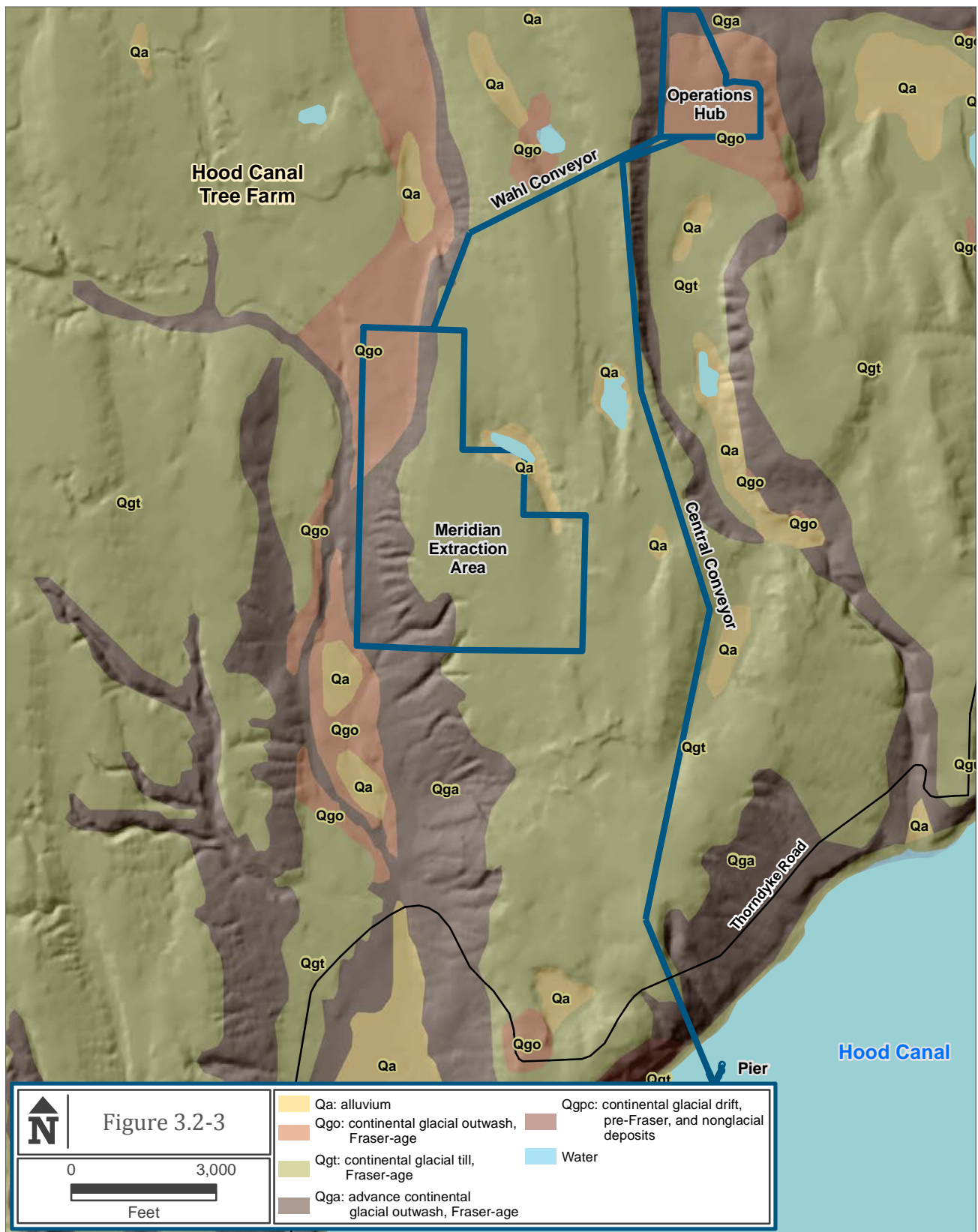
Project Topography The project vicinity includes gentle sloping ridges with peak elevations at approximately 500 feet above sea level. From the proposed Operations Hub, the conveyor route rises 100 feet, follows a north-south ridge and crosses a triangular shaped upland plateau before reaching the shore. **Source:** Puget Sound Lidar Consortium



ALC: Alderwood gravelly sandy loam, 0 to 15% slopes
AmC: Alderwood gravelly loam, 0 to 15% slopes
CfC: Cassolary sandy loam, 0 to 15% slopes
Co: Coastal beaches
DaC: Dabob very gravelly sandy loam, 0 to 15% slopes
DaD: Dabob very gravelly sandy loam, 15 to 30% slopes
EvC: Everett gravelly sandy loam, 0 to 15% slopes
EvD: Everett gravelly sandy loam, 15 to 30% slopes
HuC: Hoypus gravelly loamy sand, 0 to 15% slopes
InC: Indianola loamy sand, 0 to 15% slopes

KtC: Kitsap silt loam, 0 to 15% slopes
Mm: McMurray and Mukilteo peats
Mu: Mukilteo peat, moderately shallow variant
Ro: Rough broken land
Sm: Semiahmoo muck, shallow variant
SnC: Sinclair gravelly sandy loam, 0 to 15% slopes
SnD: Sinclair gravelly sandy loam, 15 to 30% slopes
StB: Swantown gravelly sandy loam, 0 to 8% slopes
W: Water

NRCS Soils Map Soil types in the vicinity of the proposed project. **Source:** National Resources Conservation Service.



Geology Geologic units in the vicinity of the proposed project. Source: WA Department of Natural Resources

3.2 2.1 Meridian Extraction Area

See Figure 3.2-1

Meridian Extraction Area is 525 acres, generally rectangular and located within a terrace on the east side of the Thorndyke Creek valley. Ground surface elevations in the Meridian Extraction Area range from approximately 400 feet mean sea level in the eastern portion to approximately 200 feet mean sea level near the southwest corner. Elevations gradually decline from east to west beginning along a north-south axis running through the approximate center of the area.

Geologic materials mapped within Meridian Extraction Area are comprised of Vashon recessional outwash (Qgo), Vashon glacial till (Qgt), and Vashon advance outwash (Qga). Vashon recessional outwash typically consists of a loose to dense mixture of sand, gravel and some cobbles that were deposited by streams and rivers emanating from the front of the retreating glacial ice sheet. This material is mapped in the north portion of Meridian Extraction Area (NRCS 2003; SCS 1975).

Vashon till is typically a very dense mixture of silt, sand and gravel deposited at the base of the advancing glacial ice sheet. However, typical glacial till soils were encountered at only one (OB-22) of 10 borings within Meridian Extraction Area (GeoResources 2011). Geologic data from the other nine borings suggests that Vashon till is either absent in these areas or comprises a very granular material with less fine-grain particles than a typical till material. Vashon advance outwash (map unit Qga) was deposited by streams and rivers issuing from the front of the advancing glacial ice sheet. This material generally comprises a dense to very dense mixture of sand with layers of gravel and some silt. This material is mapped along the west border of Meridian Extraction Area, which comprises a slope. Advance outwash was encountered in the borings completed by the Applicant (GeoResources 2011; GeoResources 2013).

Soils mapped at or near Meridian Extraction Area include the following:

- Alderwood gravelly sandy loam, 0-15 percent slope (AiC)
- Dabob very gravelly sandy loam, 0-15 and 15-30 percent slope (DaC and DaD)
- Everett gravelly sandy loam, 15-30 percent slope (EvD)
- Indianola loamy sand, 0-15 percent slope (InC)
- Sinclair gravelly sandy loam, 0-15 and 15-30 percent slope (SnC and SnD)
- Swantown gravelly sandy loam, 0-8 percent slope (StB)

These soils form in terrace and slope areas. Alderwood soils form from glacial till; Dabob and Swantown soils from gravelly glacial till; Everett, Indianola and Sinclair soils from granular glacial outwash. Mapped soils within Meridian Extraction Area are moderately to excessively drained and have slight to severe erosion hazard potential, which is primarily based on slope (NRCS 2003; SCS 1975).

The Wahl Conveyor would extend approximately 1.25 miles generally southwest to northeast between Meridian Extraction Area and the Operations Hub (see Figures 3.2-1 and 3.2.2) and include the “Little Wahl” leg section connecting approximately 2,200 feet north of Meridian Extraction Area. The Little Wahl leg would be located on relatively level ground while the Wahl Conveyor traverses over a ridge and

undulating ground to the proposed Operation Hub. The top of the ridge is about 400 feet elevation (mean sea level). Geologic materials mapped within and near the Wahl Conveyor are mostly comprised of Vashon glacial till (Qgt). Little Wahl traverses a mapped margin/contact between Vashon glacial till and Vashon advance outwash (Qga). The advance outwash material appears to be mapped on a slope face, west of the Little Wahl area.

Soils mapped in the vicinity of the Little Wahl and Wahl Conveyor corridors include the following:

- Alderwood gravelly sandy loam, 0-15 percent slope (AiC)
- Dabob very gravelly sandy loam, 0-15 and 15-30 percent slope (DaC and DaD)
- Everett gravelly sandy loam, 0-15 and 15-30 percent slope (EvC and EvD)
- Sinclair gravelly sandy loam, 0-15 and 15-30 percent slope (SnC and SnD)
- Hoypus gravelly loamy sand, 0-15 percent slope (HuC)

Alderwood soils form from glacial till; Dabob soils from gravelly glacial till; Everett and Sinclair soils from granular glacial outwash. Mapped soils within the Wahl Conveyor route are moderately to excessively drained and have slight to severe erosion hazard potential based primarily on slope (NRCS 2003; SCS 1975).

3.2 2.2 Operations Hub

An Operations Hub would be reconfigured within 100 acres of the Shine Pit Mineral Resource Lands Overlay. This area is relatively flat because of the extraction and processing that occurred there when the Shine Pit was operating. The area is approximately 300 feet elevation (mean sea level). Operations Hub activities would include construction, trucks and loaders, stockpile areas, portable conveyors, equipment for crushing, washing, screening and recycling.

See Figure 1-7 in Chapter 1 for Operations Hub typical description.

Vashon recessional outwash is mapped at the Operations Hub location, with no natural surface soils remaining. Soils mapped at the Operations Hub area include Hoypus gravelly loamy sand, 0-15 percent slope (HuD and HuC), and Alderwood gravelly sandy loam, 0-15 percent slope (AiC). The Hoypus soil forms in glacial moraines; Alderwood soils from glacial till (NRCS 2003; SCS 1975).

3.2 2.3 Central Conveyor

The proposed Central Conveyor begins as a Twin Conveyor at the Operations Hub. The initial, approximate 1,700 feet of the Conveyor climbs about 100 vertical feet to a southwest ridgeline (Krazan 2003). From this point, the Conveyor route runs on or near the spine of a north-south trending ridgeline for a total lineal distance of about 3.3 miles.

The Central Conveyor transitions to a Single Conveyor approximately 1,500 feet northwest of Thorndyke Road, crossing an upland plateau that slopes gradually downward to the south and southwest. Comprising the final 0.7 miles of the Central Conveyor, the Single Conveyor route skirts the top west edge of a ravine with apparent side slopes of up to 70 percent and documented signs of slope creep before crossing Thorndyke Road,

which lies in a 60-70-foot-deep cut between high banks. Across Thorndyke Road, the ground surface continues on a southeast slope, generally increasing in steepness to the south to the top of a steep bluff. From this point, the Single Conveyor route traverses a steep bluff 80 to 100 feet in vertical height, to the beach. The bluff varies in slope from 40 percent to nearly vertical (Shannon & Wilson 2003).

Mapped Vashon glacial till underlies much of the proposed corridor for the Central Conveyor. Advance outwash is mapped east of the north section of the Central Conveyor corridor, within a slope area. A veneer of recessional outwash or glacial drift may overlie the till in places (Krazan 2003). Geologic material mapped within the upland area south of the crossing of Thorndyke Road consists of Vashon glacial till. Vashon advance outwash soils likely underlie the till at some depth in this area.

Soils mapped along the Central Conveyor include the following:

- Alderwood gravelly sandy loam, 0-15 percent slopes (AiC)
- Dabob very gravelly sandy loam 0-15 and 15-30 percent slopes (DaC and DaD)
- Everett gravelly sandy loam 0-15 and 15-30 percent slopes (EvC and EvD)
- Hoypus gravelly loamy sand 0-15 percent slopes (HuC)
- Sinclair gravelly sandy loam 0-15 and 15-30 percent slopes (SnC and SnD)
- Cassolary sandy loam, 0-15 percent slope (CfC)
- Kitsap silt loam 0-15 percent slope (KtC)
- Swantown gravelly sandy loam 0-8 percent slope (StB)

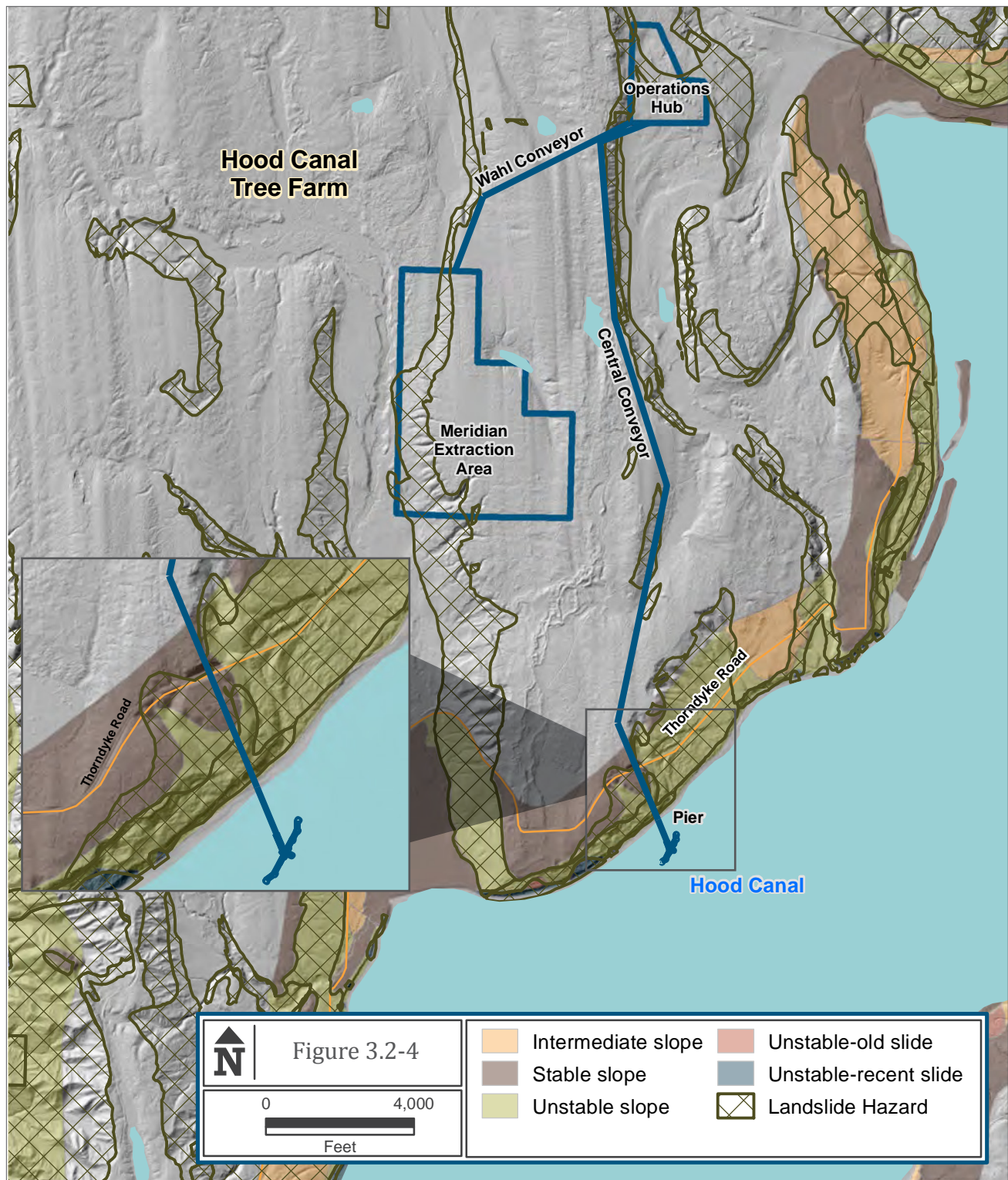
Alderwood soils form from glacial till; Dabob and Swantown soils from gravelly glacial till; Everett, Hoypus, Sinclair and Cassolary soils from granular glacial outwash or moraines. Mapped soils along the Conveyor alignment are moderately to excessively drained and have slight to severe erosion hazard potential, based primarily on slope (NRCS 2003; SCS 1975).

Kitsap soils at the site form from glacially consolidated lacustrine sediments and are found in bluff areas. These soils are moderately drained with a very slow permeability. Erosion hazard in these soils is slight to moderate, but can be moderate to severe for Kitsap slopes in areas of 15 to 30 percent slope (NRCS 2003; SCS 1975).

3.2 2.4 Pier

See Figure 3.2-4

Rough, broken land is mapped along shoreline bluffs where the Pier would be situated. These areas are considered unstable and are subject to frequent landslides, according to the U.S. Soil Conservation Service (SCS 1975) and Jefferson County Public Works (Public Works 1999).



Lidar Hillshade with Slope Stability and Landslide Hazard The project vicinity includes gently sloping ridges with peak elevations approximately 500 feet above sea level and valleys leading to a shoreline bluff. Landslide hazards are mapped along the central conveyor in several areas and within a small area of the Meridian Extraction Area. In addition, at the shoreline bluff where the central conveyor extends down to the shore, stable and unstable slopes are mapped. **Source:** Puget Sound Lidar Consortium, Jefferson County, Ecology

3.2 2.5 Geologic Hazards Discussion

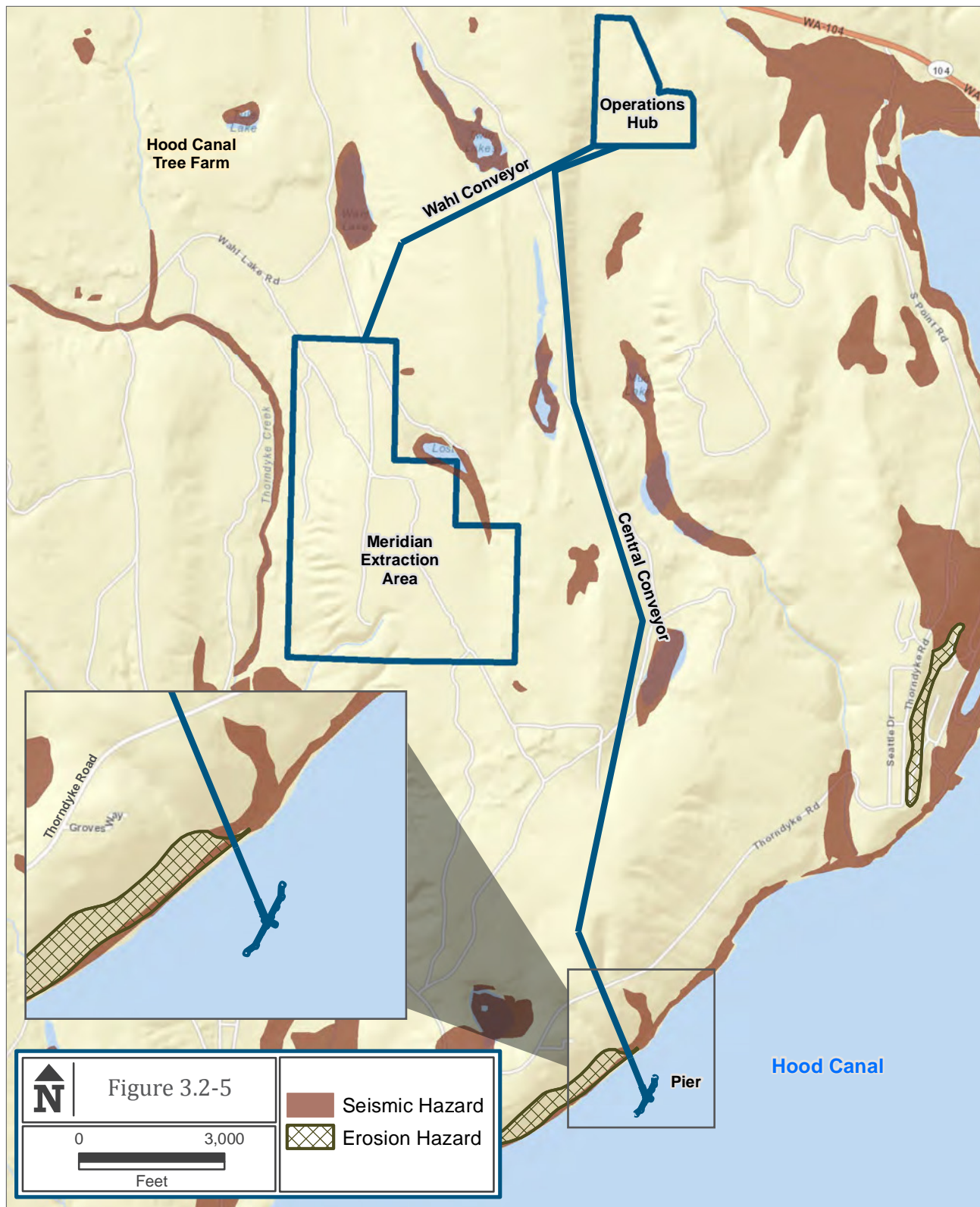
As noted, mapped geologic hazards include Landslide Hazards, Erosion Hazards and Seismic Hazards. The western portion of the Meridian Extraction Area, where mining of sand and gravel would happen, appears to meet the Jefferson County technical criteria for landslide hazard areas based on slope and mapped Soil Conservation Service soil type. Various portions of the route the Central Conveyor also appear to meet the criteria for landslide hazard areas. Specifically these areas, the slope just southwest of the Operations Hub, the area where the Conveyor would cross Thorndyke Road and the shoreline area of Hood Canal. Landslides have been documented or observed along the shoreline bluff where the proposed Pier would situate (Shannon & Wilson 2003; Public Works 1999). Jefferson County mapped Geologic Hazards in the vicinity of the project site are shown in Figure 3.2-4.

There are areas of the project location which contain soil types that meet the Jefferson County technical criteria for erosion hazard areas. These soil types are:

- Dabob very gravelly sandy loam, 15-30 percent slope (DaD)
- Rough Broken Land (bluff area) (Ro)
- Sinclair gravelly sandy loam, 15-30 percent slope (SnD)

See Figure 3.2-5 The Puget Sound area is a seismically active region and has experienced thousands of earthquakes in historical time. Jefferson County defines Seismic Hazard Areas as those areas subject to damage as a result of ground shaking, slope failure, settlement, soil liquefaction (wherein soil strength is dramatically reduced when subjected to vibration or shaking) and fault rupturing. Jefferson County indicates that these areas are typically identified as containing poorly drained soils with more than 50 percent silt with little coarse grained material, loose sand and gravel, peat, artificial fill, landslide materials or soil units with high organic contents.

In general, most of the project site and nearby areas are underlain predominately by granular glacial outwash and glacially consolidated deposits. Most of the site areas likely have a low risk of seismically induced impact/failure. The proposed cut area south of Thorndyke Road and the marine bluff in this area have a higher risk, based on the history of landsliding in and near this area and the steepness of the bluff slope. Jefferson County mapped Geologic Hazards in the vicinity of the project site are shown in Figure 3.2-4.



Seismic and Erosion Hazards The Meridian Extraction Area includes a small area located along its eastern edge that is mapped as a Seismic Hazard area. The Central Conveyor passes over a mapped Seismic Hazard area and small portion of a mapped Erosion Hazard area at the bluff above the Hood Canal shoreline. **Source:** Jefferson County

3.2 3 Proposed Action: Direct and Indirect Impacts

3.2 3.1 Proposed Project Construction

The Proposed Action would be built on different types of soils and on or next to various slopes of different heights and stability. Following vegetation removal for Conveyor construction, soils on the sloped portions of the site, particularly south of Thorndyke Road, will be subject to sloughing and sediment transport during periods of stormwater runoff, if not protected. Erosion impacts may include excessive runoff and sediment transport in runoff from project areas, possible resulting in turbidity in receiving waters and loss of habitat.

See Chapter 3.4 Water for details on Ecology Stormwater Manual compliance.

The design and construction of components of the Proposed Action that would require Jefferson County building permit(s) require compliance with the Washington Department of Ecology (**Ecology**) Stormwater Management Manual for Western Washington. Therefore, it is anticipated, as requirement of fulfilling requirements of Jefferson County building permit(s), that erosion control methods to be used during construction include efficient channeling of surface water runoff; minimizing the extent of disturbed areas; applying erosion-preventing slope cover (such as straw or rock) and channel liners; and, constructing trench dissipaters, diversion ditches or levees. Straw bales or geotextiles and temporary sedimentation basins would be liberally used.

3.2 3.1.1 Meridian Extraction Area

Portable equipment and Conveyors used in mining of sand and gravel at the Meridian Extraction Area would be freestanding - not requiring foundations. The foundation elements for support of the Wahl Conveyor are presently in place. Neither cuts nor fills will be required to assemble and construct the Conveyor, though some grading may be necessary for access. Construction of the relatively short (approximately 2,000 feet) Little Wahl corridor of the Wahl Conveyor involves abandoning and realigning portions of forestry service road T 2900, including some land clearing and grading. Abandoned portions of the forestry road will be regraded and revegetated. Thus, the impact to the geology and soils in the immediate area, caused by the construction is expected to be minimal.

3.2 3.1.2 Operations Hub

The existing grade at the 100 acres where the proposed Operation Hub would situate is at, or nearly at, design grade. Minor grading and excavations for new structure footings is expected to occur as a part of the construction of the Operations Hub. Thus, the impact to the geology and soils in the immediate area, caused by the construction is expected to be minimal.

3.2 3.1.3 Central Conveyor

Construction of the Central Conveyor will require abandonment and revegetation of approximately 6.3 acres of existing forestry service roads, including relatively minor cuts and/or fills along the Central Corridor alignment necessary to create approximately 7.3 acres of new or improved roads. Along the portions of the route where Landslide Hazard Areas are identified, slope failures could occur; especially during construction if groundwater seeps and/or springs are encountered.

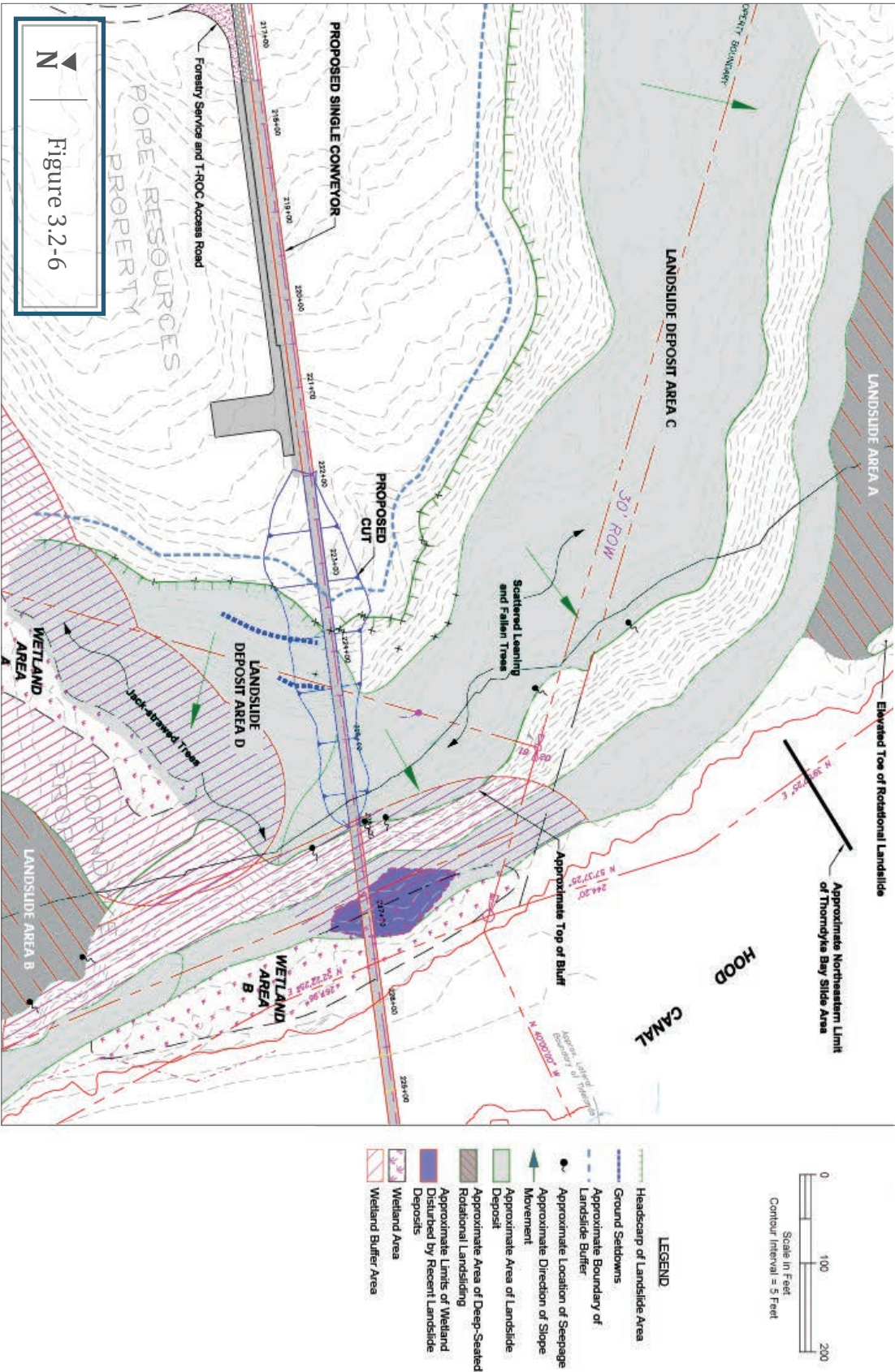
Cut slopes and other disturbed areas could erode or unravel during construction, particularly if earthwork is performed during periods of wet weather. The Central Conveyor will be set-back at least 50 feet from the top of the steep slope areas in the north portion of the alignment. This setback is greater than the Jefferson County prescriptive setback (30 feet) from the top of landslide hazard areas.

The overall potential for soil erosion in the developed condition is anticipated to be reduced; once the construction cut slopes have been re-vegetated and stabilized. Cut slopes associated with construction may generally be built at lesser grades than existing slopes, or may be supported by retaining structures, thereby lessening the potential for erosion.

Prior to construction, a geotechnical design level study, including subsurface explorations and stability analyses, especially in the areas identified as Landslide Hazard Areas would be required before issuance of any building permit. Thus, the impact to the geology and soils in the immediate area and along the route, caused by the construction is expected to be minimal.

3.2 3.1.4 Pier

The final portion of the Central Conveyor, before it reaches the Pier, would be built on a shoreline bluff which is considered unstable and prone to landslides (Public Works 1999). The Applicant has stated that significant soil cuts would be necessary to construct the Conveyor in this portion (between Thorndyke Road and the Hood Canal). A preliminary concept design was included in as part of the application (Shannon & Wilson 2003). Figure 3.2-6 illustrates the Conveyor landslide and landslide deposit areas. The design included plans to excavate and remove soils from a portion of the shoreline steep bluff, to alleviate the potential of a surficial ground slide. Soils exposed in this cut area would be susceptible to erosion, and may not be stable in certain slope configurations both during and after construction. Some erosion of exposed soils in cuts would be expected unless protective measures are in place. To reduce the likelihood of slope failure once the Conveyor is constructed, the design anticipated that seep water and stormwater would be collected at various sources in the vicinity of the Conveyor and tight-lined downslope. Discharge of this water would likely be via a spreader in the vicinity of the wetland at the base of the slope, maintaining freshwater hydrology to the wetland.



Conveyor Route to Shoreline At the shoreline approach, the conveyor would cross an area where soils have already been deposited from past landslides (landslide deposit areas C and D). Landslide area A runs approximately three-quarters of a mile to the north while landslide area B runs about one-mile to the south. While soil creep and minor slides partially filled a wetland at the base of the bluff, the areas are considered a low potential for major slides due to the lack of landslide mass on the upper steep slope. Shannon and Wilson (2003) developed a conceptual cut and drainage system to stabilize the conveyor route in this area. **Source:** Shannon & Wilson

Preliminarily, the concept design appears to be adequate to address concerns about slope stability and landslides (Shannon & Wilson 2003). However, it is anticipated that particular attention will be focused on the shoreline area of the Proposed Action during the federal permitting process. The U.S. Army Corps of Engineers (**USACE**) will require complete design, geotechnical studies (including subsurface explorations and stability analyses), hydrogeology and other reports and reviews to satisfy the **USACE**'s mandates for safety and stability. It is expected that use of the information and construction design generated by the **USACE**'s permitting process will be the bases for determining issuance of building permits by Jefferson County.

Concerns about the stability of the shoreline area are addressed in Section 3.3 Marine Shoreline, particularly the underwater slope.

3.2 3.2 Proposed Project Operations

Mining includes excavating and removing soil materials, (recessional outwash, till and possibly advance outwash) on a gradual and sequential basis within the Meridian Extraction Area and transporting the sand and gravel to the proposed Operations Hub via the Wahl Conveyor.

Prior to mining, the Applicant would be required to receive a **WDNR** reclamation (mining) plan. **WDNR** mining plans require sequential and continual reclamation of prior mined areas. The Applicant would be limited to opening up only 40-acre segments or in accordance with **WDNR**'s best management practices (Ordinance, Section 2(e)(12)).

In accordance with the **Ordinance** (Section 2(e)(11)), the Applicant would be limited to mining to a depth (floor of the mine) no deeper than 10 feet above the seasonal high groundwater table's elevation. **WDNR** permitting review(s) include specific hydrogeological analysis which would establish the particular floor of mine elevation (seasonal high groundwater plus 10-feet).

See Figure 3.2-7

WDNR rules and regulations require mine operators to post a performance bond (or other acceptable financial instrument) to assure that if the operator was unable to fulfill their obligation to reclaim, **WDNR** would have the financial ability (and legal right) to do so. **WDNR** annually adjusts the required bond amount based partly on field inspections and current costs of labor and equipment, necessary to complete reclamation.

A strong emphasis of **WDNR** mining permits is reclamation. Thus, to re-establish commercial tree growth in the Meridian Extraction Area after mining, existing surface soils (top-soils) would be removed and stockpiled for later reclamation purposes.

Mining will result in a nearly flat mine floor with headwall cut slopes at angles established in a site-specific geotechnical report at the time of **WDNR** permitting. It is anticipated that compliance with the approved **WDNR** Reclamation Plan and **BMP**'s would keep both the stockpiled top-soils and exposed soils caused by mining from eroding. Also compliance would keep mine operators from creating unstable certain slope configurations.

Operational impacts are not expected for the Meridian Extraction Area to geology and soils, provided that recommendations in the **WDNR** required geotechnical report(s) and mine sequence plan are followed as part of the overall reclamation plan.

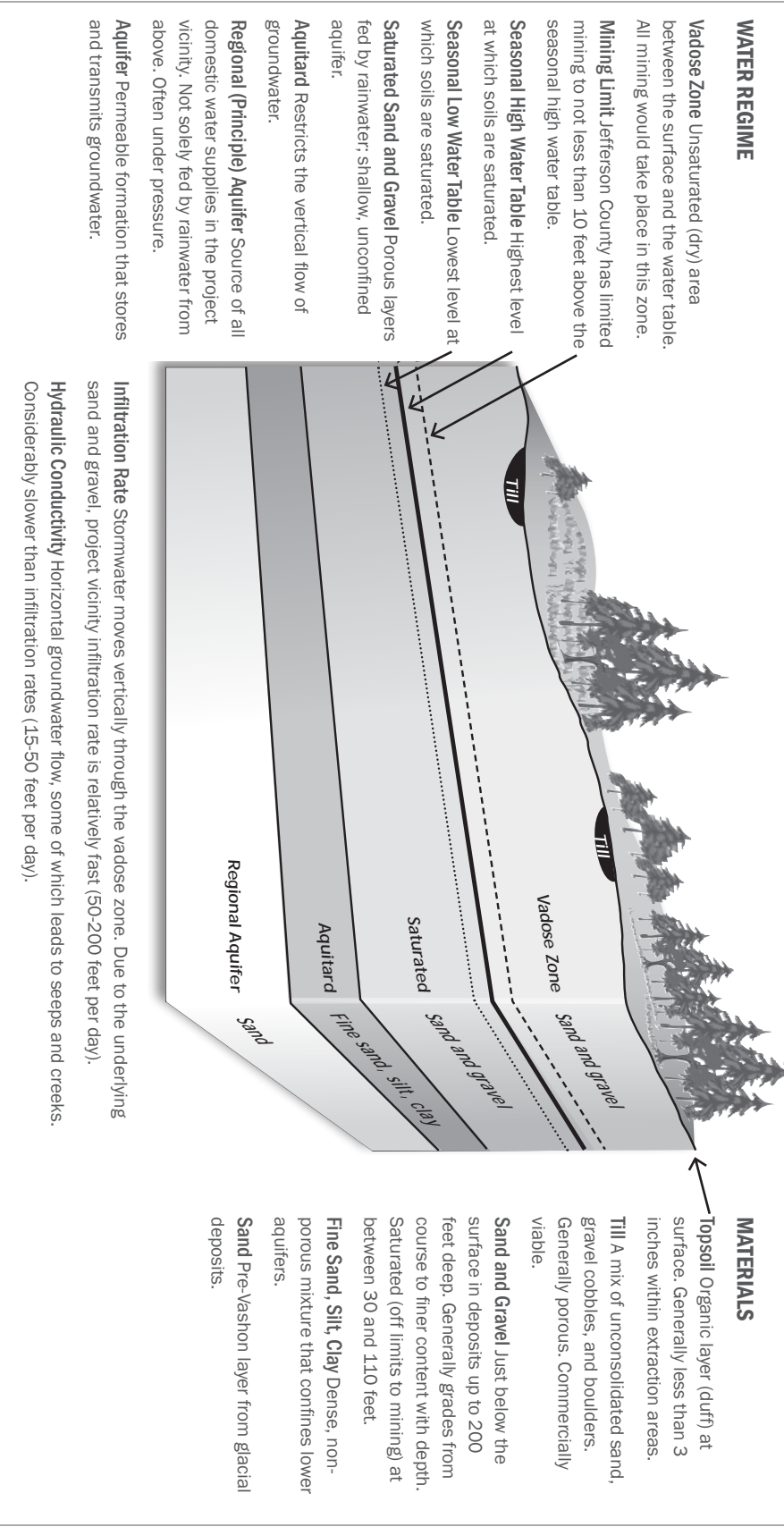


Figure 3.2-7

Operational activities at Meridian Extraction Area, Operations Hub and Central Conveyor are all subject to compliance with a site-specific **WDNR** Reclamation Plan and **Ecology** National Pollutant Discharge Elimination System (**NPDES**) general permit. Adequate stormwater control and release, even in high rain events, is one of the main areas of concern, regulated by those state requirements. Permanent erosion control measures will be employed to ensure the surficial stability of cut slopes and disturbed areas at any particular site. Erosion control measures will include regular inspection and maintenance of slope and disturbed areas by qualified personnel. It is expected that compliance with state stormwater requirements and associated best management practices would not allow stormwater to erode or cause slope failure (see Section 3.4 Water).

In the course of review and issuance of Jefferson County building permits, the effect of earthquakes on the particular structure are considered. However, seismic events (earthquakes) are, by their nature, unpredictable in timing and severity. Impacts to the Proposed Project from a seismic event may include slope failures, potential safety hazards, potential for loss of function, repair and reconstruction costs.

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3.3 MARINE SHORELINE

The pier and the over-water portion of the proposed conveyor for this project are located within the northern portion of Hood Canal. Construction and operation of the pier and conveyor could potentially impact local geology, topography/bathymetry, waves, currents, tides, wind, shorelines, sediment deposition and erosion patterns and water quality. Impacts evaluated in this section of the EIS primarily relate to:

- Activities relating to design and construction of the over- and in-water features.
- Operations and maintenance of the conveyor and pier.
- Loading vessels at the pier.

3.3 1 Regulatory Overview and Permits

3.3 1.1 Federal

The U.S. Army Corps of Engineers (**USACE**) under Section 404 of the Clean Water Act (**CWA**) is responsible for maintaining the chemical, physical and biological integrity of the nation's waters. The overwater portion of the project will require regulatory action under Section 404. The **USACE** also regulates any development within the country's navigable waters, including all waters within Puget Sound below the ordinary high water mark, under Section 10 of the Rivers and Harbors Act. This permit would also require National Environmental Policy Act (**NEPA**) review, National Historical Preservation Act (**NHPA**) Section 106 review, an Endangered Species Act (**ESA**) Section 7 Consultation and an Essential Fish Habitat (**EFH**) review.

The **CWA** sets forth requirements for establishing water quality standards for all contaminants in surface waters. The Environmental Protection Agency (**EPA**) has designated authority for implementing **CWA** programs and requirements, with portions of that authority often delegated to State agencies such as the Washington Department of Ecology (**Ecology**). State water quality standards must meet or exceed federal standards.

EPA has established water quality criteria for tributyltin (EPA 2004) and copper (EPA 2007) and regulates the sale of antifouling paints containing organotin compounds (Showalter 2005).

3.3 1.2 State

The Hydraulic Project Approval Program, under the Washington Department of Fish and Wildlife (**WDFW**), regulates the use, diversion, obstruction or changes to waters of the state, including the overwater portion of the conveyor and pier.

Ecology, under **CWA** Section 401, oversees compliance with water quality laws. Every two years, **Ecology** conducts a water quality assessment of surface waters in the state,

including all the rivers, lakes, and marine waters where data are available. Based on these data, waterbodies are placed into one of five categories that describe the status of water quality.

- Category 1 - Meets tested standards for clean waters.
- Category 2 - Waters of concern: waters where there is some evidence of a water quality problem, but not enough evidence at this time to require production of a water quality improvement (WQI) project (including total maximum daily load [TMDL]).
- Category 3 - Insufficient data: water where there is insufficient data to meet minimum requirements according to Policy 1-11.
- Category 4 - Polluted waters that do not require a TMDL.
- Category 5 - Polluted waters that require a TMDL or other WQI project: the traditional list of impaired water bodies traditionally known as the 303(d) list, a stipulated federal requirement for an integrated water quality report under Section 303(d) of the CWA. Waters whose beneficial uses (drinking, recreation, aquatic habitat, and industrial use) are impaired by pollutants, fall short of state surface water quality standards and are not expected to improve within the next two years, are placed in the polluted water category on the water quality assessment, known as the “303(d) List of Impaired Waters”.

The conveyor and pier would be regulated for stormwater discharges, turbidity and spills as the result of in-water work under this program. A Coastal Zone Management Certification through **Ecology** would be required.

The **WDNR** manages all publicly owned tidelands within the state, of which the offshore (non-tidelands) portions of the Proposed Project are a part. A lease to use state-owned aquatic lands would be required from the **WDNR**.

The Proposed Project is subject to the Shoreline Management Act (**SMA**). The intent of the **SMA** is to preserve the quality of water and aquatic habitat, encourage water-dependent shoreline land uses, and preserve the public's opportunity to enjoy shorelines. The **SMA** prioritizes protecting the state-wide interest over local interest, long term over short-term benefits. (RCW 98.58.020). Although overseen by **Ecology**, the primary responsibility for administering the **SMA** is assigned to local governments through the mechanism of shoreline master programs, pursuant to **Ecology's** rules that establish goals and policies implemented through use regulations. No substantial development is permitted on the state's shoreline unless a permit is obtained from the local jurisdiction. The Jefferson County Shoreline Master Program identifies the project as a Conditional Use. The **SMA** requires that permits for Shoreline Conditional Use permits, after action at the local level, be submitted to **Ecology** for final approval.

See discussion of the County's Shoreline Master Program on the following page.

3.3 1.3 Jefferson County

Building permits from Jefferson County to construct the proposed Pier would trigger review of the proposed activities under regulations contained in the Unified Development Code (including Critical Area regulations) and Jefferson County Shoreline Management Master Program.

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Section 3.8 Land Use. The following goals and policies are applicable to this discussion of the Proposed Project's impacts on marine shorelines:

ENVIRONMENT ELEMENT GOAL

- ENG 4.0 Preserve the long-term benefits of shoreline resources.

ENVIRONMENT ELEMENT POLICIES

- ENP 4.1 Shorelines shall be managed according to the following order of preferred uses as established in the Shoreline Management Act (RCW 90.58.020):
 1. Recognize and protect state-wide over local interests;
 2. Preserve the natural character of the shoreline;
 3. Achieve long-term over short-term benefits;
 4. Protect the resources and ecology of the shoreline;
 5. Increase public access to publicly owned areas of the shoreline;
 6. Increase recreational opportunities for the public on the shorelines; and,
 7. Provide for any other element as defined in RCW 90.58.100 and deemed appropriate or necessary.
- ENP 4.4 Promote public access on shorelines in a manner that preserves or enhances the characteristics of the shoreline
- ENP 4.7 Encourage and participate in projects and programs that foster a greater understanding of shoreline protection and hazards, maritime activities and history, and environmental conservation.

ENVIRONMENT ELEMENT GOAL

- ENG 5.0 Allow development along shorelines which is compatible with the protection of natural processes, natural conditions, and natural functions of the shoreline environment.

ENVIRONMENT ELEMENT POLICIES

- ENP 5.1 Regulate shoreline land use activities based on the best available scientific information.
- ENP 5.2 Protect nearby properties and the shoreline environment from the individual or cumulative effects of development that may interfere with the functions of sediment transport systems along the shoreline.
- ENP 5.3 Establish a preference for the use of non-structural rather than structural solutions in projects for shoreline stabilization, mitigation, rehabilitation, restoration, and enhancement.

- ENP 5.6 Manage shoreline hazard areas such as unstable bluffs and erosion and coastal flood hazard areas to protect public safety and public and private property.
- ENP 5.7 Manage storm water for proposed and existing development in a manner which prevents erosion, land instability, and flooding.
- ENP 5.8 Promote best management practices to protect shorelines in land use regulations related to septic systems, forest practices, agricultural practices, industry, and other development.

In addition, the Shoreline Master Program (SMP) requires that a project proposal be evaluated for consistency with certain Shoreline designation policies and performance standards pertaining to the over-water portion of the Proposed Project; the upland portion of the Proposed Project within 200-feet of Ordinary High Water (Conservancy Environment, SMP 4.103); and the use designation (Industrial and Port Facilities, SMP 5.90) including:

AQUATIC ENVIRONMENT MANAGEMENT POLICIES

- The aquatic environment should be managed for appropriate use activities, allowing either multiple use or single dominant use in areas of unique conditions, while recognizing and ensuring compatibility with adjacent upland shoreline designations.
- Abandoned structures within the Aquatic designation should be removed when they no longer serve their permitted use unless retaining such structures will provide a net environmental benefit, for example, artificial reef effect of concrete anchors.
- All structures placed on the water's surface should have as low a profile as possible to minimize visual intrusion.
- Potential conflicts with adjacent uses such as commercial fishing, recreation, and navigation should be considered in the review of proposed aquatic developments. Developments should not be permitted where they would materially interfere with existing uses.
- Aquatic developments should not locate in areas where the ecological quality of the shoreline environment would be significantly degraded.
- Aquatic developments should be designed and located to ensure that they do not have a significant adverse impact on natural dynamic processes of shoreline formation or change.
- Aquatic developments should make minimal and appropriate use of approved pesticides, herbicides, antibiotics, vaccines, growth stimulants, or other chemicals. Operators shall receive prior review and approval for their use from the appropriate federal and state agencies.
- Only Federal and State approved anti-fouling agents should be used in aquatic developments.

AQUATIC ENVIRONMENT PERFORMANCE STANDARDS

- Structures, equipment, and materials shall be removed as soon as practicable upon the cessation of a project's operation or a structure's useful life. Any structure that is damaged or breaks away in the water shall be repaired or

removed by the permittee as soon as practicable. Permittees who anticipate a temporary interruption of the use of a facility or structure may be allowed to keep it in its permitted location provided they notify and receive written concurrence from the Jefferson County Planning and Building Department. Any structure not utilized for over one (1) year shall be removed regardless of future anticipated use unless prior permission has been granted by the Jefferson County Planning and Building Department upon showing of good cause.

- Permittees for developments in the Aquatic designation shall be required to post a performance bond or other suitable guarantee to ensure removal of all structures, equipment, and materials, should the project cease operation. The County may require security beyond that required by the state if it is determined that state requirements are not adequate to secure removal of structures.
- Permittees shall be liable for all damages to public and private property should their structures fail. The County may require liability insurance beyond that required by the State if it is determined that state requirements are not adequate to cover damages.
- Aquatic developments shall not be approved in narrow channels, shipping lanes, or in other areas where they are a significant hazard to navigation.
- All structures that could interfere with navigation shall be marked in accordance with the U.S. Coast Guard Private Aids to Navigation.
- The maximum level for noise generated in the Aquatic designation shall be 50 dBA at a distance of 100 feet. This standard shall not apply to vessels that are underway. All feasible methods shall be employed to minimize over-water noise generation.
- Structures placed in the Aquatic designation shall blend into the surroundings to the greatest extent feasible utilizing appropriate color(s), texture, non-reflective materials, and other design characteristics.

CONSERVANCY ENVIRONMENT MANAGEMENT POLICY

- To protect, conserve, and manage existing resources and valuable historical and cultural areas in order to ensure sustained resource stabilization and that sensitive natural conditions are not subject to inappropriate uses.

INDUSTRIAL AND PORT FACILITIES POLICIES

- Water dependent industries should be given priority over other industrial uses.
- Port facilities should be designed to permit viewing of harbor areas from viewpoints and public facilities that would not interfere with port operations or endanger public health and safety.
- The cooperative use of docking, parking, cargo handling, and storage facilities should be strongly encouraged in waterfront industrial areas.
- Since industrial docks and piers are often longer and greater in bulk than recreational and residential piers, careful planning must be undertaken to reduce the adverse impact of such facilities on other water dependent uses and shoreline resources.
- Because heavy industrial activities are associated with industrial piers and docks, the location of these facilities must be considered a major factor in determining the environmental compatibility of such facilities.

INDUSTRIAL AND PORT FACILITIES PERFORMANCE STANDARDS

- Only shoreline dependent industry shall be permitted on shoreline locations. The only exception to this rule shall be when other shoreline oriented industry can clearly demonstrate that no other site location is feasible.
- Industrial development shall be located, designed, constructed, and operated in such a manner that it would minimize adverse effects on aquatic life.
- Industrial developments shall comply with all federal, state, regional, and local requirements regarding air and water quality. No pollution of air by fly-ash, dust, vapors, odors, smoke, or other substances shall be permitted that are harmful to health, animals, vegetation, or other property, or that can cause excessive soiling.
- Industrial and port facilities shall be located, designed, constructed, and operated to minimize unnecessary interference with the right of adjacent property owners, as well as adjacent shoreline or water uses.
- Industrial and port facilities shall not duplicate but share over-water structures such as docks and piers whenever practicable. Any activity involving the use or storage of flammable or explosive materials shall be protected by adequate fire-fighting and fire prevention equipment and by such safety devices that are normally used in the handling of any such material. Such hazards shall be kept removed from adjacent activities to a distance that is compatible with the potential danger involved.
- Industrial and port facilities shall make adequate provisions to minimize the probability of spills of fuel or other toxic substances. Provisions shall be made to handle accidental spills that occur.
- Objectionable noise that is due to volume, frequency, or beat shall be muffled or otherwise controlled.
- No vibration shall be permitted that is discernible without instruments on any adjoining lot or property.
- Industrial facilities shall assure that no direct or reflected glare is visible from adjacent properties, streets, or water areas.
- Industrial facilities shall be so located, designed, and operated to eliminate all unnecessary noxious odors.
- Port and industrial facilities shall provide public access to shoreline areas when feasible, taking into consideration public safety, health, and security.
- Waste treatment ponds shall be located as far inland as practicable.
- Port and industrial facilities shall be located, designed, and constructed to permit viewing of harbor areas or other recognized or officially delineated vistas.
- Upland commercial or industrial structures in Suburban or Conservancy designations shall be screened from view from adjacent residential or recreational areas by fences, berms, and/or vegetative buffers.

The Proposed Project will require a Shoreline Conditional Use Permit (SCUP). In its recommendation on the Shoreline Conditional Use Permits, the Hearing Examiner must consider whether the proposed is consistent with certain performance standards, including:

1. That the proposed use is consistent with the policies of RCW 90.58.020 and the policies of the Master Program.

2. That the proposed use will not interfere with the normal public use of public shorelines.
3. That the proposed use of the site and design of the project is compatible with other permitted uses within the area.
4. That the proposed use will cause no unreasonable adverse effects to the shoreline environment in which it is to be located.
5. That the public interest suffers no substantial detrimental effect. In those limited instances where a conditional use is proposed, consideration shall be given to the cumulative impact of additional requests for similar actions in the area.

3.3 2 Affected Environment

The marine shoreline consists of a bluff, beach and tidelands, along with the waters of Hood Canal.

3.3 2.1 Bluff, Beach, and Tidelands

On the western shore of Hood Canal, there is a bluff with a cliff at the edge of the waterfront property where the Proposed Pier would be located. The top of the cliff is approximately 100-feet above mean sea level. Much of this bluff is prone to landslides. Shoreline bluff landslides occur due to a combination of over-steepened bluff, wave cutting and pressurized groundwater seepage. The area where the Pier would cross the bluff appears to be less effected by landslides than areas to the immediate northeast and southwest, where active and dormant bluff landslide features are observed on LiDAR maps and site observations (Shannon & Wilson 2003).

See Figure 3.3-1

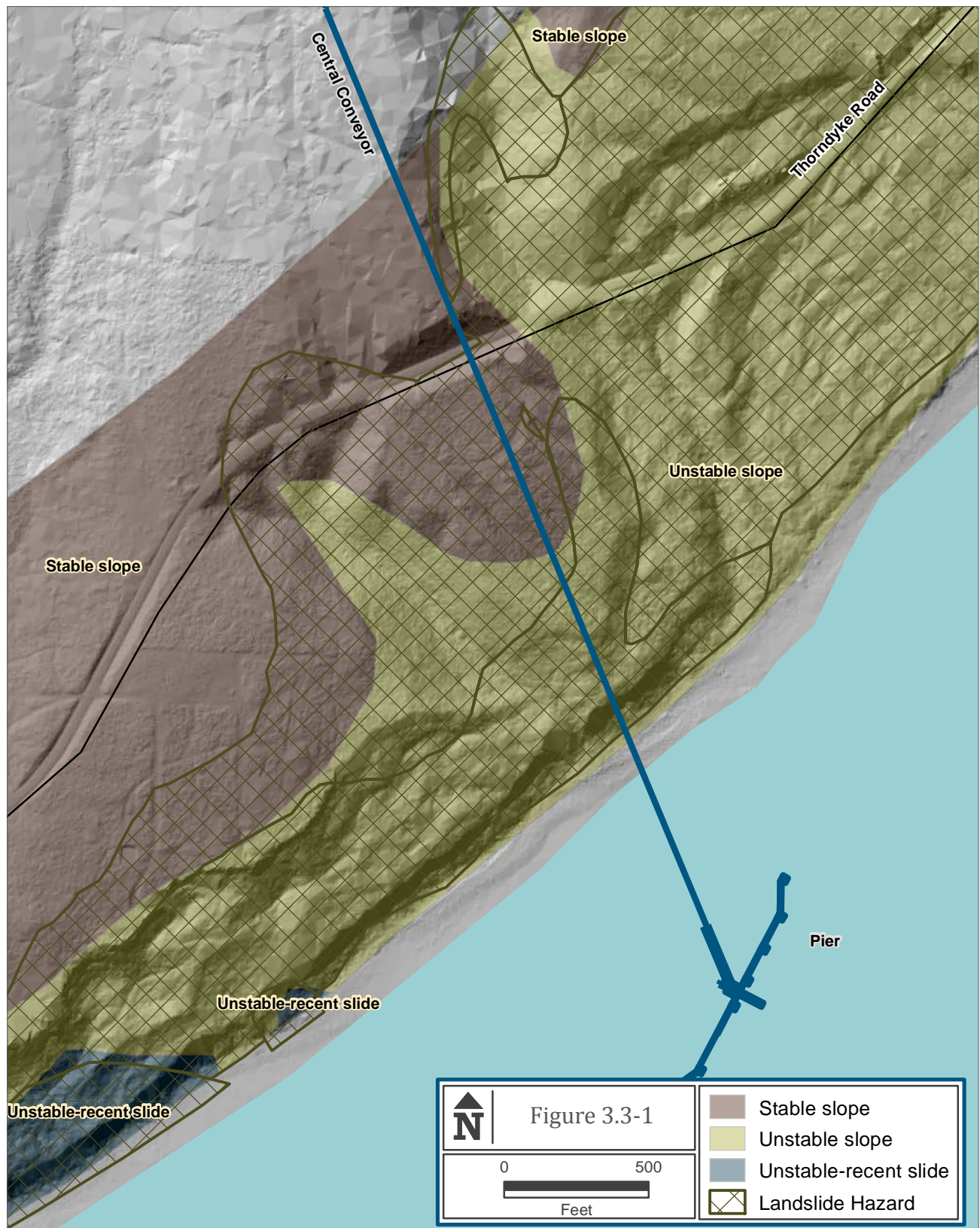
At the toe of the bluff, groundwater seepage and deposition (movement) of beach material has created a wetland. The groundwater seepage flows from glacially consolidated pre-Vashon soil materials that make up a part of the bluff.

Approximately 150 feet waterward of the wetland area, a high tide drift line (+6 **MLLW**) composed of large woody debris forms a storm berm. This backshore area has scattered high saltmarsh vegetation. The woody debris content likely varies according to season.

Further waterward (below +6 **MLLW**) is a moderately steep and sandy beach (sand flat) which extends about 600 to 700 feet. The beach, composed primarily of coarse clean sands with areas of cobbles and gravel, generally slopes downward to the southeast at less than 3 percent slope. During high tide conditions, the entire sand flat is submerged (Hart Crowser 2013).

See Figure 3.3-2

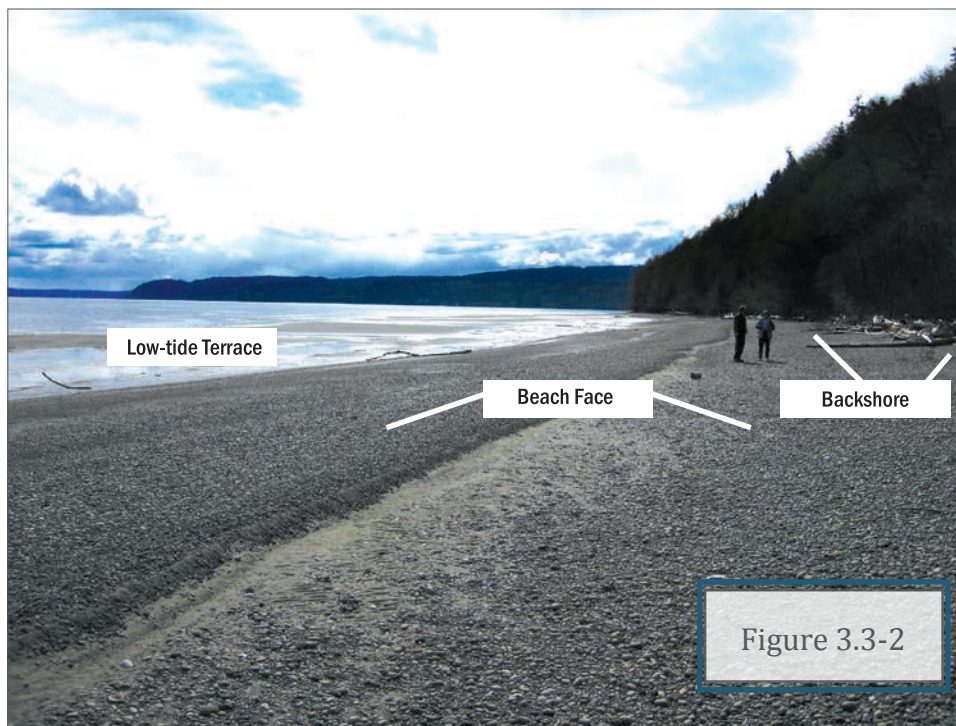
The southeast edge of the sand flat is the top of a submarine slope which then drops steeply to deeper water. The approximate elevation of the top of submarine slope is about -10 feet **MLLW**. The bottom of the submarine slope is at an elevation deeper than -140 feet **MLLW**. The slope descends downward to the southeast at 25 percent to 35 percent. A broad, northeast-southwest oriented trough is located at the toe of the submarine slope (Hart Crowser 2013).



Landslide Hazard Area along the Shoreline The Conveyor extends to the shoreline through a mapped landslide hazard area that begins at Thorndyke Road and extends to the shoreline. Stable and unstable slopes are also mapped in the area of the shoreline.
Source: Puget Sound Lidar Consortium, Jefferson County, Ecology

The existing surface expression of the steep upland bluff and sand flat are the result of erosion and retreat of the steep slope. The primary mechanisms of erosion are surface winds, rain water, and landslide and wave erosion at the toe of the bluff. Erosion and retreat of the bluff have occurred since glacial ice retreated from the area and sea-level stabilized to the approximate present-day levels. The submarine slope likely formed from sub-glacial erosion during the last glacial episode in the area and subsequent minor erosion by tidal flows since glacial retreat.

The normally consolidated, wave mobilized and deposited materials which cover the beach (sand flat) overlie glacially consolidated Pre-Vashon materials (silt, sand and gravel). The thickness of the wind, wave and current deposited materials is presently unknown, but are likely less than 15 feet thick (Shannon & Wilson 2003).



Nearshore at Proposed Pier Location

Backshore areas near the proposed pier site contain beach vegetation, piles of driftwood, and a shoreline wetland below a bluff. The beach face is composed of pebbles and cobbles and extends 150 feet to a low-tide terrace, extending approximately 650 feet to deep water. **Source:** Applicant

3.3 2.2 Tides, Waves, and Wind

The Hood Canal saltwater flow currents within and near the proposed Pier site comprise three distinct types. These are the following:

- tidal currents;
- wind currents (Longshore); and,
- wind currents (Rip).

Sediments exposed on the sand flat at the site are composed of materials that have eroded from coastal bluffs or have been transported and deposited at the mouth of streams/rivers. Water currents then transport the wave suspended sediments. The combined action of waves and currents on beach sediment is a major cause of natural shoreline change on Hood Canal. Anthropogenic (man-induced) changes along the shoreline of Hood Canal include both bulkheads and docks.

See Figures 3.3-3 and 3.3-4

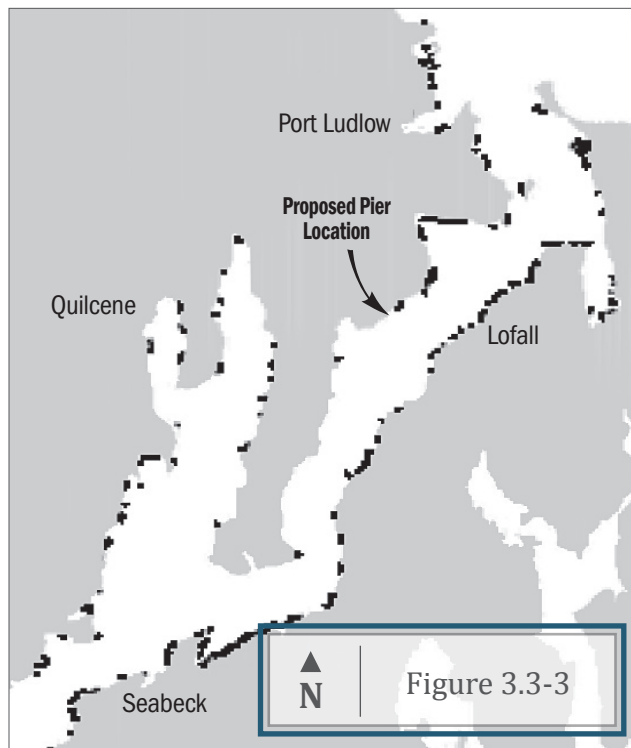


Figure 3.3-3

Bulkheads Bulkheads and other forms of shoreline armoring typically prevent sand from feeder and contributing bluffs from reaching nearshore areas, thus inhibiting eelgrass and other productive near-shore habitats. **Source:** Point No Point Treaty Council Shoreline Alterations Report 2003

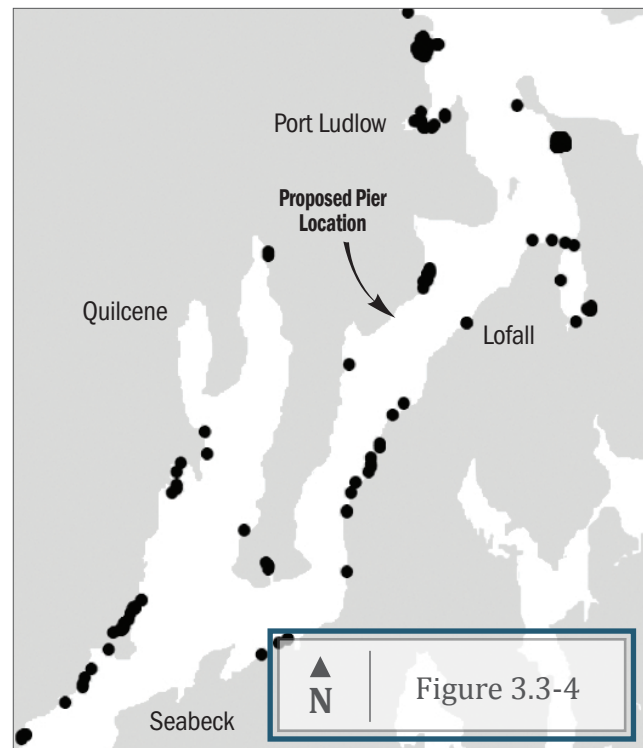


Figure 3.3-4

Docks Docks can impede water flow and create shade that reduces eelgrass and other important plant life. As of March 2003, some 486 docks were present along the shores of Hood Canal and the eastern portion of the Strait of Juan de Fuca, excluding large docking areas at Naval Base Kitsap-Bangor and several marinas. Additional shoreline physical disturbances included 408 stairways, 118 rail boat launches, 128 launch ramps and 30 jetties/groins. **Source:** Point No Point Treaty Council Shoreline Alterations Report, 2003

Bluff materials erode either through relatively slow processes or suddenly from landslides. The distribution and movement of sediments at and near the site therefore is dependent on waves and wave generated currents. Tidal forces alone are not sufficient enough to mobilize the sediment types and sizes observed at the where the proposed Pier would situate. However, the strongest and most pervasive currents near the site are tidal currents. Tidal currents affect the entire thickness of the water column and, at the proposed Pier site, flow generally parallel to the orientation of Hood Canal (southwest-northeast). Tidal currents are strongest in deeper water, where the vertical water column is thickest and weaker near the shore where the vertical water column is thin. A model of Hood Canal currents in the vicinity the site, estimated the peak nearshore current speed (2.1-feet per second) happened during ebb tide (Coast & Harbor Engineering 2008).

Longshore currents are generated by wind driven waves. These current generally travel parallel to the shoreline. Rip currents are also wind driven waves that are relatively narrow and usually occur at points, groins, jetties, etc., of irregular beaches,

and at regular intervals along straight, uninterrupted beaches. The different types of currents vary in velocity, depending on the tidal stage, wave climate, water depth, and the presence or absence of structures.

Sediment movement at and near the proposed Pier site is predominantly parallel to the shoreline by longshore and cross-shore currents. Wind speed and direction are the primary drivers with respect to wave direction and magnitude at the site. Cross-shore sediment movement is dependent on wave energy, which is in turn dependent on climate and season. The highest wave heights with shorter periods occur during the winter season. These wave and currents transport sediments offshore. In Hood Canal, the winter season is characterized by southerly winds and long waves that carry sediment loads longshore, mostly from south to north, and offshore. Longer period waves, typically experienced during the summer season, tend to transport sediment onshore. The summer season experiences northerly winds that induce a north to south movement of sediment. During the summer season, waves typically exert less energy on the beaches than during the winter (Shannon & Wilson 2003).

Wind speed data recorded at a station mounted on the Hood Canal Bridge, during December 1999 through February 2000, December 2000 and June 2002, revealed the highest wind velocities occurred from south to north. Approximately 66 percent of the wind measured during the time intervals occurred in a southerly to northerly direction at the site (Coast & Harbor Engineering 2008).

A long drift cell (JE-13) (Johannessen 1992) originating approximately 10 miles south of the proposed Pier site (2.2 miles north of Hazel Point on the Toandos Peninsula) terminates artificially at the jetty north of the Bridgehaven Marina, located approximately two miles northeast of the proposed pier alignment (Hirschi 2003; WDNR 2000; Johannessen 1992). Drift sediment within the drift cell is initially derived from two stream deltas near the cell origin, exposed bluffs cut into sandy glacial drift, and from streams that are found intermittently along the cell. Net sediment movement is northward and there are many sediment sources outside the project location, even though the backshore also serves as a source (Anchor 2003).

3.3 2.3 Water Quality

Water quality refers to the chemical, physical and biological characteristics of water and is a measure of the condition of water relative to requirements of a given species or a human need, intent, or purpose. Typical ambient water quality parameters include temperature, pH, dissolved oxygen (DO) (Ecology 2002; EPA 2008), and turbidity. Other water quality parameters include salinity, nutrients, contaminants (e.g., petroleum hydrocarbons, metals, persistent organics), and bio-toxins/hazards (e.g., bacteria, toxic algae/phytoplankton (EPA 2008)).

Waters in the vicinity of the proposed Pier site are designated as Extraordinary Primary Contact waters by the State of Washington (Ecology 2013), meaning the water has an extraordinary quality for aquatic life. This designation carries stricter water quality standards for turbidity, dissolved oxygen (DO), pH, and temperature (WAC 173-201A-210). Measured levels of dissolved oxygen temperature, and

For a more robust discussion of the water quality associated with this Proposed Project see GeoEngineers' Thorndyke Resource Marine Water Quality Letter Report (GeoEngineers 2014). Table 3.3-1 in this section also provides a consolidated review.

turbidity in the upper Hood Canal, including Naval Base Kitsap-Bangor (NBK Bangor) (approximately 2.7 miles south of the proposed Pier) meets standards under WAC 173-201A-210 for Fair to Good. Saltwater meeting the standard for “good” is capable of supporting salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning; a “fair” designation means it is capable of supporting salmonid and other fish migration.

Marine water quality parameters considered pertinent to the Proposed Project are organized into six primary elements as follows:

- Salinity/Temperature;
- Turbidity;
- Metals/Organotins;
- Petroleum Hydrocarbons;
- Nutrients/Bacteria and Exotic Species; and,
- Dissolved Oxygen (DO).

SALINITY AND TEMPERATURE

The salinity regime of Hood Canal is typical of an estuary with saltier water flowing at depth and lighter, less salty water flowing out of Hood Canal at the surface. The salinity of the upper layer is dependent on rainfall and freshwater inputs, currents, and mixing from deeper layers (Newton 2008).

TURBIDITY

Turbidity is a measure of the amount of suspended particles in the water column. Based on samples collected from 2005 to 2008 by the U.S. Navy at the NBK Bangor the mean monthly turbidity of waters in the project vicinity ranged from 0.0 to 9.9 NTUs. During the same sampling period weekly minimum and maximum turbidity ranged from 0.0 to 42.9 NTUs. The Washington State Aquatic Life Turbidity Criteria for Marine Waters of Extraordinary or Excellent quality is +5 NTUs (WAC 173-201A). Ratings of Good Quality and Fair Quality apply to the NBK Bangor (Navy 2012).

METALS/ORGANOTINS

The hulls of tugs, barges and ships expected to call on the proposed Pier are typically coated in paints containing biocides (Sandberg 2007). The use of antifouling paints is considered necessary because marine invertebrates colonize hulls reducing the streamlining of the vessel and potentially damaging the hull. In general, sites where concentrations of anti-fouling paint biocides in sediment or water are an issue with regard to exceeding toxicity thresholds include heavy shipping lanes, busy ports and harbors or marinas (Schottle 2007, Seligman 2004; Strand 2000).

PETROLEUM HYDROCARBONS

The tugs and ships expected to call on the proposed Pier would be fueled and lubricated by petro-chemicals (e.g. diesel, liquid natural gas, oils and lubricants).

NUTRIENTS/BACTERIA AND EXOTIC SPECIES

In 1996 and 1998, marine waters in Thorndyke Bay and Squamish Harbor met the Washington State water quality standards for fecal coliform (Ecology 2008). In the 2012 Water Quality Assessment one site along the NBK Bangor shoreline and one site north of the Thorndyke project site on the opposite shoreline were listed as Category 2 – Waters of Concern for fecal coliform (Ecology 2012).

See Figure 3.3-5

DISSOLVED OXYGEN

The shape, bathymetry and water circulation of Hood Canal are typical of a fjord-type estuary with deeper parts to the south and a restrictive sill near NBK Bangor (approximately 22 miles south of the entrance to Hood Canal (Twin Spits). Even though surface currents are strong in Hood Canal, there is little movement of nutrients and oxygen via currents and little vertical mixing. Circulation patterns and bathymetry can cause the waters to separate in distinct vertical layers, creating a pattern of low levels of Dissolved Oxygen (DO) in southern Hood Canal which are a concern for the health and survival of aquatic life (Newton 2008).

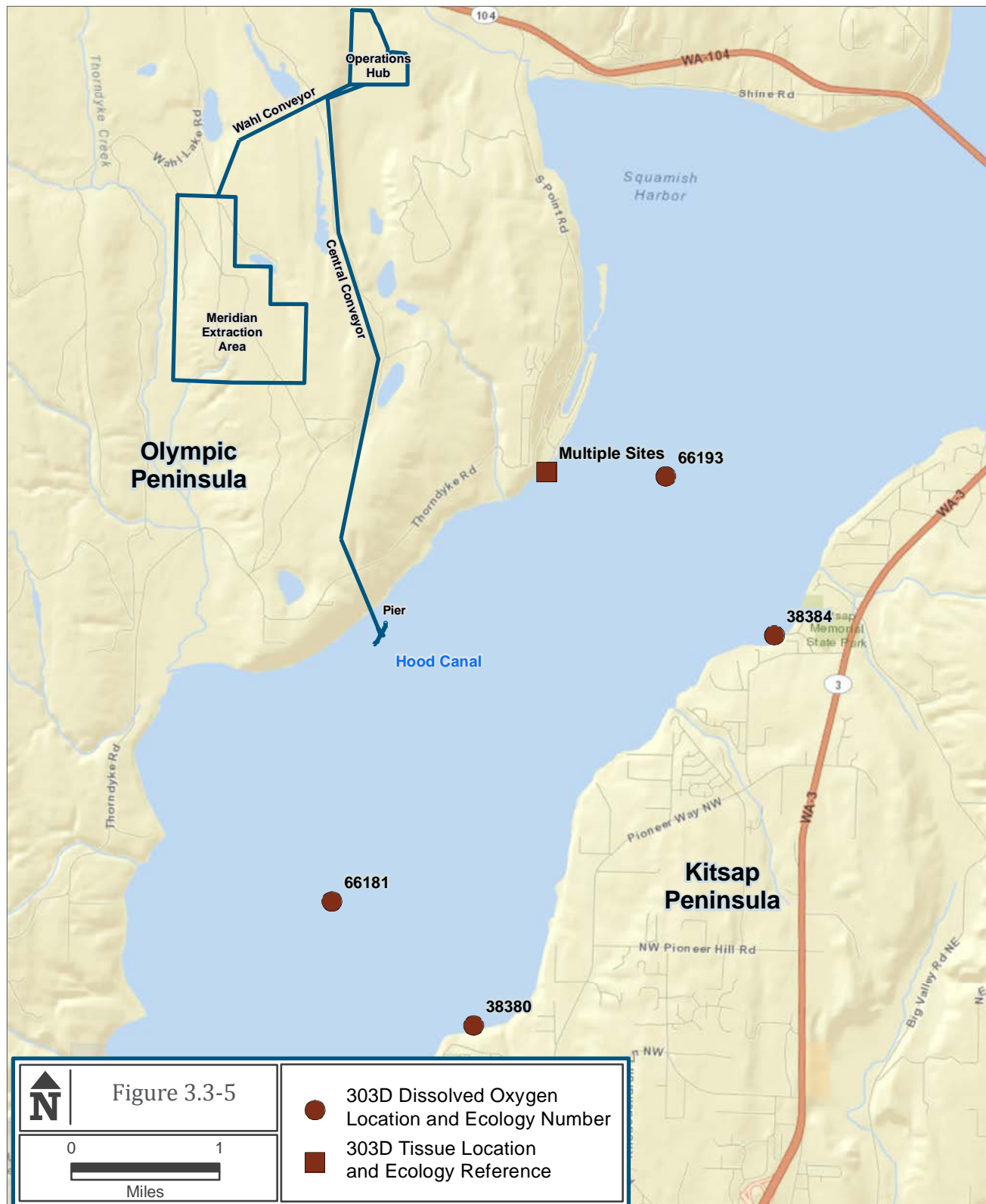
Washington State marine water quality criteria (WAC 173-201A) include the following classifications for lowest 1-day minimum oxygen concentration as related to aquatic life:

- Fair Quality - 4 mg/L
- Good Quality - 5mg/L
- Excellent - 6 mg/L
- Extraordinary - 7 mg/L.

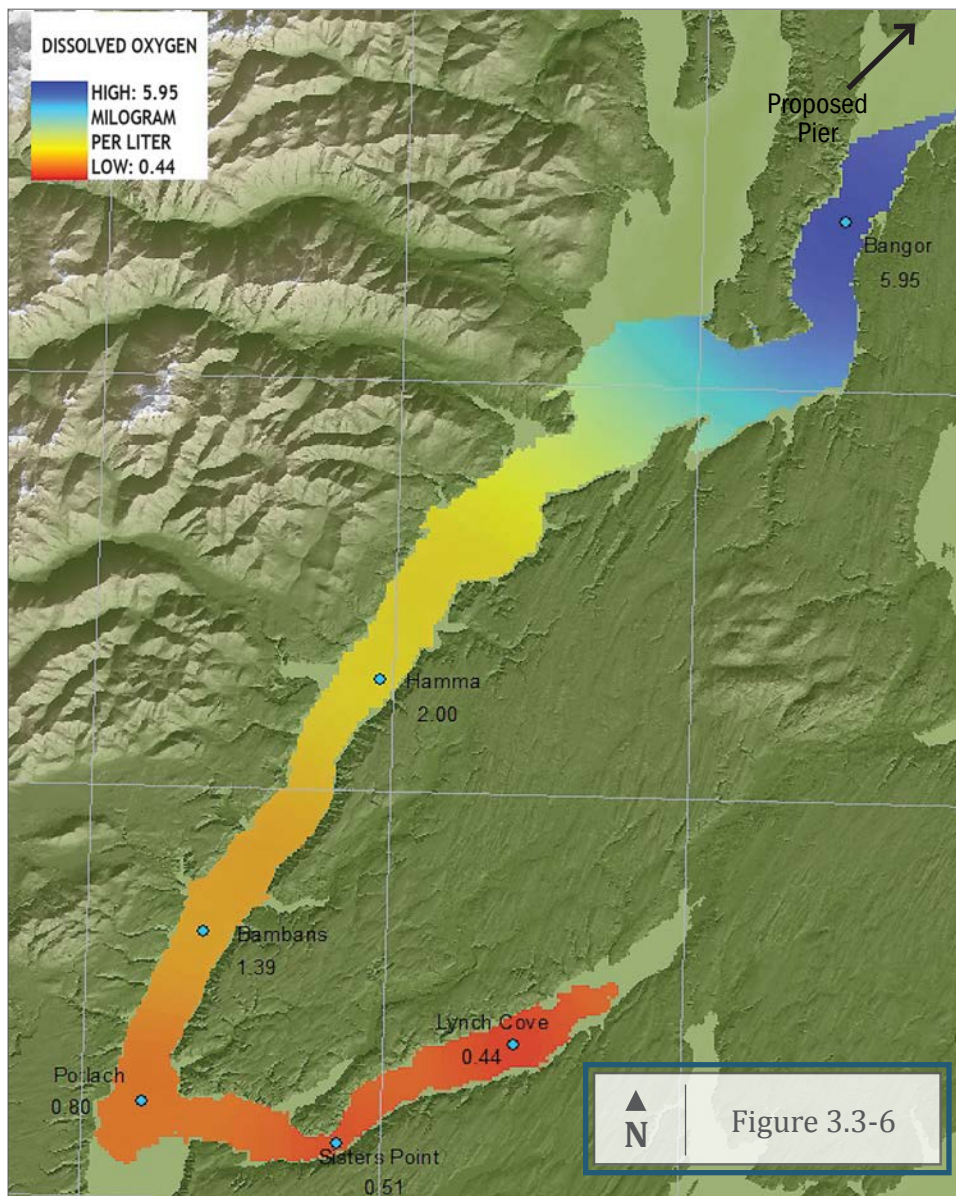
Minimum oxygen concentrations of 1-2 mg/L have been measured in Hood Canal since the early 1990s (Newton 2008). During sampling events in 2006, in Hood Canal near the mouth of Dabob Bay oxygen concentrations ranged from approximately 7 to 12 mg/L in the surface waters and 4 to 6 mg/L in bottom waters (Khangaonkar 2012). Data collected by the University of Washington at two stations in the vicinity of the Proposed Project show only occasional instances of dissolved oxygen concentrations below 5 mg/L (Hart Crowser 2013). In summary, dissolved oxygen levels in the project vicinity appear to be seasonally depressed (5 mg/L daily average in the summer). Dissolved oxygen in the vicinity of the Proposed Project is less depleted than more southerly portions of Hood Canal.

See Figure 3.3-6

However, four sites in Hood Canal in the vicinity of the project site have been listed on Ecology's 303(d) List of Impaired Waters for dissolved oxygen - listing IDs: 38380, 38384, 66181 and 66193 (Ecology 2012). A site at the south end of Squamish Harbor has been listed on the 303(d) List of Impaired Waters for contaminated tissue concentrations which is approximately 2.5-miles north of where the proposed Pier site (Ecology 2013).



303(d) List The Ecology 303(d) list comprises waters that have a polluted water category, for which uses such as drinking, recreation, aquatic habitat, and industrial use, are impaired by pollution. Four sites in the vicinity of the project have been listed on the 303(d) list of impaired waters for dissolved oxygen. **Source:** Ecology 2012. **Listing IDs:** 38380, 38384, 66181 and 66193.



Hood Canal Dissolved Oxygen

Dissolved oxygen levels were measured at six stations in August 2006 from Lynch Cove in the southern reach of Hood Canal to Bangor in the north. Located approximately five miles further north is the proposed pier site. **Source:** Hood Canal Dissolved Oxygen Program 2006.

3.3 3 Proposed Action: Direct and Indirect Impacts

The marine shorelines could be impacted by both construction and operations of the Proposed Action.

3.3 3.1 Construction

The proposed Pier is designed to be supported by steel pipe piles. The number of piles, pile sizes and pile spacing are currently based on preliminary designs. The preliminary design of the pier and retractable load-out structure shows pilings spaced at 100-foot intervals, two support towers, eight dolphins (eight breasting and two mooring dolphins), with a 5-foot elevated, grated catwalk connecting to each dolphin.

For the first 500-feet, the proposed Pier would be supported on steel support frames (truss supports) that will be spaced approximately 100-feet apart. A total of 28 piles would be used to support seven trusses along this section of Pier with each of the trusses supported by four, 18-inch diameter steel piles. Each truss would be 13-feet wide in order to support both the Central Conveyor and walkway. Beginning at the point where the conveyor would slope upward, the conveyor will continue for a distance of 135 feet to the first open steel tower support. A second tower structure will be located approximately 240-feet further waterward. Each of the two open steel towers would include sixteen, 30-inch steel piles (32 piles total). The docking facilities at the end of the Pier would consist of six pile-supported breasting dolphins and two pile-supported mooring dolphins located in water depths of -49 to -64 feet **MLLW**. Each dolphin would be supported on twelve 30-inch steel piles; construction the breasting and mooring dolphins would require a total of 96 piles. The pile caps on each of the dolphins would be 20' by 20' square. The bottom of the pile caps will be approximately 15 feet above **MLLW**.

Piles would likely be installed at the site using a crane mounted on a floating platform (barge). The piles would be installed to depths required to achieve fixity, and to provide the design lateral, uplift and downward capacities required for each pile. Some disturbance of submarine soils in the areas immediately adjacent to each installed pile will occur during these activities.

The project proponent will complete design-level hydraulic, geotechnical, structural and civil engineering studies for the pier and over-water conveyor delivery system. The final type, size and location of piles to support the structures would be dependent on the result of those studies.

No shoreline armoring is proposed as part of this project.

Construction will not alter groundwater flow patterns beneath the upland portion of the site, which govern in large part the potential for landslides and erosion from the bluff. Some localized mobilization of sediment may occur during pile driving and installation. However, these effects are expected to be temporary in nature (Hart Crowser 2013).

It is expected that installation of piles to support the pier would occur in the summer or early fall during the approved fish "work window" to avoid fish migration windows. This is typically when wave generated currents are relatively low energy, as compared to winter-generated waves. Piles could be installed in portions of the sand flat area during low tide conditions any time of the year. Impacts to waves, tides and currents during construction are therefore expected to be minimal (Anchor 2003).

Permits and licenses from **USACE** (Nationwide) and **WDFW** (Hydraulic Project Approval (HPA)) will be required prior, to any construction. This federal process will include environmental review through **NEPA**. Under that process it is expected that design-level studies will determine final number, type and design tip elevation (depth) of the piles. The County may require further environmental review if changes mandated as part of the federal review involve significant adverse impacts that were not previously evaluated as part of this EIS (WAC 197-11-600).

It is expected that geotechnical design studies will be required to determine the stability of the submarine slope, under both static and seismic-design conditions. This type of study typically requires drilling of soil borings. USACE and WDFW rules and regulations require that permits be obtained prior to drilling. It is expected that drilling of the soil borings would occur in the summer or early fall during the approved fish “work window” to avoid fish migration windows. Drilling operations associated with the design studies are not anticipated to impact waves, tides and currents. Only a short-term mobilization of equipment would occur as a part of this type of design study.

It is expected that most of the soil borings will be advanced over water by a drill rig mounted on a barge and/or landing craft. It is possible that some borings may be advanced on the beach during low tide conditions using a small drill rig. Each boring would likely disturb an area about 12 inches in diameter. Each borehole would be backfilled with grout. Wave action will likely quickly cover each borehole area with sediment. Thus, drilling operations associated with the design studies are not anticipated to impact waves, tides or currents.

It is expected that the Pier’s final design would be sufficient to resist the effects of seismic forces including liquefaction and submarine slope landslides.

The Applicant has stated that a vibratory hammer will be used for the majority of pile installations, with an impact hammer used to proof test the piles. However, the ability to use pile driving is dependent on other factors such as geotechnical design studies of the shoreline bluff and substrate of the beach and tidelands (Anchor 2003). The results of such studies may alter the proposed pile type chosen for the project, thus changing the method of pile driving construction.

Because of the relatively silt free nature of the sandy sediments in the intertidal and shallow subtidal areas, relatively little material will be suspended in the water column during pile driving, barging and other construction activities. However, turbidity (clouded water) may be increased within the immediate vicinity of construction activities and could exceed criteria for state water quality standards (WAC 173 2101A). Because of local currents and tidal action, exceeding any potential water quality limits is expected to be temporary and highly localized. Local currents will disperse suspended sediments from pile driving and barging operations at a moderate to rapid rate, depending on tidal stage.

Minor increases in turbidity could also result from propeller wash from tugboats conveying construction barges to and from the overwater conveyor during construction. Scouring impacts from propeller wash would be short-term, localized and have minor and temporary impacts on turbidity, shoreline processes or beach stability. Any potential turbidity increases resulting from these actions would be transient, highly localized.

Prior to any construction, the Applicant will be required to receive building permit(s) for the proposed Pier and its associated structures by Jefferson County.

3.3 3.2 Operational Impacts

SEDIMENT

Barges and ships would dock at the Pier during loading of sand and gravel. Review of the preliminary design indicates that most of the waves in the site area are oriented northwest-southeast, somewhat parallel to the orientation of the proposed Pier and how the barges and ships would be moored to the berthing dolphins. The orientation is designed so as not to obstruct longshore sediment transport or deflect waves in a manner that causes the sediments near the surface of the sea bed on either side to accumulate or be scoured away by tidal action (called the “tombolo effect”) (Coast & Harbor 2008).

Structures may block wave energies thereby impacting longshore transport of sediment. To avoid such impacts, the final design of the pier must ensure that:

- the spacing between piles are greater than half a wave length;
- the pile diameter is smaller than $\frac{1}{4}$ of the wave length;
- the total (integrated) longshore wave power during the period with no vessel at the pier is greater than or equal to 75 percent of the wave power occurring when a barge or ship is at the pier (moored vessel); and,
- any vessel docked at the Pier satisfies the USACE criteria for tombolo formation calculated with waves of the yearly storm event (Coast & Harbor 2008).

The Applicant has provided a report (Anchor 2003) which indicates that neither the proposed location nor diameter of the piles in its preliminary pier design, nor vessels moored at the proposed Pier would impact the longshore transport of sediment along the drift cell or the immediate beach profile. It is anticipated that the final pile spacing for the conveyor supports, pier and breasting dolphins will be evaluated/established during the design studies for the project. The federal review of the project will make a final determination regarding such potential impacts.

TURBIDITY

*See Thorndyke Resource
Marine Water Quality
Letter Report for additional
information (GeoEngineers
2014).*

Minor increases in turbidity could result from propeller wash from tugs escorting barges and ships to and from the pier. Results of Anchor’s PROWASH model show that scouring of bed sediment due to propeller wash may occur in waters shallower than 50 feet (Anchor 2003). Once the site is operational, project tugs will generally operate in waters depths of 75 feet or greater. Assuming that propeller depth, boat orientation and other boat and operating specifics are the same as those modeled in the Anchor’s study, scouring impacts from propeller wash would likely be short-term, localized to the immediate area and have no significant adverse impact on turbidity, waves, currents, tides shoreline processes or beach stability (Anchor 2003). Without significant scouring impacts, resulting turbidity will be minimal, transient, highly localized, subject to the composition of the substrate materials and tidal dispersion, and expected to fall within state turbidity criteria.

Runoff from stormwater or unstable slopes could increase discharges of sediment to the nearshore, affecting water quality within the intertidal zone. Runoff will be minimized by a design feature that would geotechnically stabilize the lower portion of the Single Conveyor route along the shoreline bluff. A “cut and drainage” system

will be placed a sufficient distance from the top of the shoreline bluff to minimize bank erosion, capturing runoff through a storm drain pipe and trench drains. Runoff will be discharged into a vault with catch basins and a diffuser system before final discharge onto the nearshore, minimizing the potential for both pollutants and high velocity discharges that could create intertidal erosion.

METALS/ORGANOTINS

Given the relatively limited berthing of barges, ships and tugboats at the Proposed Pier Project, operations are not expected to increase concentrations of metals and organotins to levels exceeding Washington State and **EPA** marine water quality criteria (WAC 173-201A-240) (EPA 2007). Strong currents and tidal exchanges in the Proposed Project area will also reduce the potential for accumulation of metals and organotins within the water column and substrate. No antifouling paint will be applied on site, further reducing the risk of leaching or introducing metals and TBT into the environment.

PETROLEUM HYDROCARBONS

Fuel spillage during construction activities and operation of the Pier is possible. Fueling of vessels will not occur on site, any spill or leak would be limited to that contained within the tug or ship (barges do not contain fuel). Prior to operations, a Marine Operations Plan (**MOP**) will be developed in consultation with the Coast Guard; **USACE**; Navy; Washington State Department of Transportation (**WSDOT**); **Ecology**; **WDFW**; Puget Sound Harbor Safety Committee (**PSHSC**); and Jefferson County. The **MOP** would be patterned after the Puget Sound Harbor Safety Plan (PSHP 2014). The Proposed Project **MOP** would include standard procedures and protocols or Standards of Care (SOC) covering safety and environmental elements to address fuel spill prevention and response plan including provisions for on site containment equipment and a tender and boom available at the Pier. Spill prevention and spill response procedures will be maintained throughout construction and operation of the proposed Pier; therefore such spills or leaks are possible but unlikely to have any long-term impact on water quality.

NUTRIENTS/BACTERIA AND EXOTIC SPECIES AND DISSOLVED OXYGEN

All tugboats and ships will hold and dispose of their sewage and greywater in accordance with applicable federal and state rules and regulations. Discharge of sewage or greywater by the tugs and ships is possible. However, the anticipated low frequency of discharges, restrictions on the discharge of sewage or greywater and tidal currents of the upper Hood Canal will likely minimize risk of locally elevated nutrient levels and concentrations of organic matter that could lead to oxygen depletion (Hart Crowser 2013; Pentec 2003). Washington State is petitioning the **EPA** to establish a no discharge zone (NDZ) in all (or some parts of) the Puget Sound, which could potentially make it illegal to discharge sewage or grey water at the project site in the future (Ecology NDZ 2012).

See Section 3.12 Public Services for more discussion on this topic.

Restroom facilities located at the end of the pier will be pumped out, maintained, contained and disposed at an upland facility. Therefore, no greywater or sewage would enter the Hood Canal from the Pier operations. Coast Guard and WDFW rules require international or out-of-state vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore, or treat ballast water to a standard of allowable concentration of living organisms, before being allowed to discharge ballast into waters of the state (33 CFR Part 151 and 46 CFR Part 162; RCW 77.120.030 and 09.48.080; WAC 220-77-095), thus reducing the probability of introducing exotic species at the project site and to Hood Canal. All vessels of 300 gross tons and greater (such as the bulk carriers expected to call on the Pier), except military vessels, must file a ballast water reporting form 24 hours prior to entering state waters. Vessels operating locally are required to not contain exotic species (33 CFR Part 151 and 46 CFR Part 162). Illegal discharges of ballast water from non-Washington State vessels would likely harm the ecosystem of Puget Sound, but are unlikely to occur. Therefore, no exotic species are expected to be introduced into Hood Canal by the Proposed Action.

Potential impacts to water quality are summarized in Table 3.3-1, on the following page.

Table 3.3-1 Water Quality Potential Impacts

Water Quality Parameter	Potential Causes and/or Sources ¹	Likelihood of Incident/Action Occurring ²	Likelihood of Potential Impact ³	Supporting Literature and/or Studies
Turbidity	Prop wash due to intermittent and ongoing boat/barge traffic.	Likely —Prop wash from tugs has a high probability of occurring during routine docking, undocking and loading in the vicinity of the pier.	0 to 10 inches Unlikely —Because the sediment grain size down to 10 inches depth in the area of the proposed conveyor and pier loading facility is medium to fine sand particles, disturbed sediments will settle to the bottom quickly and should not create damaging levels of turbidity. Glacially consolidated soils in this area would also make prop wash less likely. Deeper than 10 inches Unlikely —The presence of fine particles that could be resuspended from sediments below 10 inches are unlikely. Modeling of prop wash combined with the barge/tug layout makes deeper sediment disturbance unlikely.	Anchor 2003 Coast and Harbor 2008 GeoEngineers 2008
	Increased stormwater runoff from pier facility and conveyor in the nearshore area.	Unlikely —Stormwater runoff from new impervious surfaces as a result of the pier loading facility, conveyor and associated structures has a high probability of occurring, but it will be captured and treated before flowing over the slope into a diffuser discharge system.	Unlikely —Quantitative data on frequency and magnitude of occurrence, catchment and treatment of stormwater runoff suggests that potential impact are unlikely.	¹ Coast and Harbor 2008
	Incidental spills of gravel from the conveyor and pier structure.	Likely —Small incidental spills of sand and gravel from the conveyor and pier structure will likely occur at a low frequency.	Unlikely —The structurally enclosed conveyor and containment systems that will be used on the barges and ships will reduce the potential for spills. In addition the percent fines content of the sand and gravel is low (2-6%) reducing the likelihood of exceeding turbidity criteria if a spill occurs.	Hart Crowser 2013
	Temporary pier and nearshore conveyor construction activities.	Likely —Temporary construction activities have a high probability of occurring with all marine (in-water) construction projects.	Likely —Short-term sediment disturbance will occur during construction of the conveyor piers and associated pile support structures.	Pentec 2003 Jones and Stokes 2000 Coast and Harbor 2008
Metals/ Organotins	Leaching of metals and tributyltin from coatings on boat/barges that are in direct contact with the water column.	Likely —Almost all marine vessel hulls in contact with the water are coated with anti-fouling paints containing various levels of metals/organo-metals designed to prevent growth of marine organisms. Tributyltin has historically been used for this but is slowly being replaced by other metals (lead, copper) because of its high toxicity to marine organisms and persistence in the marine environment.	Unlikely —Leaching of some metals/organo-metals from vessel hulls will occur, however in general, only heavy shipping sites (shipping lanes, busy ports and harbors or marinas) seem to be areas of concern with regard to exceeding toxicity thresholds of metals and organotins in sediment or water.	Sandberg et al. 2007 Schottle and Brown 2007 Seligman et al. 2004 Strand and Jacobsen 2000

Petroleum Hydrocarbons	Oil and gasoline/diesel spills due to accidents.	Unlikely —The probability of a catastrophic spill as a result of boat or barge collisions and/or accidents is low.	Short-term impacts likely, long-term impacts unlikely —An agency-approved spill prevention and response plan, to be developed prior to construction, will outline measures to prevent accidents and spills and provisions for rapid containment and cleanup of a spill.	Hart Crowser 2013
	Incidental oil and gasoline/diesel leaks and contaminated rainwater runoff from boat/barges.	Likely —Incidental oil/grease and gasoline/diesel coming from precipitation runoff from boat/barge surfaces or small leaks or spills has a high probability of occurring.	Unlikely —On-going incidental inputs of PAHs from up to six barges or ships a day will occur, however operating procedures such as rapid clean-up of oil, gasoline, and diesel on the pier and vessels and repair of leaks, in addition to implementation of BMPs will reduce the quantity of inputs. The likely rate of loading is anticipated to be low enough that the receiving environment can evaporate, dilute, metabolize, and assimilate the PAHs.	Hart Crowser 2013
	Increased discharge of petroleum or exhaust products from idling automobile traffic on Hood Canal Bridge during bridge closures for barge/boat traffic.	Unlikely – Barge/boats will disrupt automobile traffic on the Hood Canal Bridge very infrequently when compared to the total amount of time the bridge is open to traffic.	Unlikely —Automobile traffic will release insignificant levels of oil/grease if idling on the Hood Canal Bridge as a result of barge/boats passing through the Canal.	Heath 2011
Nutrients, Bacteria, and Exotic species	Release of greywater (sewage) from vessels with resulting inputs of nitrogen/phosphorus and bacteria into Hood Canal.	Likely but low frequency —Only treated sewage or greywater may be discharged within 3 miles of shore. Accidental releases of untreated greywater/sewage may occur but would be expected to be unlikely.	Unlikely —Restrictions on the discharge of sewage and greywater and tidal currents at the site will minimize risk of localized nutrient or bacteria pollution problems.	Pentec 2003 WAC 2001 RCW 2000 Foss et al. 2007 33 USC § 1322
	Discharges of untreated ballast water introducing exotic species to Hood Canal.	Exotic Species, Unlikely —It is illegal to discharge untreated ballast water in Washington State.	Exotic Species, Unlikely —International or out-of-state vessels are unlikely to illegally discharge untreated ballast water. All vessels of 300 gross tons and greater, except military vessels, must file a ballast water reporting form 24 hours prior to entering state waters. Vessels operating locally should not contain exotic species. Illegal discharges would harm the ecosystem of Puget Sound but they are unlikely.	RCW 2000 33 CFR Part 151 46 CFR Part 162
Dissolved Oxygen	Release of greywater (sewage) from vessels with resulting inputs of nitrogen and phosphorus into Hood Canal which is already limited for dissolved oxygen (DO) concentrations.	Likely but low frequency —Only treated sewage or greywater may be discharged within 3 miles of shore. Accidental releases of untreated greywater/sewage may occur but would be expected to be unlikely.	Unlikely —Low frequency of discharges, restrictions on the discharge of sewage/greywater and tidal currents at the site will minimize risk of locally elevated nutrient levels and concentrations of organic matter that could lead to oxygen depletion.	Pentec 2003 WAC 2001 RCW 2000 Foss et al. 2007 33 USC § 1322

Notes

1 Impacts not addressed: potential long-term marine water quality impacts due to upland land use changes or activities within the Hood Canal watershed that may occur in the future if this project is approved.

2 **Likely**: Sufficient existing information to conclude that activity or action has a high probability of occurring. **Unlikely**: Sufficient existing information to conclude that activity or action has a low probability of occurring. **Unknown**: Insufficient existing information to conclude that activity or action has a low probability or high probability of occurring.

3 **Likely**: Sufficient existing information to conclude that impact from that activity or action is probable and therefore this potential impact should be evaluated in the EIS. **Unlikely**: Sufficient existing information to conclude that activity or action has a low probability of occurring and that impact is improbable OR that there is not precedent for addressing this impact for a project with this scale and scope and therefore this potential impact should not be evaluated in the EIS. **Unknown**: Insufficient existing information to determine likelihood of impact and therefore this impact should be evaluated in the EIS after collection of more data and/or information.

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3.4 WATER, including Surface Water and Groundwater

Clean and abundant water and associated wetlands, streams, aquifers and shorelines are essential for plants, animals, fish, marine life and people. Lakes and streams (surface waters) provide habitat for fish and wildlife and can also provide recreational opportunities and sources of potable water for humans. Underground water (groundwater) that feeds springs, wells and aquifers also provides potable water for humans and regulates surface water temperatures. Water quality influences the beneficial uses of surface water and groundwater. Most water quality issues in the Puget Sound and Hood Canal have shifted from massive, point-source dumping (largely abated) to non-point pollution sources such as oil and toxics from cars and trucks, fertilizers from lawns, effluent from septic tanks, and even prescription medications contained in the wastewater stream. Pavement and other impervious surfaces send stormwater directly into streams, rather than through the slow and buffered groundwater-fed flows of natural systems, leading to damaged streambeds and contributing to the decline in salmon and other stream-associated plants and animals.

Construction and operation of the Proposed Action may impact surface water and groundwater (and marine saltwater) in the project area. Processing areas, conveyor foundations and roads can create impervious surfaces channeling stormwater and pollutants. Sand and gravel mining that alters water flows into wetlands, surface and ground waters may impact aquifer recharge.

*For marine saltwater impacts,
see Section 3.3 Marine
Shoreline.*

3.4 1 Regulatory Overview and Permits

3.4 1.1 Federal

Freshwater critical areas such as wetlands are protected through the Water Pollution Act, better known as the Clean Water Act (**CWA**), whose primary goals are to restore and maintain the chemical, physical and biological integrity of the nation's waters by preventing point and non-point pollution sources; providing assistance to publicly owned treatment works for the improvement of wastewater treatment; and, maintaining the integrity of wetlands (33 U.S.C § 1251 et seq.). The U.S. Army Corps of Engineers (**USACE**) administers the Engineering Section of the **CWA**, which includes regulation of fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), mining and other projects. **CWA** Section 404 requires a permit before dredged or fill material may be discharged. Minor wetland impacts are typically required under nationwide permits; larger impacts under individual permits (applicable to the Proposed Project primarily because of the Proposed Pier).

The **CWA** provides for comprehensive federal regulation of all sources of water pollution and prohibits the discharge of pollutants from non-permitted sources. **CWA** authorizes the Environmental Protection Agency (**EPA**) to administer or

delegate water quality regulations covered under **CWA**. In Washington State, the **EPA** has delegated administrative authority of its responsibilities under **CWA** to the Washington Department of Ecology (**Ecology**) except on tribal and federal lands.

Protection of groundwater and groundwater sources (aquifers) used for drinking is required federally under the Safe Drinking Water Act (**SDWA**) (42 U.S.C. § 300f), as well as related state statutes and regulations.

3.4 1.2 State

Ecology establishes rules and requirements on how to manage, treat for pollutants and release stormwater for the all state and local jurisdictions. **Ecology's** Stormwater Management Manual for Western Washington (various editions) has been adopted by state agencies, as well as County that reviews and issues construction and operational permits required for this Proposed Action, if approved.

The Proposed Project is subject to the Washington Department of Natural Resources (**WDNR**) Aquatics Land Lease regulations that regulate impacts to freshwater systems (streams and wetlands) and tide lands (WAC 332-30-122). Additionally, the **WDNR** Forest Practices Act regulates timber activities on both private and public forest lands and protects wetlands and streams on those lands. (Ch. 76.09 RCW). **WDNR** regulates the construction and maintenance of private forestry service roads that would be used or constructed to access and support Wahl and Central conveyors. The mining activities at the Meridian Extraction Area, processing at Operation Hub and the various Conveyor systems and transfer points of Wahl and Central Conveyors would be under the jurisdiction of the **WDNR** Geology Division, which requires a site-specific **WDNR** reclamation permit.

Washington Department of Fish and Wildlife (**WDFW**) protects freshwater and marine habitats, regulating construction projects that use, divert, obstruct or change the natural bed or flow of state waters. Construction of the Pier and its Conveyor approach would require a Hydraulic Project Approval (**HPA**) permit, due to impacts to wetlands associated with streams and clearing in the riparian area resulting from Applicant's proposed work in the shoreline zone and Wetland B (Ch. 77.55 RCW, Ch. 220-110 WAC). The **HPA** requirements, as well as construction and maintenance of the stormwater controls for the Proposed Pier, would overlap with Jefferson County's jurisdiction.

The Water Pollution Control Act (**WPCA**) (RCW 90.48) is the primary water pollution law for Washington State and identifies and mandates water quality standards for surface waters (WAC 173-201A).

In general, the discharge of wastewater, except domestic wastewater going to a municipal treatment plant, requires a wastewater discharge permit. This includes stormwater from industrial and construction sites. Discharges to surface waters require an National Pollution Discharge Elimination System (**NPDES**) individual permit or coverage under a general **NPDES** permit. Discharges to ground, and industrial discharges to a municipal treatment plant, require a state wastewater discharge permit.

Both **WDNR** and **Ecology** permits require that the various site-specific stormwater control and treatment systems be constructed, operated and maintained in compliance with the most recent edition of **Ecology**'s stormwater manual published. Dischargers must apply all "known, available and reasonable methods of prevention, control and treatment" (**AKART**) prior to discharge into the state's waters.

To promote compliance with state surface water quality standards, **Ecology** will require:

- **CWA** Section 401 certificates of water quality compliance for each project requiring a **CWA** Section 404 permit.
- **NPDES** and State Waste Discharge Construction Stormwater individual and general permits.
- **NPDES** and State Waste Discharge Sand & Gravel Permit for Non-Portable Facilities. This covers discharge of wastewater, including process water, stormwater or mine dewatering water from industrial activities.

3.4 1.3 County

At the local level, wetland and stream impacts are regulated under the Jefferson County Code (**JCC**), including mitigation for unavoidable impacts to wetlands and protective buffer requirements (**JCC** 18.22.290-350, and 18.22.450). Proposed projects within Jefferson County are required to delineate and characterize onsite wetlands and evaluate project-related effects. The Proposed Project vested under Jefferson County's 2003 regulations (**JCC** 18.15.340) with respect to wetland ratings and buffer requirements. However, the Applicant has agreed for purposes of analysis in this chapter to evaluate impacts to wetlands and their buffers under the 2013 code (**JCC** 18.22), the 2008 **Ecology** rating system, and Best Available Science in wetland analysis (GeoEngineers 2013).

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Chapter 3.08 Land Use. The following goals and policies are applicable to this discussion of the Proposed Project's impacts on wetlands, surface water and ground water:

ENVIRONMENT ELEMENT GOAL

- **ENG 1.0** Manage, protect, enhance, and conserve water resources through a comprehensive watershed management program that is integrated with recovery plans for fish species proposed for listing under the ESA.

ENVIRONMENT ELEMENT POLICIES

- **ENP 1.2** Participate in the Jefferson County Water Resources Council and other collaborative watershed and salmon habitat conservation planning processes with state, federal and tribal governments and local stakeholders, in order to integrate water resource management for human needs with fish and wildlife habitat protection and restoration.
- **ENP 1.3** Manage water resources using the best available scientific information and participate in collaborative processes to develop new information.

ENVIRONMENT ELEMENT GOAL

- ENG 2.0 Protect the quality and quantity of surface and ground water resources, and enhance and restore them where they have been damaged.

ENVIRONMENT ELEMENT POLICIES

- ENP 2.1 Preserve the environmental functions of surface and ground water resources whenever feasible, and require mitigation measures for land use activities that may adversely impact surface and ground water.
- ENP 2.2 Manage surface water resources in accordance with a storm water management plan developed within the framework of a comprehensive watershed management plan.
- ENP 2.3 Protect surface water and its functions through mitigation measures developed in coordination with Ecology, the Washington State Department of Transportation (WSDOT), and other local, state, federal, and tribal agencies.
- ENP 2.4 Work with the Department of Ecology to restore and protect instream flow volumes, and comply with the State's Surface Water Quality Standards and other programs affecting surface water resources, consistent with a comprehensive watershed management approach.
- ENP 2.5 Provide buffers between land-disturbing activities and surface water resources to meet the standards of the best available fisheries science for protecting water resources and related habitat functions.
- ENP 2.6 Promote best management practices to protect surface and ground water in land use regulations related to septic systems, forest practices, agricultural practices, industry, and other development.
- ENP 2.7 Minimize the adverse impacts of land use activities on water resources where there is a potential for hydraulic continuity between surface and ground waters.
- ENP 2.10 Establish a well monitoring program, whenever possible in conjunction with partners such as the Public Utility District (PUD) No. 1 and Ecology, with protocols to assure quality control, and coordinate data interpretation and application through Water Resource Inventory Area (WRIA) Planning Units operating in Jefferson County per the Watershed Planning Act (RCW 90.82).

ENVIRONMENT ELEMENT GOAL

- ENG 12.0 Protect and enhance fish and wildlife habitat throughout Jefferson County.

ENVIRONMENT ELEMENT POLICIES

- ENP 12.3 Buffers for fish and wildlife habitat areas should be consistent with the best available science for habitat protection.
- ENP 12.5 Promote best management practices to protect fish and wildlife habitat in land use regulations related to septic systems, drainage, forest practices, agricultural practices, industry, and other development.

ENVIRONMENT ELEMENT GOAL

- ENG 13.0 Protect aquifer recharge areas from depletion of aquifer quantity or degradation of aquifer quality.

ENVIRONMENT ELEMENT POLICIES

- ENP 13.1 Aquifer recharge areas should be designated and managed based on the best available science.
- ENP 13.2 Until geohydrologic studies provide additional information regarding the full extent of aquifer recharge areas, the County should protect aquifer recharge capability in all areas of the County.
- ENP 13.3 Storm water should be managed to enhance and protect aquifer recharge quality and rate of infiltration based on a comprehensive watershed plan.
- ENP 13.4 Promote best management practices to protect aquifer recharge areas in land use regulations related to septic systems, drainage, forest practices, agricultural practices, industry, and other development.

ENVIRONMENT ELEMENT GOAL

- ENG 14.0 Protect and enhance wetlands in all their functions.

ENVIRONMENT ELEMENT POLICIES

- ENP 14.1 Designate and manage wetlands based on the best available science.
- ENP 14.2 Land use activities that may impact wetlands should be reviewed in the context of a comprehensive watershed and habitat conservation plan.
- ENP 14.3 Standards for wetland buffers should be consistent with the best available science as recommended by wetland and habitat biologists.
- ENP 14.4 Promote best management practices to protect wetlands in land use regulations related to septic systems, drainage, forest practices, agricultural practices, industry, and other development.

The Proposed Meridian Extraction Area is located within the Wahl-Meridian Mineral Resource Land Overlay (**MRLO**) approved by the **Ordinance**. To protect environmentally sensitive areas within the **MRLO**, the **Ordinance**:

- Prohibits mining in wetlands and fish and wildlife habitat areas or their associated buffers; and,
- Requires submission of an Aquifer Recharge Area Report and Drainage and Erosion and Control Plan and Grading Plan to demonstrate a lack of degradation to groundwater or surface waters. (Ordinance, Section 2(1)(a)).

In addition, the Ordinance includes several conditions related to any mining operations located within a designated Aquifer Recharge area. These conditions specify that:

Mining operations shall demonstrate that the proposed activities will not cause degradation of the groundwater quality below the standards described in Chapter 173-200 WAC, and further requires: annual training for employees re. BMPs; compliance with ORCAA permit requirements; third-party NPDES monitoring; and preparation of independent annual reports evaluating implementation of the approved WDNR reclamation plan. (Ordinance Section 2(4) through (8))

Building permits from Jefferson County necessary to construct the various Conveyors and structures associated with the Proposed Action would trigger review under Jefferson County's Critical Areas regulations (JCC 18.22 Article III); which establishes

and regulates activities in Critical Aquifer Recharge Areas. Protection standards address relevant factors such as stormwater disposal, on-site sewage disposal, above-ground and underground storage tanks, mining and quarrying, and hazardous materials.

On-Site Sewage Systems installed will require compliance with Jefferson County Department of Health rules and regulations.

A Jefferson County Type 1 Stormwater Permit is required for Meridian Extraction Area to address mining operational requirements and ensure consistency with both the ordinance and the Uniform Development Code (UDC) Mineral Extraction and Processing Performance Standards.

3.4 2 Affected Environment

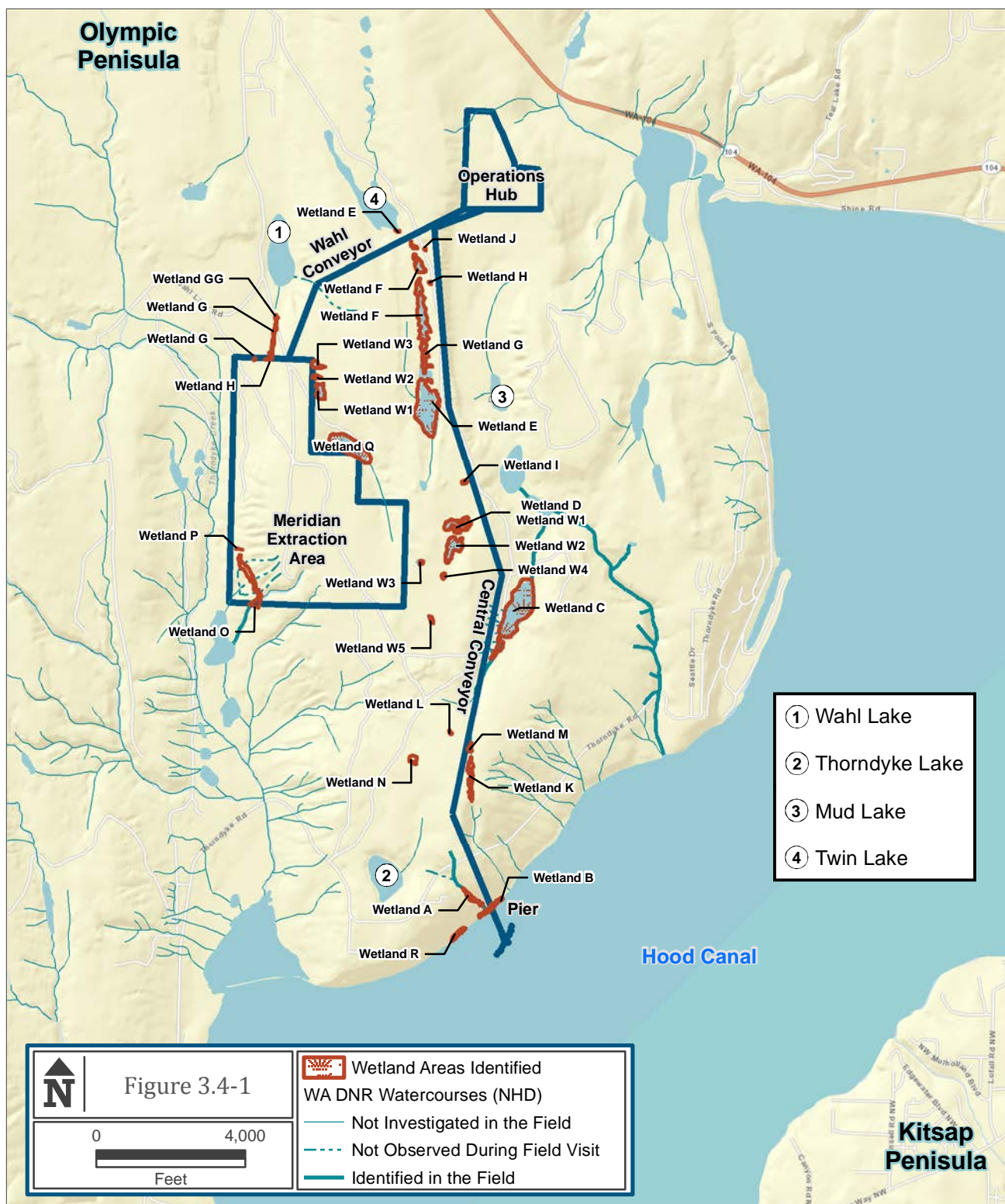
The Proposed Project will take place in upland forest and nearshore, intertidal and subtidal habitats. This section focuses on surface and groundwater which includes freshwater wetlands and streams. Surface and near surface hydrology in the project area is driven by an average of 39.3 inches of precipitation annually (Correa 2002). Precipitation feeds all local lakes, streams, wetlands and recharges local groundwater. The project area is located in the Quilcene-Snow Watershed, Water Resource Inventory Area (WRIA) 17. Proposed Project components are located in the Ludlow and Dabob-Thorndyke Creek sub-basins of WRIA 17 (Cascadia 2003).

3.4 2.1 Lakes and Streams

See Figure 3.4-1

Surface waters in the vicinity of the Proposed Project include several lakes, named and unnamed streams, and wetlands. Named lakes that may be affected by the Proposed Project include Wahl Lake, Twin Lakes, Pheasant Lake (Wetland E), Mud Lake and Lost Lake (Wetland Q). It is important to note that some of these named lakes are actually wetlands, as they are too small (less than 20 acres) to be considered regulated lakes. Included are both their common names and how they are described in the technical reports (Krazan 2003a; BGE 2008; GeoEngineers 2013). Streams include Thorndyke Creek, Manhattan Beach Creek, Shine Creek and several unnamed drainages.

Thorndyke Creek (WRIA 17.0170), the largest named stream in the vicinity of the Proposed Project, is located immediately east of Meridian, originating at Sandy Shore Lake and extending south to Thorndyke Bay on Hood Canal. With a stream length of 6.3 miles and an additional 7.7 miles of perennial and intermittent tributaries, Thorndyke Creek drains a 12.1-square mile watershed (Correa 2002).



Wetlands, Lakes and Streams Ten of the 29 wetlands reported within the project area relate to the Meridian Extraction Area, 19 with the Central Conveyor and Pier. The general project vicinity also contains seven small lakes totaling approximately 70 acres.

Manhattan Beach Creek (WRIA 17.0180) and Shine Creek (WRIA 17.0181) are small streams that may receive runoff from project components. The mouth of Manhattan Beach Creek is located south of South Point on Hood Canal. With a main tributary within reach of surface water runoff from the Central Conveyor, the mainstem length is 1.4 miles. Shine Creek, which may receive limited surface water runoff from the Proposed Operations Hub, has a mainstem length of approximately 2 miles and drains a watershed area of 5.2 square miles (Correa 2002).

The named creeks are all classified as AA extraordinary for water quality by Ecology. Thorndyke Creek was on Ecology's 303(d) list as exceeding temperature standards and water quality assessments from 1996 through 2012 (JeffCo MLA 2004). Manhattan Beach Creek also met water quality standards throughout the published period. Shine Creek is listed as a water of concern for temperature but is not on the 303(d) list of contaminated water bodies (Ecology 2013a).

3.4 2.2 Stormwater

Most of the Proposed Project is located within an active commercial forest and timber production area with a network of forestry service roads. Stormwater generated from forestry service roads sheet flows into surrounding forested or vegetated areas. In locations near downstream sensitive areas, such as steep or unstable slopes or adjacent to wetlands, stormwater from road surfaces is concentrated to a series of ditches or culverts directed away from the sensitive sites, eventually discharging to a nearby creek or wetland (Team4 Engineering 2003a; 2003b).

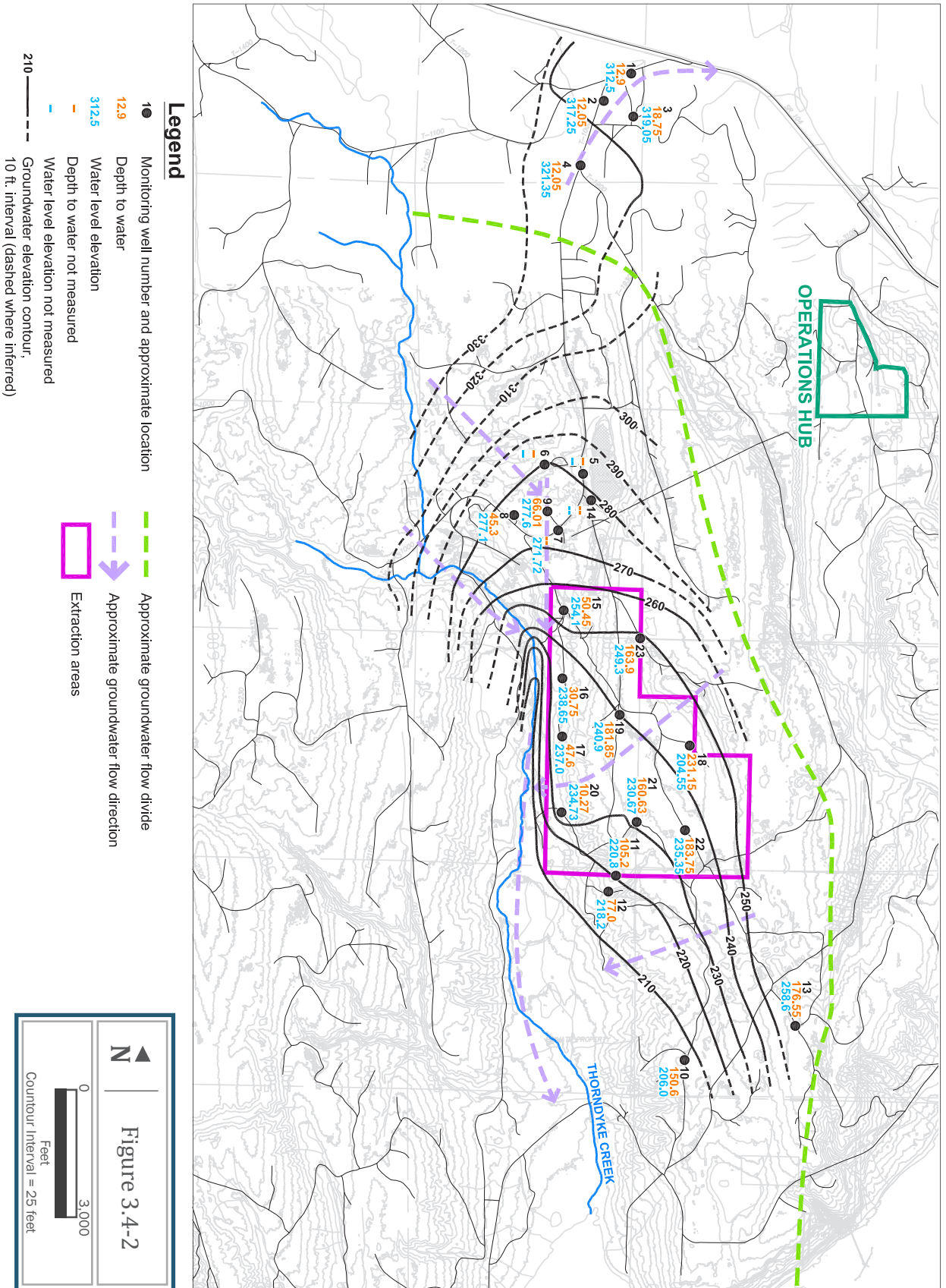
Stormwater generated from the former Shine Pit was managed under an existing **Ecology NPDES** Sand and Gravel Permit (WAG 50-1120). In general, stormwater was allowed to infiltrate without treatment in this area.

3.4 2.3 Groundwater

Figure 3.4-2 Groundwater Elevation Contour map shows groundwater flow directions of the Vashon outwash aquifer for the Meridian Extraction Area.

Groundwater resources underlying the Proposed Project area include the unconfined, water-table aquifer within Vashon outwash materials and a deeper confined, artesian aquifer found in pre-Vashon sediments. A confining layer, about 200 feet thick, appears to separate the two aquifers.

Measured groundwater elevations in the water-table aquifer ranged from 316 feet in the north near SR 104, to 210 feet south near Thorndyke Lake (GeoResources 2011). In the Proposed Project area, groundwater flow in the unconfined aquifer is generally south-southwest. This aquifer is hydrologically connected to area wetlands, lakes and Thorndyke Creek.



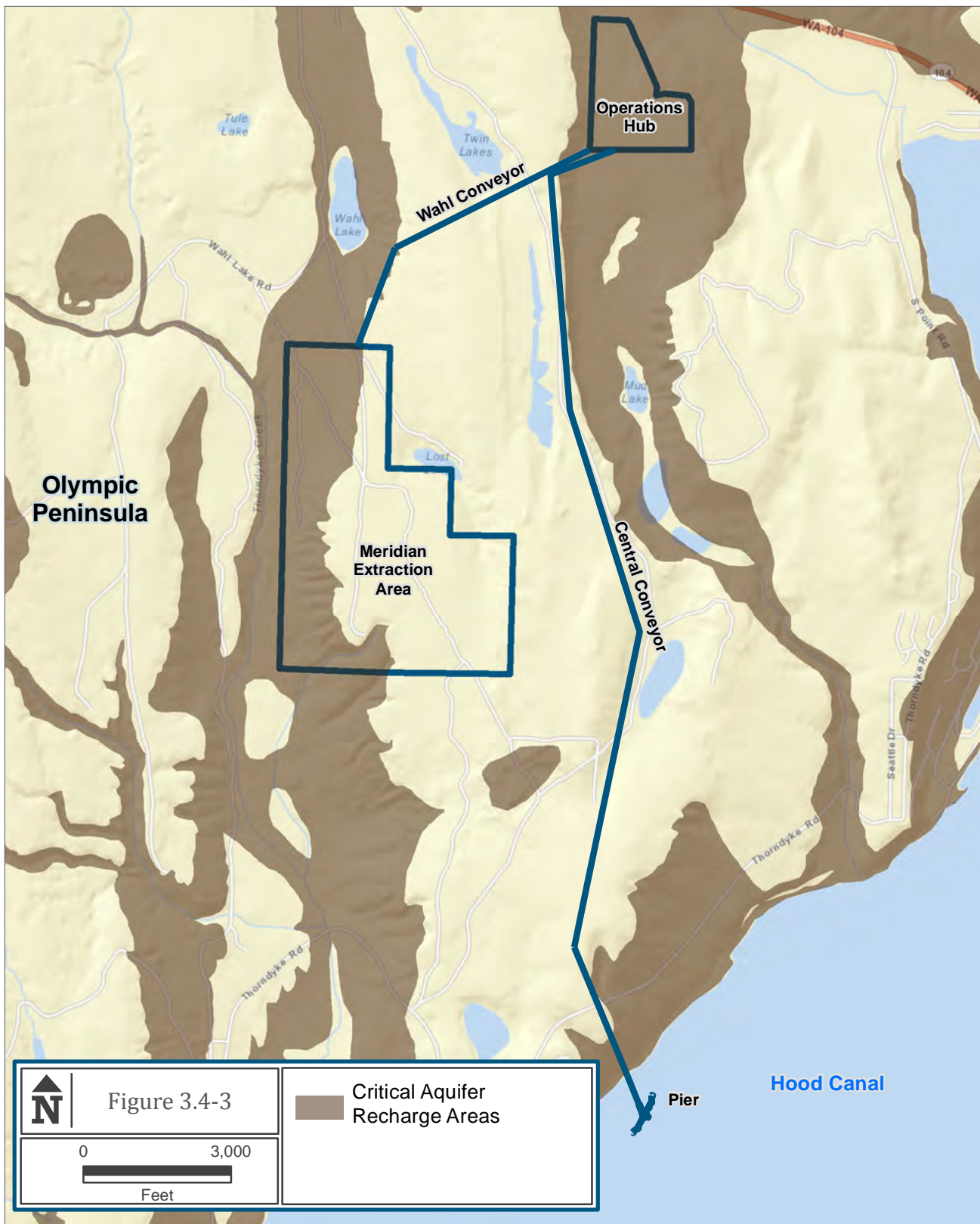
See Figure 3.4-3 Groundwater in the pre-Vashon aquifer appears to be under artesian pressure. Groundwater flow within this aquifer appears to be toward the east, southeast (Robinson & Noble 1999). Thorndyke, Squamish and Bridgehaven area water supply wells appear to be completed within this aquifer, at about Elevation -50 feet. Based on information provided on well logs, static water levels in these wells ranged from about Elevation 10 to 30 Feet. These water levels appear to be between about 60 to 80 feet above the top of the pre-Vashon aquifer at the well locations. Portions of the Meridian Extraction Area, Operations Hub and the Proposed Central Conveyor corridor are located within Critical Aquifer Recharge Areas (JeffCo Map 2013). Because of this, an Aquifer Recharge Area Report is required for the project.

Potable water on the Toandos Peninsula appears to be provided exclusively via wells. A water supply well located at the then-operating Shine Pit supplied drinking water for on-site workers and process water for operations. The reconfigured Operations Hub will use water from this well. The majority of the of the Proposed Project appears to be more than mile away from private and community water supply wells. The nearest private water supply well is about one-third of a mile from the portion of the Single Conveyor segment near Thorndyke Road (Ecology 2013b).

Located over 1.5 miles east of Meridian, the Bridgehaven area wells are the closest community supply wells to the project site. These wells are completed in the pre-Vashon aquifer, which is about 400 feet below ground surface at the Bridgehaven site. Groundwater flow within the pre-Vashon aquifer is from the west to the east/southeast (Robinson & Noble 1999). The 10-year capture zone for water movement within the pre-Vashon aquifer at the Bridgehaven Well 1 extends to just east of Meridian (Robinson & Noble 1999). Groundwater flow within the shallower Vashon aquifer at the site is to the south-southwest.

The Proposed Project should not impact the quality or quantity of water from Bridgehaven wells because:

- The Vashon aquifer is closest to the base of the proposed mine at Meridian.
- The pre-Vashon aquifer is separated from the bottom of the Vashon aquifer by a confining layer about two hundred feet thick.
- Groundwater flow in the pre-Vashon aquifer is to the east-southeast, groundwater flow within the Vashon aquifer is to the south-southwest.
- The two aquifers are not hydraulically connected based on the differing groundwater flow directions within each aquifer unit.



Critical Aquifer Recharge Areas The western boundary of the Meridian Extraction Area, the area within and surrounding the Operations Hub, an area east of the northern portion of the Central Conveyor, and the upland area above the Hood Canal shoreline are mapped as Critical Aquifer Recharge Areas. **Source:** Jefferson County

3.4 2.4 Wetlands

Twenty-nine wetlands of varying types and ratings have been reported within the project area (See Table 3.6-1). Ten of these wetlands are associated with the Meridian Extraction Area; 19 with the Central Conveyor and Pier. These wetlands vary in size from approximately 0.2 to 19.7 acres as shown in Figure 3.4-1.

Most of the aquatic critical areas (wetlands and streams) were delineated in the early 2000's (Krazan 2003a) in accordance with Jefferson County standards (JCC 18.15.340), which include utilization of the 1997 *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997).

In 2008, wetlands and streams associated with the Central Conveyor and Pier were later verified. The updated wetland ratings used the *Washington State Wetland Rating System for Western Washington ver. 2004* (Hruby 2004). Results found that wetland boundaries had not changed (BGE 2008) nor had the functions were unchanged from the early 2000's review (Krazan 2003a). However, some of the wetlands had different wetland ratings and were thus assigned the appropriate buffer widths (JCC 18.22.330(2) (moderate land use category)) (BGE 2008).

In June 2013, GeoEngineers verified or re-categorized 17 wetland boundaries (GeoEngineers 2013a) using *Wetland Rating System for Western Washington rev. 2006* (Hruby 2006), and the wetland delineation methodology provided in the *Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual* (USACE 2010).

Each wetland was rated and either delineated or had its boundary verified, as if the Proposed Project was vested under current Jefferson County current wetland regulations (JCC 18.22.300), using the most current **Ecology** wetland manual (Hruby 2006). Buffer widths for the wetlands were also determined in accordance with Jefferson County current standards (JCC 18.22.330). The Applicant has agreed to a proposed wetland mitigation plan based on the June 2013 GeoEngineers findings. (GeoEngineers 2013b). Table 3.4-1 tracks the progression of the identified wetlands.

For many of the project area wetlands, the **WDNR** identified potential streams onsite; however, field observations could not confirm the presence of the streams. For example, eight streams are mapped near Wetland C as flowing under the existing forest service road, but no evidence of these streams was observed during the field visit. Similarly, no evidence of streams was found in the vicinity of Wetlands M and K (near the south end of the Central Conveyor) or Wetland O (southwestern corner of the Meridian Extraction Area). The mapped stream flowing into Wetland A and onto Wetland B was observed. While the required buffer for this stream is contained within the required wetland buffer, no impact to either the stream or its buffer is expected.

Table 3.4-1 Wetlands Associated With the Project Area

Current wetland locations relating to the project area are shown here, including the original (vested in 2003) wetland rating and buffer requirements (per the previous JCC 18.15.340) and the current (2013) rating and buffer requirements (JCC 18.22.330). Prior to the GeoEngineers survey (2013) “N/A” wetlands were not delineated, nor were “*” wetlands verified. Further descriptions of wetlands associated with the Meridian Extraction Area and Central Conveyor and Pier can be found in Krazan (2003a), BGE (2008) and GeoEngineers (2013) wetland delineation reports.

Wetland Name	Approximate Location	Category		Required Buffer Width (ft)	
		Previous (2003) ¹	Current (2008) ²	Vested (2003) ³	Current (2013) ⁴
Meridian Extraction Area					
Wetland O (Alder Forested)	SW Corner	N/A	III	N/A	150
Wetland P (Seep Wetland)	SW Corner	N/A	IV	N/A	50
Wetland Q (Lost Lake)	Eastern area	N/A	II	N/A	150
W3	SE of the corridor	N/A	I	N/A	250
W2	SE of the corridor	N/A	I	N/A	250
W1	SE of the corridor	N/A	I	N/A	250
Wetland GG	SW of the corridor	Per Team 4 drawings, located outside area evaluated			
Wetland G	SW of the corridor	Per Team 4 drawings, located outside area evaluated			
Wetland H	SW of the corridor	N/A	III	N/A	150
Wetland D	SW of the corridor	N/A	III (estimated, to be confirmed in field)	N/A	80 (estimated, to be confirmed)
Central Conveyor and Pier					
Wetland E (Twin Lakes)	North of Wahl Conveyor	Per Team 4 drawings, located outside area evaluated			
Wetland J	North end of Central Conveyor	III	III	50	80
Wetland F	North end of Central Conveyor	I	III*	150	110*
Wetland H	North end of Central Conveyor	III	III	50	80
Wetland G	North end of Central Conveyor	III	IV*	50	40*
Wetland E (Pheasant Lake)	Near central part of Central Conveyor	I	III	150	150
Wetland I	North end of Central Conveyor	III	III	50	80
Wetland D	Near central part of Central Conveyor	II	IV*	25	40*
Wetlands W2, W3, W4, W5	Near central part of Central Conveyor	Per Grand Central FPA drawings, outside area evaluated			
Wetland C	Central part of Central Conveyor	I	II	150	300
Wetland M	Near south end of Central Conveyor	III	III	50	80
Wetland L	Near south end of Central Conveyor	IV	III*	25	60*
Wetland K	Near south end of Central Conveyor	II	III	100	80
Wetland N	Near south end of Central Conveyor	III	III*	50	60*
Wetland A	Upland nearshore, west of Central Conveyor	II	III	100	80
Wetland B	Shoreline, northern part of Pier	II	II	100	150
Wetland R	Along shoreline south of Conveyor	N/A	II	N/A	150

1. Wetland Rating from Krazan (2003a) report.

2. Wetland Rating in accordance with Washington State Wetland Rating System for Western Washington (Hruby, revised 2008).

3. Jefferson County Code (JCC) 18.15.340 – Protection Standards (2003).

4. Jefferson County Code (JCC) 18.22.330 – Protection Standards. The final buffer width is subject to approval by the jurisdictional authority.

* Not rated by GeoEngineers (2013). Wetland Rating from BGE (2008) report using the 2004 Washington State Department of Ecology's Wetland Rating System for Western Washington (Hruby 2004). Buffer determined using moderate land use category according to JCC 18.22.330(2) (BGE 2008).

Wetland B is situated within a depression that is located at the toe of the steep hillside bluff that borders the eastern shoreline of Hood Canal. It is a forested and emergent estuarine wetland system that meets the criteria for a Category II system based on special characteristics. It extends offsite to the north and south of the Proposed Conveyor. The wetland is dominated by tree and shrub vegetation with topography that slopes down to a depression at the toe of the slope. The wetland is connected to undisturbed upland and wetland habitats.

Wetland R (an offsite wetland located on property owned by Thorndyke Resource) is situated within a depression that is located between the steep hillside to the north and west Hood Canal to the south and east and is similar in shape, size and vegetation characteristics as Wetland B. It is a forested and emergent estuarine wetland system that meets the criteria for a Category II system based on special characteristics. The wetland is dominated by tree and shrub vegetation with topography that slopes down to a depression at the toe of the slope. The wetland is connected to undisturbed upland and wetland habitats.

3.4 3 Proposed Project: Direct and Indirect Impact

The Proposed Project will largely avoid surface waters such as wetlands, lakes and streams and their buffers. The Proposed Project will not result in direct discharge to area lakes or streams, though some of the project elements are located within critical aquifer recharge areas. Water quality and quantity management measures will be employed to minimize the risk for impacts to surface water and groundwater.

Precipitation falling on the project area is expected to evaporate, be transpired by plants, or infiltrate surface materials and migrate either to nearby surface waters, wetlands or underlying groundwater. This includes water used for dust suppression or other process needs.

Impacts to surface water and groundwater would largely stem from sediment contained in stormwater runoff from impervious surfaces or activities associated with construction. Oil and hazardous materials spills are possible in fueling and equipment maintenance areas within the Proposed Operations Hub. If spills and leaks from vehicles are discovered during mining operations, prompt source control measures would be employed.

3.4 3.1 Construction

3.4 3.1.1 Operations Hub

The Proposed Operations Hub will use a portion of the reconfigured Shine Operations Hub and will be subject to a future NPDES permit that will likely include the same key elements included in the previous Shine Operations Hub. A few of the source control of pollutants Best Management Practices (BMPs) could include restrictions on:

- Dust control at disturbed land areas, unpaved roads and parking lots, as necessary;
- Vehicle and heavy equipment fueling locations;
- Vehicle and equipment maintenance areas; and,
- Spills of oil and hazardous substances, as required.

The reconfigured Operations Hub would reside within the area where the old Shine Pit operated and would not require cutting of trees or create impacts to aquatic features.

3.4 3.1.3 *Central Conveyor*

Project area surface water may be impacted by uncontrolled erosion of soils exposed during land clearing, grading and construction activities along the four-mile Central Conveyor. Stormwater from the construction sites may be contaminated with sediment, high pH (greater than pH 7), phosphorus (as a constituent of suspended sediment), petroleum products and other pollutants from historical contamination or natural soil conditions. The majority (1.25 miles) of the Wahl Conveyor corridor has already been cleared, graded and stabilized.

Because the project would result in more than an acre of land disturbance, construction activities must be conducted under a **NPDES** Construction Stormwater General Permit (General Permit) issued by **Ecology**. The current General Permit, effective Jan. 1, 2011 and similar to Jefferson County requirements, mandates that operators of regulated construction sites to develop stormwater pollution prevention plans (**SWPPP**) and implement sediment, erosion and pollution prevention measures. Permit conditions include planning, sampling, monitoring, record keeping and implementation of stormwater **BMPs** (Ecology 2013c). Established stormwater treatment strategies in place at the Proposed Operations Hub, along with prescribed construction **BMPs**, will effectively control construction-related contamination at this location.

As described in Chapter 1, construction of the Central Conveyor would include removing and replanting approximately 6.3 acres of existing forest service road with approximately 7.3 acres, including new forestry service/maintenance roads aligning with the Conveyor; adding approximately 1 acre of additional gravel road surface to the tree farm.

The design and alignment of the Central Conveyor (which includes the Twin Conveyors and the Single Conveyor) was routed and designed to avoid or minimize impacts to wetlands and their associated buffers. In cases where construction limits would encroach into wetland buffers, special stormwater handling strategies (**BMPs**) would be implemented. When not in proximity to wetlands, construction stormwater would be discharged for dispersion to the surrounding forested or naturally vegetated areas, following appropriate treatment, if needed.

Typical construction **BMPs** include:

- Erosion Control – dust control, soil retention, soil roughening
- Runoff Control – check dams, permanent slope diversions
- Sediment Control – construction entrances, silt fences, straw or hay bales, vegetated buffers
- Good Housekeeping and Materials Management – construction site waste management, spill prevention and control plans

Construction of the Conveyor will involve clearing of vegetation along the alignment for installation of electrical and control wiring along the access road and/or Conveyor alignment. While staging activities for Conveyor construction may also involve

vegetation clearing, staging likely will rely primarily upon areas recently cleared during timber harvest activities. For all these types of clearing, vegetation removal is temporary, since new vegetation will be allowed to grow back upon completion of construction.

Design and alignment of the Central Conveyor (which includes the Twin Conveyors and the Single Conveyor) was developed specifically to avoid direct impacts to wetlands and streams, and minimize direct impacts to their associated buffers.

Under the 2003 definitions of wetland rating and buffers which are applicable to the Proposed Project, the Proposed Central Conveyor alignment avoids buffers of Wetlands C and M (Krazan 2003a). However, under the 2013 definitions of wetland rating and buffers, the alignment encroaches into the buffers of Wetlands B, C and M (GeoEngineers 2013) and has direct impacts upon Wetland B.

See Figure 3.4-4

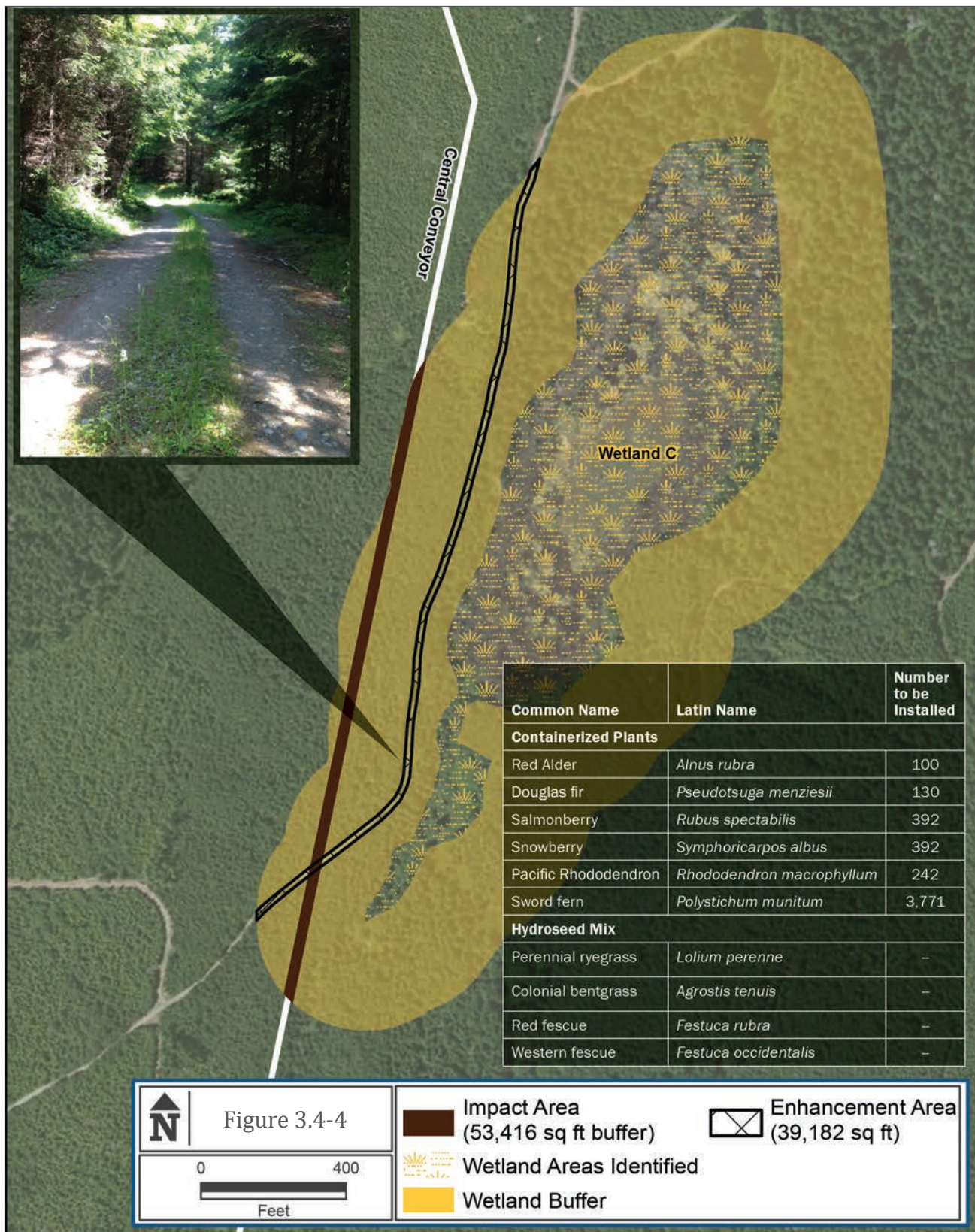
Although no direct impacts would occur to Wetland C, the Central Conveyor alignment would impact approximately 53,416 square feet along the southwestern edge of the Wetland C buffer, based on approximately 1,900 feet of the Conveyor alignment extending 10 to 150 feet into the outer edge of the 300-foot buffer. At its closest point, the current road comes within 60-75 feet of the western edge of the wetland. The area of disturbance contains young forest re-growth. Tree removal within the Conveyor corridor construction zone would be limited to the width of the Conveyor and associated maintenance access road. Furthermore, the proposed forestry service road (relocated maintenance road for the Conveyor) will be located approximately 200 feet farther away from the edge of Wetland C than in its current configuration, which will enhance hydrological connectivity and likely increase the long-term function and value of the wetland.

See Figures 3.4-5 and 3.4-6 which illustrate revegetation of Wetlands H and I respectively.

Impacts to the Wetland C buffer would be offset in the buffer areas of Wetlands H, I and C itself. Within the Wetland C buffer, 39,182 square feet of an existing forest service road would be reclaimed and re-vegetated. Affected areas surrounding the construction zone will be replanted. Mitigation of the remaining 14,234 square feet of buffer impact would be accomplished through revegetation of the existing logged buffers in Wetlands H and I.

See Figure 3.4-7

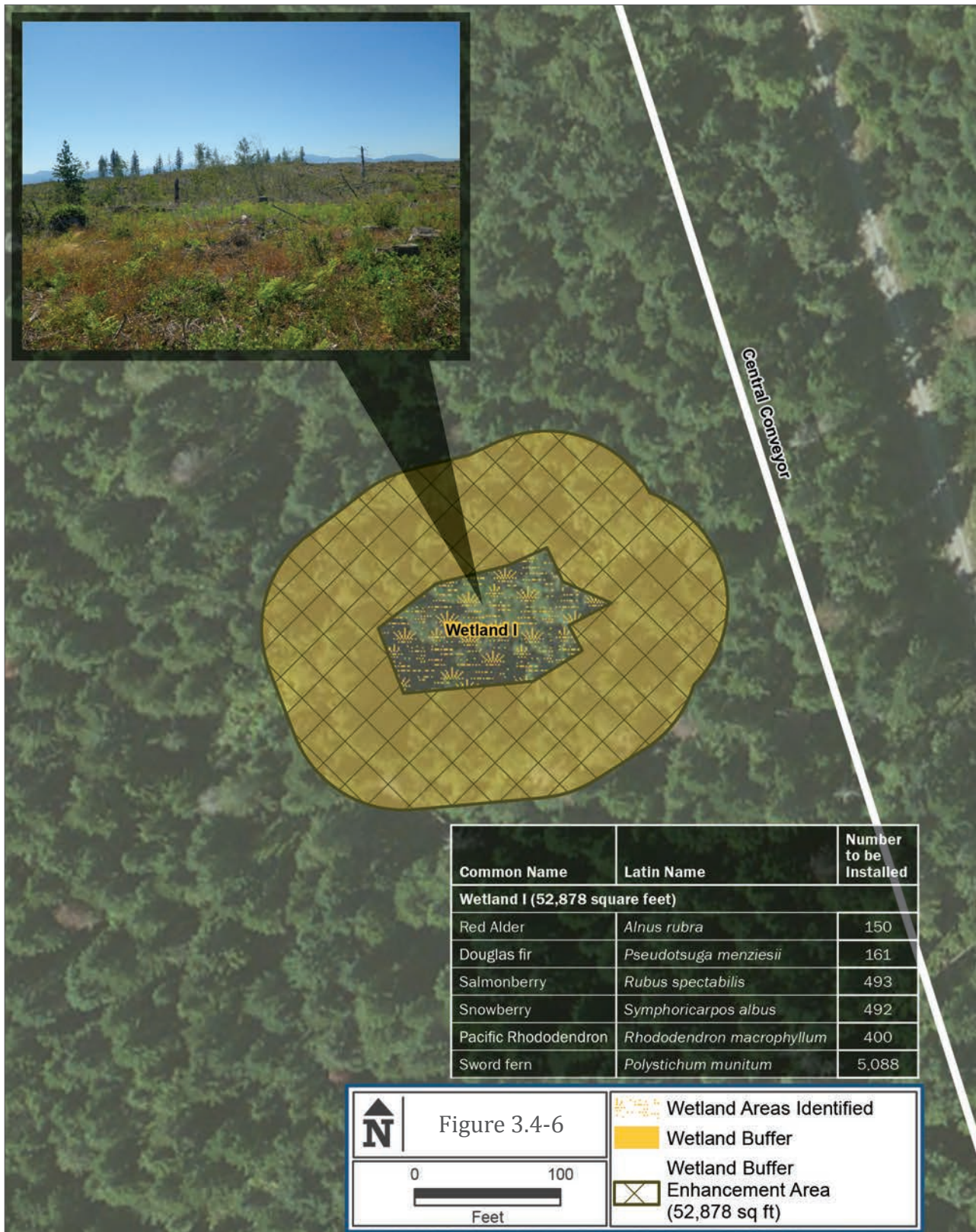
Although no direct impacts will occur to Wetland M, the Conveyor route will impact 4,526 square feet of its buffer. For approximately 150 feet, the Central Conveyor alignment extends 10-30 feet into the western edge of the required 80-foot buffer. Wetland M's impacted buffer area is comprised chiefly of an older deciduous forest. The forest is dominated by alders, a fast growing species. Given the impacted buffer's limited size and the anticipated replanting of construction impacted areas, adverse effects to the function and value of Wetland M are not expected. Mitigation, to compensate for buffer impacts, would be provided through additional revegetation of the logged buffers of wetlands H and I.



Wetland C Proposed Impact and Mitigation Area Wetland C buffer will be impacted from the Central Conveyor. As mitigation, the existing forest service road will be removed and the old road will be restored to intact forested buffer.



Wetland H Proposed Mitigation Area As part of the mitigation for impacts to the buffers of Wetlands C and M, Wetland H buffer will be enhanced. The existing buffer at Wetland H consists of logged habitat with little vegetation.



Wetland I Proposed Mitigation Area As part of the mitigation for impacts to the buffers of Wetlands C and M, Wetland I buffer will be enhanced. The existing buffer at Wetland I consists of logged habitat with little vegetation.



Wetland M Proposed Impact Area Approximately 4,526 square feet of the outer edge of Wetland M buffer will be impacted from the Central Conveyor. Impacts will be mitigated for by planting the buffers of Wetlands I and H with native species.

The design and alignment of the Single Conveyor's elevated pier approach was developed to avoid impacts to Wetland B, located at the base of the coastal bluff. The Conveyor was designed to span over the entire width of Wetland B (75 feet), which has been naturally disturbed by surficial slides (raveling) of the adjacent feeder bluff.

See Figures 3.4-8 and 3.4-9

However, direct impacts to Wetland B and its associated 150-foot buffer are currently proposed due to the installation of erosion protection measures. Surface water drainage will be collected and piped down to an infiltration system located near the shoreline. This will avoid and protect the coastal bluff from further erosion. Preliminary design of the stormwater conveyance system shows that a concrete block will be installed at the bottom of the bluff, where a surface water collection pipe would tee into a 40-foot-long sheet flow spreader. Subject to final design, the spreader will be located about 35-50 feet from the base of the bluff within the "naturally disturbed area" of Wetland B and will directly impact 475 square feet (Krazan 2003a). Figure 3.4-8 illustrates both impact and restoration areas of Wetland B.

Construction and stabilization of the Conveyor will result in excavation and earth movement within approximately 3,907 square feet of the Wetland B buffer. Approximately 2,699 square feet of the disturbed buffer will be restored through plantings after the earthwork is complete. To mitigate proposed impacts to Wetland B and associated buffers, approximately 2,600 square feet (1,392 square feet for Wetland B impact and 1,208 square feet for buffer impact) of Wetland B and 10,000 square feet of Wetland R (for Wetland B impact) would be enhanced at a 24:1 mitigation ratio. This enhancement will include removing invasive plant species and installing a native vegetation community.

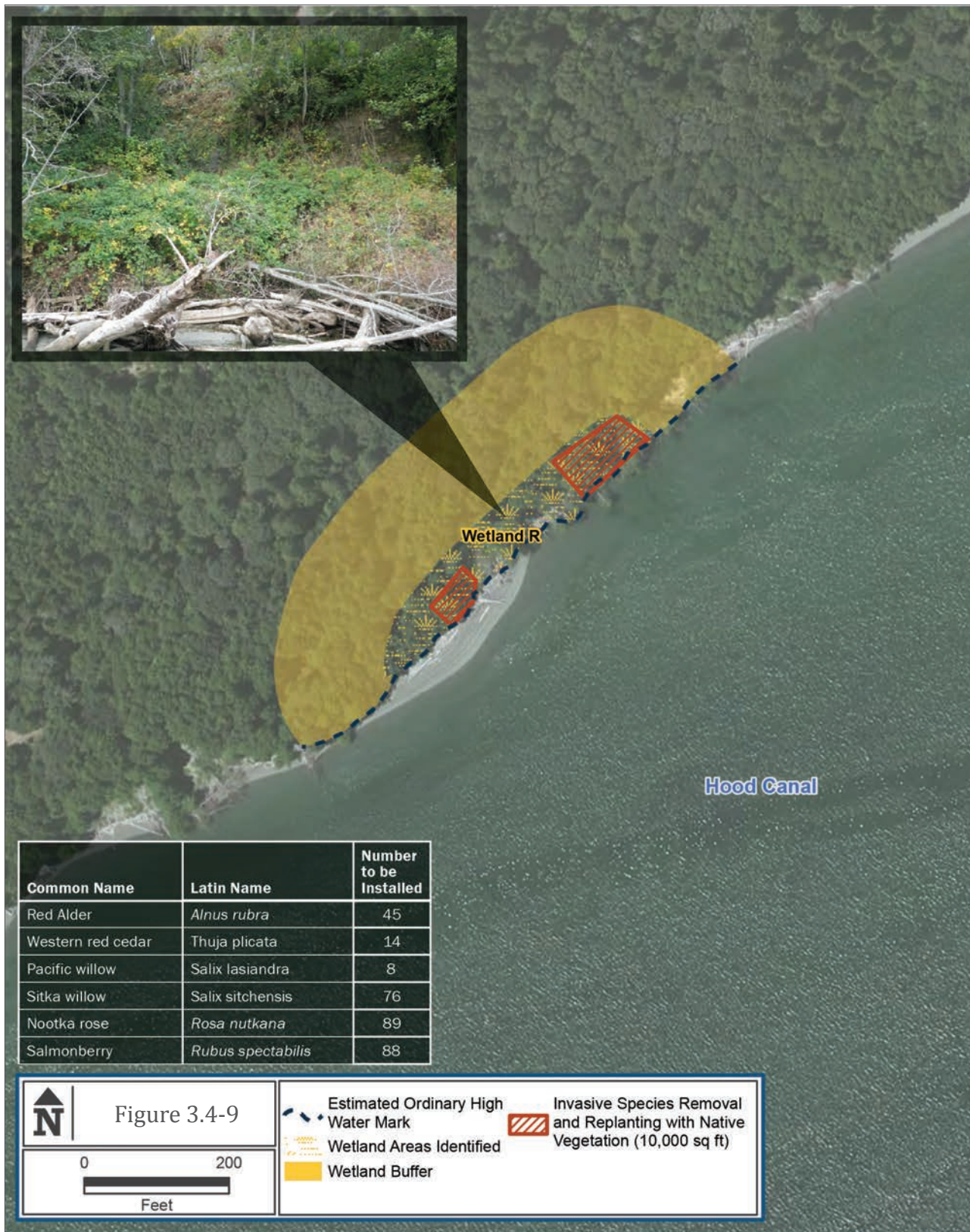
Construction of the Conveyor pier approach will require temporary placement of equipment along the beach. While equipment will not be placed within Wetland B, equipment will be placed on temporary timber mats within the buffer along the beach between elevations +6 and +12 feet Mean Low Low Water (MLLW). Measures to minimize any impacts to the wetland buffer include utilizing timber mats in a "leapfrog" manner—so that the beach is not covered by timbers at any one time—and by working in the dry during low tides. The temporary disturbance to the buffer is expected to be minimal and limited to the immediate areas where mats are placed and recovered. Once this element of work is completed, the buffer will be restored to its original condition. Therefore, impacts to the Wetland B buffer are expected to be localized and temporary.

Accidental spills of fuel or lubricants during construction will be avoided to the extent possible through the implementation of construction related BMP's. If a spill were to occur it may contaminate the localized area or surface waters until they are cleaned up.

*See further discussion of
water quality in Section 3.3
Marine Shoreline.*



Wetland B Proposed Impact and Mitigation Area Wetland B and Wetland B buffer will be impacted. As part of the mitigation, Wetland B buffer will be enhanced. Additional mitigation will be provided within Wetland R.



Wetland R Proposed Mitigation Area No direct impacts to Wetland R are proposed. As part of the mitigation for impacts to Wetland B and Wetland B buffer, Wetland R will be enhanced. Wetland R provides habitat similar to that of Wetland B.

Table 3.4-2 Summary of Impacts by Wetland

Location of Impact	Wetland Name	Impact Area (SF) ¹	Type of Impact
Buffer	Wetland C	53,416	Road and Conveyor
Buffer	Wetland M	4,526	Road and Conveyor
Buffer	Wetland B	3,907	Impact from Cut
Wetland	Wetland B	475	Concrete Gravity Block
Wetland Impact		475	
Buffer Impact		61,849	
1. Assume a 30-foot width of impact (road and Conveyor) north of Thorndyke Road. Assume a 13-foot width of impact (Conveyor width of 6 feet and 7 feet for maintenance) south of Thorndyke Road. Assumes the 12-by-16-foot utility sheds that enclose each transfer point are not found within wetland buffers.			

3.4 3.1.4 Pier

Impacts to the beach and subtidal areas during construction of the pier are discussed in Section 3.5 Marine Plants and Animals and Section 3.3 Marine Shoreline.

3.4 3.1.5 Marine Transportation

Water quality impacts from Proposed Project components over marine waters are discussed in Section 3.5 Marine Plants and Animals and Section 3.3 Marine Shoreline.

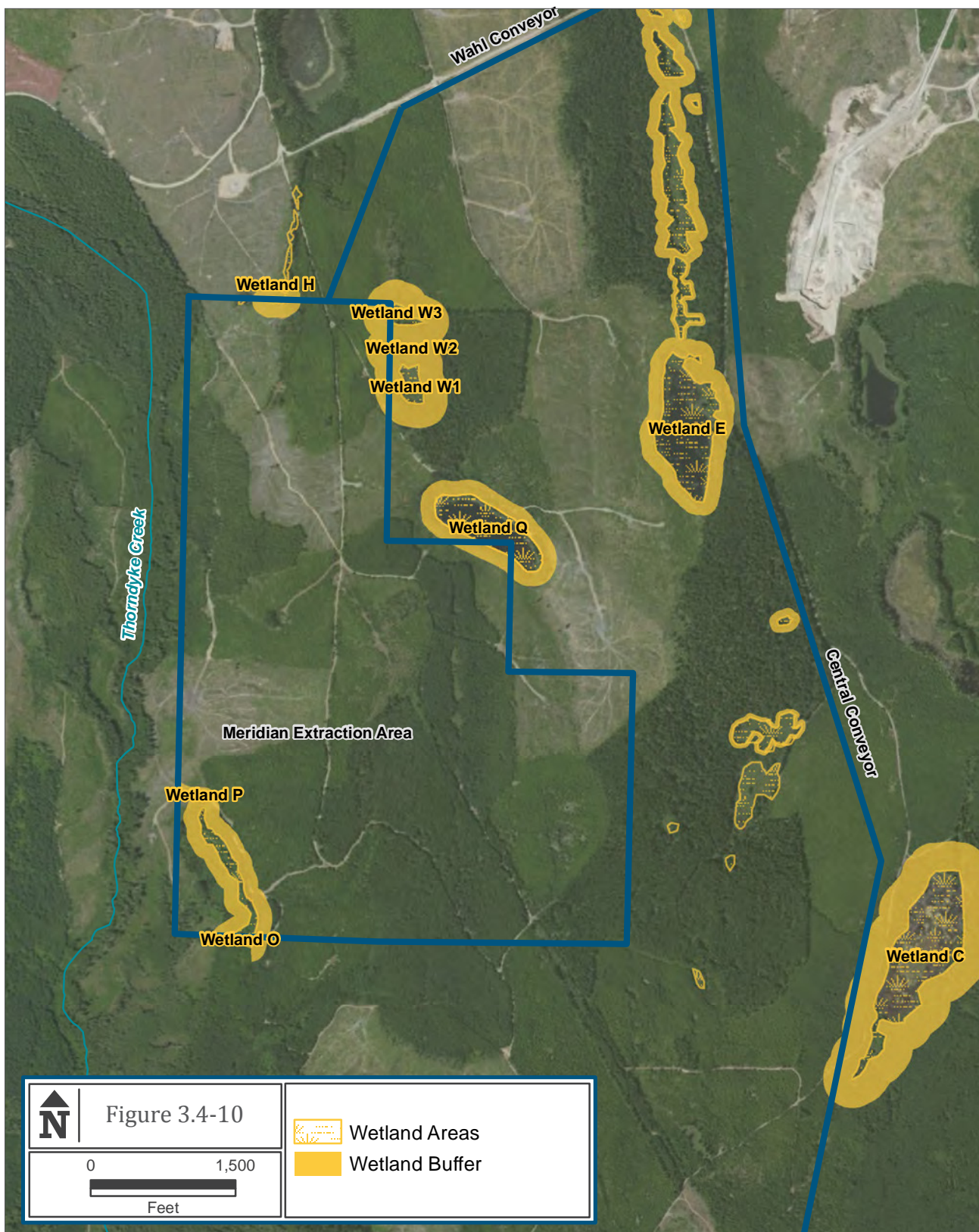
3.4 3.2 Operations

Operational activities affecting surface waters and groundwater include extraction, processing and transport of aggregate. The primary strategy for stormwater management would be full dispersion and infiltration. **Ecology's NPDES** general Sand and Gravel Permit mandates effluent limitations; monitoring, reporting and record keeping requirements; and development and implementation of various plans including an Erosion and Sedimentation Control Plan (ESCP), a **SWPPP**, a Monitoring Plan and a Spill Control Plan (SCP). Implementation and maintenance of appropriate site specific and general **BMPs** are also required.

3.4 3.2.1 Mining

As described in Chapter 1, sequential mining would occur in the Meridian Extraction Area in segments up to 40 acres. Excavation floors would be limited to 10 feet above the seasonal high water table within the Vashon aquifer. Water used for dust suppression will be trucked to the extraction area from the Operations Hub. When extraction in a segment is complete, planned and permitted reclamation activities will be established for future commercial forestry.

See Figure 3.4-10 Mining activities are unlikely to have adverse impacts on wetlands or connecting surface waters since current Jefferson County Codes (JCC 18.22) mandate that all wetlands and their associated buffers be avoided (GeoEngineers 2013), including those existing within the Meridian Extraction Area. Additional wetland buffer widths (greater than those prescribed in the Jefferson County Code) are required to maintain hydrological continuity of the wetland and stream systems. These buffers will be determined based upon information tied to each of the 40 acre mining segment submittals. Additional permit approvals through **WDNR** and other agencies will be required.



Meridian Mining Area Wetlands Numerous wetlands are located on the perimeter of the Meridian Extraction Area and Thorndyke Creek is located to the west. Mining activities will not encroach upon the wetlands, stream, or associated buffers.

Mining operations are far enough from year-round unnamed creeks east of the Proposed Project that no measurable adverse impacts to water quality or quantity to these water courses are anticipated. This conclusion is based on the results of site reconnaissance, subsurface explorations, groundwater monitoring, review of the available data, and professional experience (GeoResources 2013).

The Meridian Extraction Area is east of Thorndyke Creek and its associated drainage. Although stormwater contaminants could theoretically flow overland from extraction activities and reach Thorndyke Creek, it is unlikely due to stormwater control elements that will be designed and constructed as a part of the reclamation plan. These include interception and infiltration of stormwater within the mining area and maintenance of vegetated buffers between the mining area and surface waters located downhill. Stormwater from mining activities within Meridian are expected to be routed to engineered features that are designed as part of the reclamation plan. This could include low infiltration depressions in the mine floor (GeoResources 2003).

A maintenance facility would be established at the Operations Hub, and no vehicle or heavy equipment maintenance would occur in the Meridian Extraction Area. In instances where mobile fueling is necessary in the Meridian Extraction Area, appropriate source control **BMPs** would be employed to prevent contamination of stormwater, surface materials and groundwater.

In the absence of vegetation during mining at Meridian, groundwater recharge within the active mine areas will increase. Once reclamation is achieved and vegetation is re-established, groundwater recharge is anticipated to return to near pre-extraction levels. Because the proposed active mine area will account for only a small portion of the overall recharge area within the Thorndyke basin, little to no measurable change in overall groundwater recharge within the Thorndyke basin is expected. This would be further evaluated (Aquifer Recharge Area Report) as a part of the subsequent mining permit(s) (WNDR Reclamation Permit(s) and Jefferson County Stormwater Permit(s)) that the Applicant will be required to obtain.

Mining at the proposed site will be incremental, with segmental reclamation and replantings. Changes in surface water infiltration are expected to be similar to that during ongoing and historic timber harvesting activities throughout the region (GeoResources 2011). Because of the reduced ground cover and soil depth in the area being actively mined, infiltrated surface will reach the Vashon aquifer more quickly. At times of prolonged heavy precipitation, a more rapid travel time between the surface and the groundwater table may temporarily alter the flow in Thorndyke Creek, potentially resulting in flash events. However, the impact is not anticipated to be significant due to the distance between the extraction areas and the stream.

To satisfy the required mining depth to 10 feet above the groundwater surface, observation wells completed in the Vashon aquifer would be used to monitor groundwater levels prior to and during mining operations. Furthermore, once mining operations begin, they will be monitored by a variety of state and county regulatory agencies on an ongoing basis.

3.4 3.2.2 *Operations Hub*

As described in Chapter 1, the Proposed Operations Hub would include facilities to handle, process and store sand and gravel through the use of trucks and loaders, stockpile areas, portable Conveyors and equipment for crushing, washing, screening and recycling. Process water and stormwater would be managed under the conditions imposed by **Ecology** in the **Ecology NPDES** general Sand and Gravel Permit. Practices at the Proposed Operations Hub would be similar to historical practices for controlling surface water and groundwater contamination when the old Shine Pit was in operation. Discharge of process water and stormwater will be contained within the Operations Hub and will be discharged safely to infiltration ponds. If necessary, appropriate additional source control and pollution control measures could be implemented to further prevent contamination of groundwater.

Because activities at the Operations Hub would be located within an area previously used as a processing center, and would be in compliance with **Ecology NPDES** and County stormwater permit(s) conditions, no significant impacts to area surface waters and groundwater are anticipated. Required monitoring and reporting would be implemented to comply with regulatory standards.

There is also a pending 1993 Water Rights application (G2-28732) relating to the Proposed Operations Hub that if approved, would provide sufficient water for all Proposed Operations Hub operations.

3.4 3.2.3 *Central Conveyor*

The Proposed Central Conveyor and associated forestry service road would add approximately 1-acre of impervious surfaces to the project area. The proposed stormwater management strategy for the Central Conveyor route is described in the submitted Preliminary Storm Drainage Report (Team4 2003).

Stormwater generated on new impervious surfaces (conveyors, transfer station roofs and realigned forestry service roads) within the Central Conveyor corridor would be discharged in accordance with **Ecology's** Stormwater Manual **BMP** Full Dispersion techniques. Stormwater running off the rooftops of the six utility sheds located at the transfer points along the Central Conveyor corridor would be considered "clean" and does not require water quality treatment, so it would be discharged in accordance with **BMP** Downspout Dispersion requirements. Splashblocks would be used to disperse roof runoff to pervious, vegetated areas. The initial 1,500 feet of the Central Conveyor (station 25+23.69 to Station 41+00) from the Operations Hub would discharge for collection and infiltration. Stormwater runoff (between Station 217+50 and 221+75) includes the roof of the utility shed at Transfer Point #6, and would be collected in roadside ditches and discharged to forested areas (Team4 2003).

Stormwater between Station 221+75 and Station 225+95 would be intercepted and conveyed in a series of catch basins and buried pipe to a surface-mount HDPE pipe traversing the bluff and discharging directly to the naturally disturbed area (landslide debris field) of Wetland B. Prior to release, stormwater to the outfall will pass through an energy dissipater (Team4 2003). The Applicant provided also a preliminary

geotechnical report concerning the stability of the steep bluff landward of Wetland B (Shannon & Wilson 2003). The Pier approach bridges over Wetland B. The potential to cause surficial slide or accidental spillage of sand and gravel into Wetland B are discussed in Section 3.3 Marine Shoreline.

Operation of the Central Conveyor and Pier may cause indirect effects to wetlands and other surface water features through, accidental spillage of sand and gravel or release of lubricants off the equipment and heavy machinery if required spill prevention measures are not implemented.

3.4 3.2.4 Pier

Once the Proposed Project is operational, maintenance of Wetland B vegetation located below the approach to the Pier will require regular trimming or cutting to ensure vegetation does not grow into the structure of the Conveyor.

The elevated design for the Pier Approach would minimize potential indirect impacts to Wetland B resulting from shading. Shading effects to this wetland would be further minimized since the alignment is oriented in a general north-south direction, allowing sunlight to reach native vegetation along the alignment whenever the sun is not directly overhead (majority of time both daily and annually).

It is unlikely that accidental spillage of sand and gravel from the Conveyor would affect Wetland B. However, because the pier approach from the northern boundary of Wetland B to the loading point would include a pan attached under the Conveyor's return belt, spillage is unlikely. Furthermore, the Conveyor on the Pier and the Pier's approach over Wetland B, will be covered; effectively reducing the potential of fugitive dust from impacting Wetland B.

Potable water would not be piped to the end of the Proposed Pier. Instead potable water would be hauled to the pier via electric cart, and then pumped into an all-weather water tank, located within the control room structure.

3.4 3.2.5 Marine Transportation

Water quality impacts from Proposed Project components over marine waters are discussed in Section 3.5 Marine Plants and Animals and Section 3.3 Marine Shoreline.

For a more robust discussion of the water quality associated with this Proposed Project see GeoEngineers Thorndyke Resource Marine Water Quality Letter Report (GeoEngineers 2014).

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3.5 MARINE PLANTS AND ANIMALS

The marine nearshore provides ecologically valuable habitat for a variety of marine species including and beyond those listed as threatened and endangered. Most notably, marine habitats include corridors for juvenile salmon, spawning habitats for forage fish, sediment and sub-surface levels (benthic and epibenthic) for shellfish and other species, macrovegetation, and forage habitats for a variety of marine fish, marine mammals and seabirds.

For threatened and endangered species, see Section 3.7 Threatened and Endangered Species.

Proposed pier development and barge operations waterward of the mean high high water (MHHW) mark may increase the potential for adverse impacts on intertidal and nearshore subtidal habitats and species. Proposed construction and operational activities may impact existing habitats and resources through:

- Construction/operational disturbances and noise;
- Increased shading from pier structures and vessels, affecting photosynthesis by macrovegetation;
- Stormwater runoff onto the nearshore;
- Spills from increased marine equipment activity;
- Disruption to existing drift cell and longshore sediment transport;
- Modification of existing bottom habitats through marine operations; and,
- Potential marine mammal encounters from increased marine traffic.

3.5 1 Regulatory Overview and Permits

Federal, state and local government agencies regulate developments within the marine nearshore, requiring compliance for in-water and overwater portions of the Central Conveyor and Pier.

3.5 1.1 Federal

The U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA) is responsible for maintaining the chemical, physical and biological integrity of the nation's waters. Any substantial construction or development that includes placement of a structure, excavation or dredging, or discharge of materials in marine waters requires regulatory action under Section 404. The USACE also regulates any development within the country's navigable waters, including all waters within Puget Sound below the ordinary high water (OHW) mark, under Section 10 of the Rivers and Harbors Act.

The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) are responsible for the protection of species listed under the Endangered Species Act (ESA). A project specific biological assessment evaluates and determines the amount of "take" (defined as behavioral alteration as well as injury and mortality) of

ESA-listed species. **NMFS** authorization of take allowance is also required. The **NMFS** is responsible for the protection of all marine mammals under the **MMPA**. The **MMPA** is similar to **ESA**, and provides for evaluation and authorization of take allowances.

The 1996 amendments to the Magnuson Stevens Fishery Conservation and Management Act set forth the essential fish habitat (**EFH**) guidelines to identify and protect important habitats of federally managed marine and anadromous fish species. Federal agencies, such as the **USACE**, which fund, permit or undertake activities that may adversely affect **EFH**, are required to consult with the National Oceanic and Atmospheric Administration (**NOAA**) Fisheries.

See Section 3.7 for additional details

EFH is defined as those waters and substrate necessary for fish to spawn, breed, feed or grow. "Waters" include aquatic areas and their associated physical, chemical and biological properties that are or have been used by fish. "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities (NMFS 1999).

3.5 1.2 State

The Hydraulic Project Approval (**HPA**) Program under the Washington Department of Fish and Wildlife (**WDFW**) is responsible for regulating the use, diversion, obstruction or changes to waters of the State, which include the in-water and overwater portions of the Conveyor and pier. The State's familiarity with local natural resources often plays a role in determining conservation measures and compensatory mitigation.

The Washington Department of Ecology (**Ecology**), under **CWA** Section 401, is the authorizing agency responsible for compliance with water quality laws. The Conveyor and pier will be regulated for stormwater discharges, turbidity and spills that result from in-water work under this program. The Washington Department of Natural Resources (**WDNR**) manages all publicly owned tidelands within the State, of which the offshore (non-tidelands) portions of the Proposed Project are a part.

3.5 1.3 County

Jefferson County is responsible for reviewing and ensuring that various environmental criteria are met under the Jefferson County Shoreline Master Program (**SMP**), Washington State Shoreline Management Act (**SMA**), Jefferson County Uniform Development Code (**UDC**), including Jefferson County Critical Areas regulations, and State Environmental Policy Act (**SEPA**) compliance. This includes requirements for environmental analysis, protection and mitigation measures, approval criteria for conditional uses, and public involvement.

Currently, Jefferson County regulates critical areas including Fish and Wildlife Habitat Conservation Areas (**FWHCAs**) through its county code (Chapter 18.22). Jefferson County **FWHCAs** are identified areas of critical importance to the maintenance of endangered, threatened or sensitive species of fish, wildlife, plants and/or species of local importance (JCC 18.22.200). Designated **FWHCAs** relevant to impacts on habitat and marine species of local importance (not state- or federally-listed) include:

- Areas with which endangered, threatened, and sensitive species listed by the federal or state government have a primary association.
- Commercial and recreational shellfish areas, including designated shellfish habitat conservation areas
- Kelp and eelgrass beds.
- Surf smelt, Pacific herring, and Pacific sand lance spawning areas.
- A 150-foot buffer that extends landward from the ordinary high water (OHW) mark of marine shorelines.

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Section 3.8 Land Use. The following goals and policies are applicable to this discussion of the Proposed Project's impacts on marine plants and animals:

ENVIRONMENT ELEMENT GOAL

- ENG 1.0 Manage, protect, enhance, and conserve water resources through a comprehensive watershed management program that is integrated with recovery plans for fish species proposed for listing under the ESA.

ENVIRONMENT ELEMENT POLICY

- ENP 1.2 Participate in the Jefferson County Water Resources Council and other collaborative watershed and salmon habitat conservation planning processes with state, federal and tribal governments and local stakeholders, in order to integrate water resource management for human needs with fish and wildlife habitat protection and restoration.

ENVIRONMENT ELEMENT GOAL

- ENG 5.0 Allow development along shorelines which is compatible with the protection of natural processes, natural conditions, and natural functions of the shoreline environment.

ENVIRONMENT ELEMENT POLICY

- ENG 5.1 Regulate shoreline land use activities based on the best available scientific information.
- ENG 5.8 Promote best management practices to protect shorelines in land use regulations related to septic, systems, forest practices, agricultural practices, industry and other development.

ENVIRONMENT ELEMENT GOAL

- ENG 7.0 Protect Jefferson County's natural heritage, including native vegetation and unique landforms.

ENVIRONMENT ELEMENT POLICY

- ENP 7.1 Encourage collaboration with state programs such as the Washington Natural Heritage Program and local conservation groups to identify and protect, plant communities, habitats and landforms which reflect the County's unique natural heritage.

ENVIRONMENT ELEMENT GOAL

- ENG 12.0 Protect and enhance fish and wildlife habitat throughout Jefferson County.

ENVIRONMENT ELEMENT POLICIES

- ENP 12.2 Land use decisions should recognize the priority of the protection and enhancement of fish and wildlife habitat in accordance with proposed listings of threatened and endangered species under the Federal Endangered Species Act.
- ENP 12.3 Buffers for fish and wildlife habitat areas should be consistent with the best available science for habitat protection.
- ENP 12.5 Promote best management practices to protect fish and wildlife habitat in land use regulations related to septic systems, drainage, forest practices, agricultural practices, industry, and other development.

In addition, the Shoreline Master Program (**SMP**) requires that a project proposal be evaluated for consistency with certain Shoreline designation policies and performance standards pertaining to the over-water portion of the Proposed Project (Aquatic Environment, SMP 4.101); the upland portion of the Proposed Project within 200-feet of Ordinary High Water (Conservancy Environment, SMP 4.103); and the use designation (Industrial and Port Facilities, SMP 5.90) including:

AQUATIC ENVIRONMENT MANAGEMENT POLICIES

- Aquatic developments should not locate in areas where the ecological quality of the shoreline environment would be significantly degraded.
- Aquatic developments should make minimal and appropriate use of approved pesticides, herbicides, antibiotics, vaccines, growth stimulants, or other chemicals. Operators shall receive prior review and approval for their use from the appropriate federal and state agencies.
- Only Federal and State approved anti-fouling agents should be used in aquatic developments.

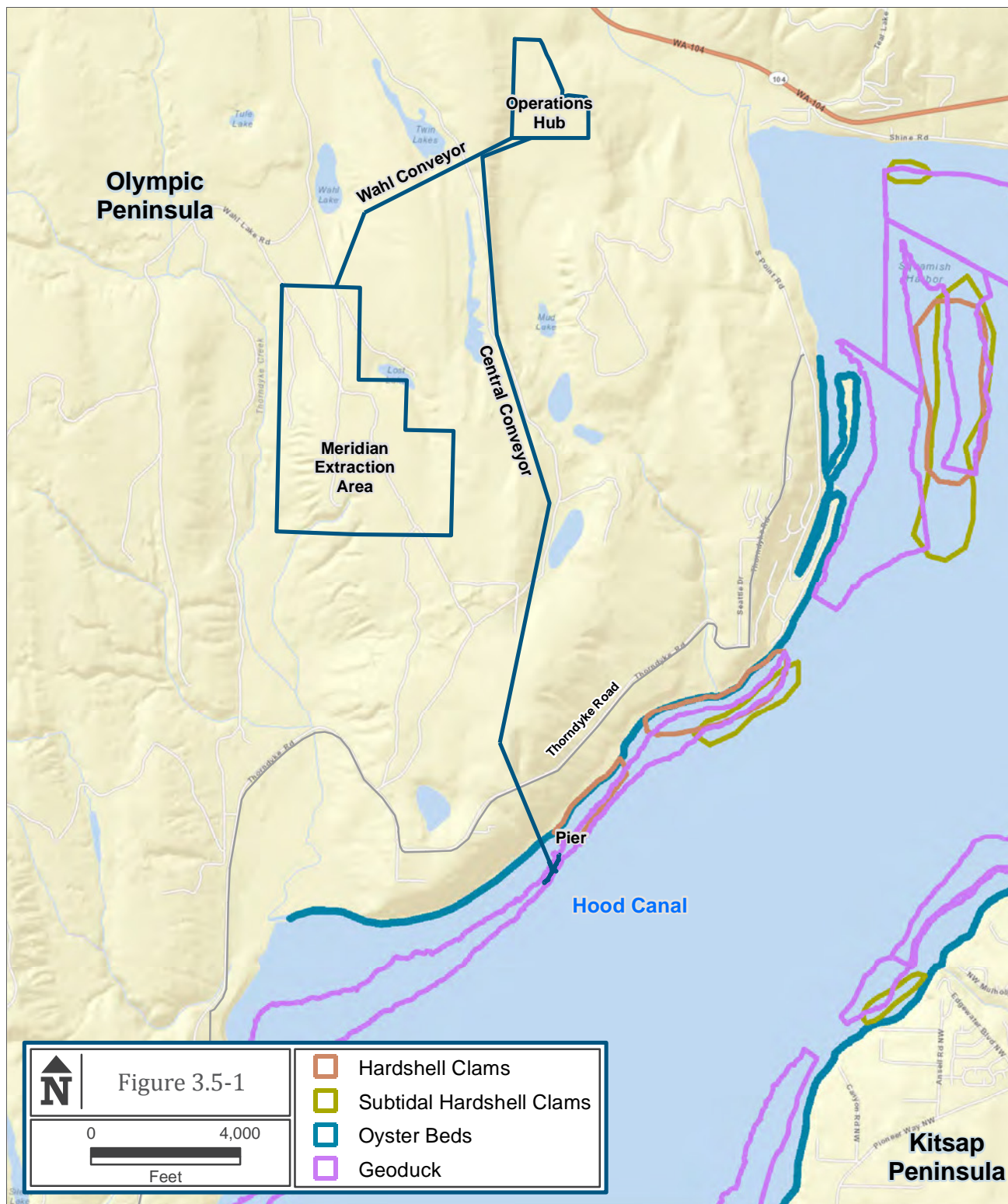
3.5 2 Affected Environment

The biological and macrovegetation characteristics of the marine nearshore environment are typical of Hood Canal beaches. The marine areas where the Central Conveyor meets the Pier and its barge/ship operations, including construction barges in the shoreline approach area, could impact back beach, intertidal and sub-tidal zones from elevations of approximately +11 feet mean low low water (**MLLW**) mark to -80 feet **MLLW** of the Project area.

3.5 2.1 Marine Invertebrates

See Figure 3.5-1

Marine invertebrate species such as hardshell clams, Dungeness crab and geoducks have been documented in the lower intertidal and shallow subtidal areas of the Proposed Pier, according to the Priority Habitat & Species (**PHS**) database managed by the Washington Department of Fish & Wildlife (**WDFW**) (WDFW 2013). Species of hardshell clams, including cockles (*Clinorcardium nuttalli*), have also been documented in coarse sandy sediments in lower intertidal and shallow subtidal areas of the Proposed Pier (Hart Crowser 2013).



Shellfish Resources Near the Proposed Pier Site Oyster beds have been mapped along the shoreline of the project area. In addition, hardshell clams and geoduck have been mapped just north of the pier. **Source:** WDFW Fish Program, WA Department of Natural Resources, Puget Sound Nearshore Ecosystem Restoration Project

In addition, Dungeness crab are known to use subtidal areas of this portion of Hood Canal (Hart Crowser 2013). PHS maps indicate the Proposed Pier would cross approximately 150 feet of a low density, historically inactive, commercial geoduck tract. However, portions of the intertidal and subtidal areas around the applicant-owned pier site have been recently leased to a commercial geoduck/shellfish culture operation. At maturity, unharvested geoduck could potentially spawn and become productive in the vicinity of the Proposed Pier.

No quantitative studies examining benthic and epibenthic biota have been conducted within the project site. However, the coarse sand and gravel of the upper beach likely supports a sparse epibenthic community of species common in Puget Sound, some of which are important to the diet of juvenile salmon. The flatter, broad, middle intertidal beach is composed mostly of coarse to medium sand and likely supports a more productive epibiota (organisms that live on the surface of others), as well as infauna such as polychaetes, bivalves, and crustaceans.

3.5 2.2 Marine Fish

3.5 2.2.1 Forage Fish Species

Larval, juvenile, and adult surf smelt (*Hypomesus pretiosus*) and Pacific sand lance (*Ammodytes hexapterus*) are important forage fish for salmonids, as well as many other species of fish, marine mammals and seabirds (Healey 1991). The substrate along and below the high tide line in the vicinity of the Proposed Pier appeared potentially suitable for spawning by surf smelt and/or Pacific sand lance during habitat surveys in 2001 and 2002 (Hart Crowser 2003). Alteration of nearshore spawning habitat of these species may directly affect the abundance of forage for many of these species.

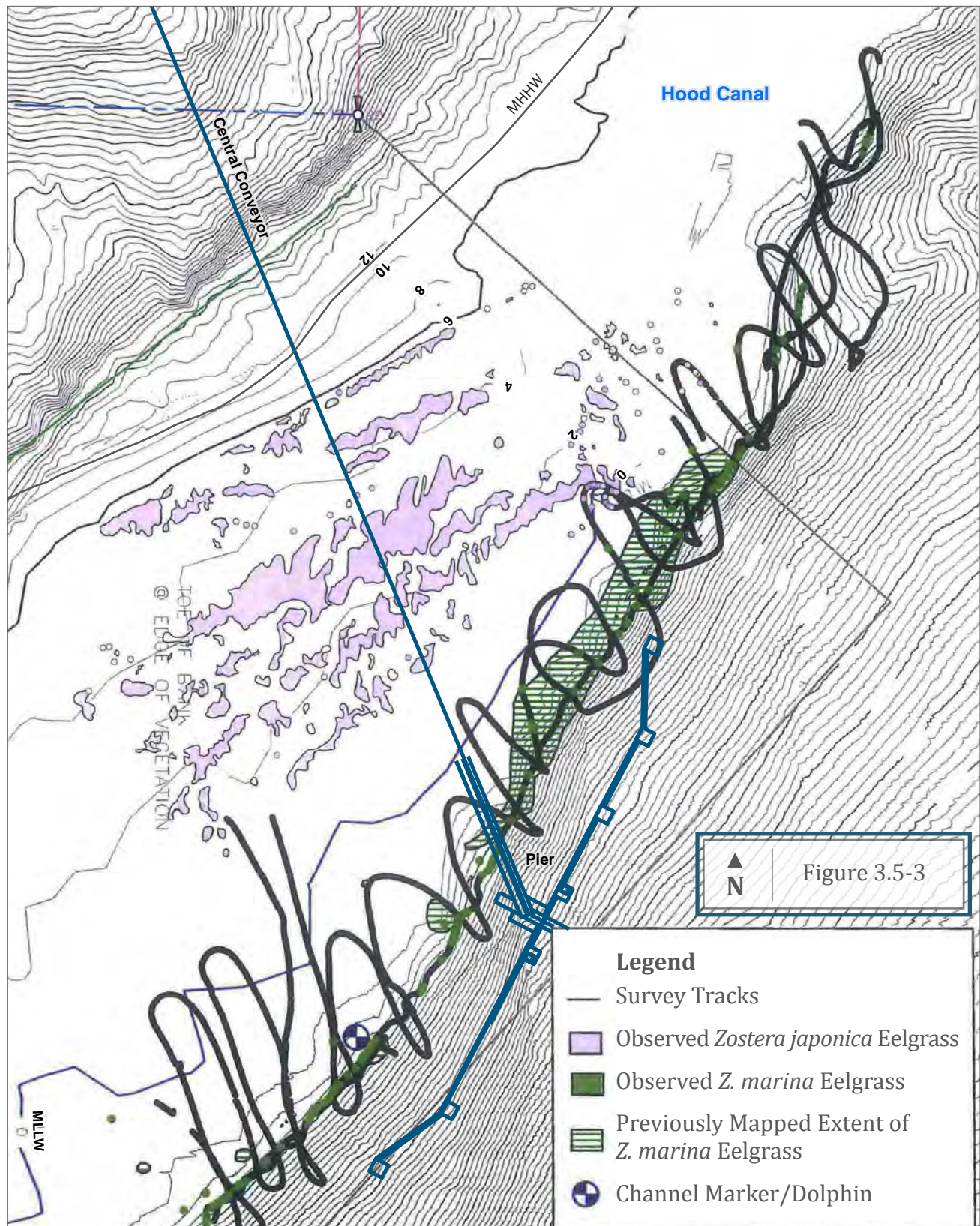
See Section 3.7 Threatened and Endangered Species

According to the Salmonscape GIS and the PHS database managed by WDFW, Pacific sand lance spawning areas have been documented within upper intertidal areas approximately a half-mile to the southwest and one mile to the northeast of the Proposed Pier site. A surf smelt spawning area has been documented approximately three miles to the northeast (Salmonscape 2013) as shown in Figure 3.5-2. Both species spawn in clean, intertidal **beach substrates consisting of coarse sand to pea gravel at elevations between +6 feet and MHHW**. Pacific sand lance spawn generally between November and mid-March; surf smelt tend to spawn year-round. Documented spawning (of sand lance) northeast of the Proposed Conveyor was found during January (Salmonscape 2013). No forage fish spawning areas have been identified or documented at or near the Proposed Pier and pier approach. A surfsmelt and sandlance survey will be conducted immediately prior to construction as required by WDFW.

Spawning areas for Pacific herring (*Clupea pallasii*), also an important forage species for many species of fish, marine mammals and seabirds within Puget Sound, have been documented 4.5 miles north of the Proposed Pier location in Squamish Harbor and 11.5 miles south in Seabeck Bay (Stick 2009). Eelgrass is one of the principal species that herring spawn on within Puget Sound. Although eelgrass is present in the area of the Proposed Pier, no herring spawn has been documented in the study area (See Figure 3.5-3).



Forage Fish There are no mapped forage fish areas on or adjacent to the project area. The closest documented sand lance spawning areas are more than 3,000 feet from the project area. **Source:** WA Department of Fish and Wildlife Priority and Species Data.



Eelgrass (*Japonica* and *Marina*) A 2007 eelgrass survey along the project shoreline found *Zostera japonica* in the tideflat (between approximately +6 feet MLLW and 0 feet MLLW), and *Zostera marina* between -1 foot MLLW and -10 feet MLLW.

3.5 2.2.2 Salmonids

Small runs of coho salmon, sea-run cutthroat trout and fall chum salmon are found in Thorndyke Creek and two small unnamed creeks within a mile of the project area, according to the PHS database (PHS 2013). These creeks are far enough removed from the Conveyor route that their riparian buffer zones will not be impacted by construction activities or operations. Furthermore, a minimum 500-foot buffer has been established from Thorndyke Creek by Jefferson County. No mining operations associated with the proposed Conveyor will occur within 500 feet of that area. Sea-run cutthroat typically conduct yearly outmigrations into the nearshore, feeding on small invertebrates and fish from mid-spring through early fall before migrating back to natal streams. Cutthroat may be found during their marine residence period as well.

Juvenile fall chum salmon, found in the nearshore from April through June before migrating offshore, may be present near the Proposed Pier site. If adult chum also occur, they tend to stage closer to the stream mouths before their spawning runs in October through early December.

Coho salmon typically spend two years in freshwater before outmigrating. Coho are less dependent upon nearshore environments during their juvenile marine residence period, but may be found in the vicinity of the Proposed Pier in May before migrating offshore.

3.5 2.3 Marine Mammals

Specific marine mammal surveys have not been conducted in the vicinity of the Conveyor footprint; however, substantial multi-year surveys have been associated with Naval Base Kitsap approximately 2.7 miles south of the Proposed Pier. Harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*) and harbor porpoise (*Phocoena phocoena*) were observed during monitoring activities between September and February of the years 2012 and 2013 (U.S. Navy 2013b). All four species have been observed along the Toandos Peninsula north of Brown Point, and may have proximal access to the study area.

WDFW has documented 13 harbor seal “haulouts”—when seals leave the water between periods of foraging activity—in northern Hood Canal, most of which are west of the Toandos Peninsula in Dabob Bay (WDFW 2013). In addition, two large haulouts are located at the mouths of the Dosewallips and Duckabush rivers, located 12 and 15 miles southwest of the Proposed Pier. One California and Steller sea lion haulout has been observed on a large U.S. Navy wharf approximately 4.7 miles south and on the opposite (east) shore of Hood Canal (Hart Crowser 2013). No haulouts have been documented in the vicinity of the Proposed Pier.

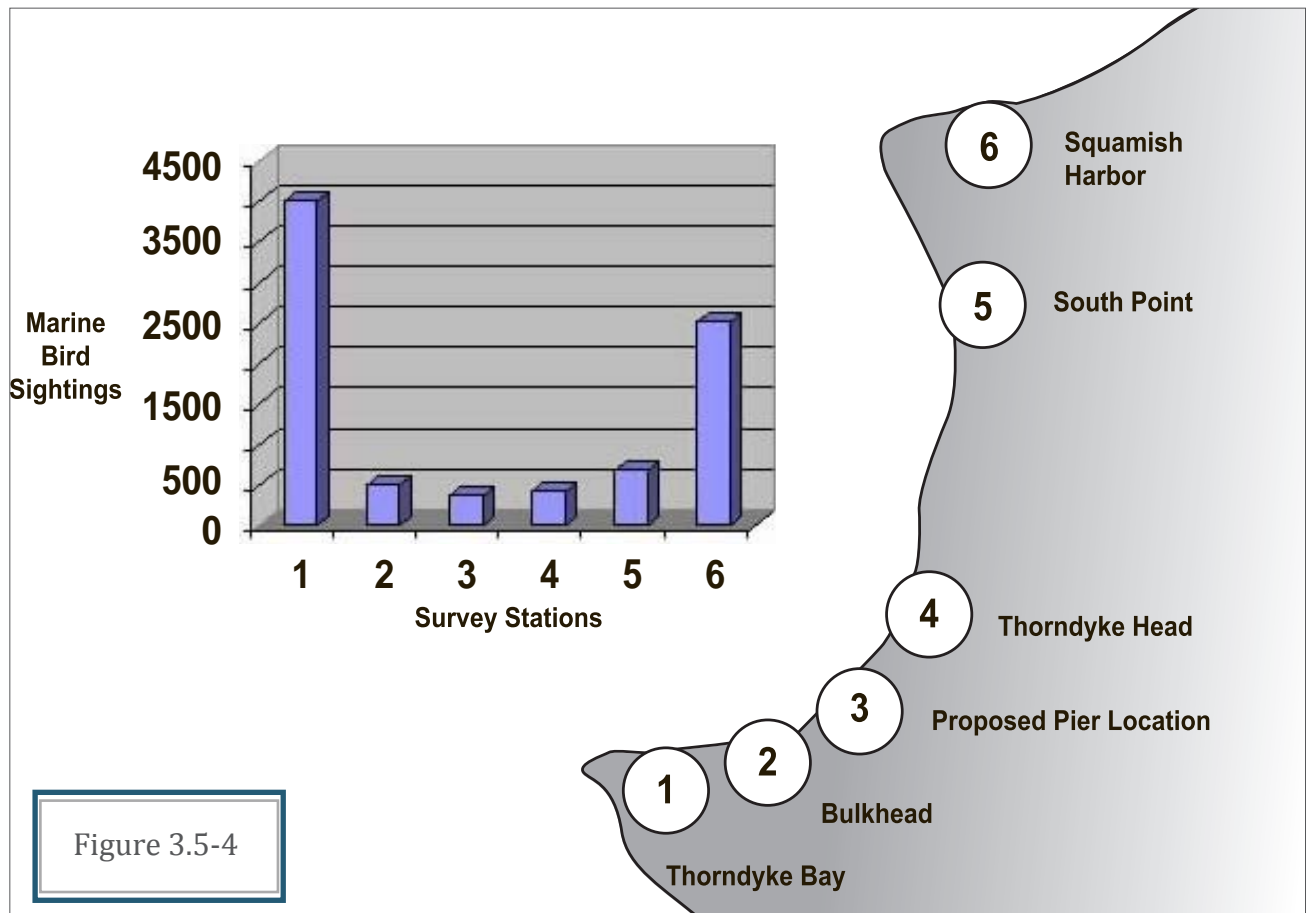
NMFS relies on the number of past sightings to assess the likelihood of Southern Resident killer whales (Orca) appearing in the project area (NMFS 2006). Orcas are only occasionally sighted in Hood Canal. Between 1990 and 2008 there were six sightings of Southern Resident killer whales in Hood Canal. The Whale Museum manages a long-term database of orca sightings and geospatial locations in inland waters of Washington State (Whale 2014). While these data are predominately opportunistic sightings from a variety of sources, orcas are visible in inland waters and followed by the interested public and research community.

3.5 2.4 Seabirds

See Section 3.7 *Threatened and Endangered Species* for more information on marbled murrelets.

Marine birds in the vicinity of the project site include seabirds, diving birds, shorebirds, wading birds, raptors, and marine waterfowl. A total of 34 marbled murrelets were observed (Sharpe 2005a) between late February and mid-November at six stations between Thorndyke Bay and Squamish Harbor. During this period, which included the breeding season, two were observed at a station adjacent to the Proposed Pier site.

In 2012 and 2013, four to five miles south of the Proposed Pier site, substantial avian monitoring was conducted daily from September to mid-February as part of a U.S. Navy marine nearshore development project. Of 52 avian species found, 26 species were diving birds, the most susceptible to impacts from pile driving noise. Besides the abundant and ubiquitous gulls and cormorants, the most frequently observed diving bird were grebes (typically horned and red-necked). Diving ducks (primarily surf scoter), goldeneye, mergansers and wigeon were abundant. The raptor species, bald eagle and peregrine falcon were also observed, usually flying over the riparian zone. (Navy 2013b).



Marine Birds According to a 10-month study, the beach area at the proposed pier location and adjacent beaches have relatively low overall marine bird use and little or no foraging use by marbled murrelets, a threatened species. **Source:** Sharpe 2005

3.5 2.5 Marine Vegetation

In the uppermost intertidal zone, from approximately the ordinary high water (OHW) mark to MHHW, scattered high saltmarsh plants of spear saltbrush (*Atriplex patula*), pickleweed (*Salicornia virginica*), marsh jaumea (*Jaumea carnosa*), sea plantain (*Plantago maritima*), meadow barley (*Hordeum branchyantherum*), common silverweed (*Argentina anserina*) and silver burr ragweed (*Ambrosia chamissonis*) were observed. Most of these occupied sand, gravel and woody debris habitats along the storm berm near the high tide drift line (Hart Crowser 2008).

From about +6 feet to MLLW within the Proposed Project area, the existing sand flats support scattered and discrete patches of eelgrass. *Zostera japonica* (see Figure 3.5-3) is an introduced species known to occur throughout northern Puget Sound, though its distribution has not been well documented (Thom 1990). Because it is an annual, the location and extent of this species is expected to be highly variable, particularly on beaches found in the study area, where advancing sand waves may bury individual patches while new patches form in the wake of sand waves. Very high shoot density (approximately 1,100 turions per square meter) and fertile fronds within eelgrass patches were documented in shallow tide pools (Hart Crowser 2003; Hart Crowser 2008).

In a brief, late winter 2002 site visit, the non-native eelgrass was again noted in locations along the upper shore. During a beach survey conducted in July 2002, the *Z. japonica* eelgrass appeared to be more scattered and less dense compared to the previous summer. It was also apparent that the upper beach and backshore in the vicinity of the Pier had changed significantly since summer 2001 as a result of high tides and intense wave action over the winter. A sand/cobble berm that existed in 2001 near the top of the slope had shifted waterward by up to several meters. In contrast, a summer 2007 beach survey documented even higher shoot densities than in 2001 (approximate mean density of 1,400 shoots per square meter). Compared to the 2001 survey data, the *Z. japonica* eelgrass population seemed to be increasing in density (27 percent increase) and in extent, as patch coverage was higher (nearly 40 percent increase) than the qualitative 25 percent reported in the 2001 survey study (Hart Crowser 2008).

Continuing waterward, the beach surface is somewhat firmer on the lower elevations of the sand flat. Beginning at about -1 foot MLLW, and extending down into the subtidal zone (approximately -10 feet MLLW), surveys have noted a band containing patches of native eelgrass (*Z. marina*) (Figure 3.5-3). Eelgrass was generally dense in the patches within this band, and the patches became larger and more continuous to the northeast of the Proposed Conveyor site. A diver survey in August 2001 showed that most patches were smaller than 20 feet in diameter, with densities in quadrants containing eelgrass ranging from 20 to 428 shoots per square meter (mean: 189 shoots per square meter). In contrast to non-native eelgrass findings, subtidal survey results in 2007 showed native eelgrass (*Z. marina*) to be declining relative to 2001 data. The number of patches and in-patch root density had decreased between 50 and 90 percent relative to 2001 data (Hart Crowser 2008).

The Proposed Pier approach footprint indicates that a 75-foot strip of area may be prone to shading (from 25 feet south to 50 feet northeast of the Pier approach). Documented *Z. marina* in this area was very sparse. Of the 32 observation points within this zone, only three contained any eelgrass. Overall density was 1.75 shoots per square meter, about 1 percent of the density in eelgrass patches southwest and northeast of the Pier approach (Hart Crowser 2008).

Several other species of macrovegetation have been observed within the Pier vicinity. Back shore beach seepage emerges at low tide to create shallow pools where the lower edge of the beach face transitions to the sand flat (approximately **MLLW**), eventually forming a channel that meanders across the flat (Hart Crowser 2003; Hart Crowser 2008). During beach surveys conducted in 2001, 2002 and 2007, patches of the annual green algae *Ulva* (*U. intestinalis* and *U. linza*) were observed in these fresh or brackish seeps.

3.5 3 Proposed Action: Direct and Indirect Impact

3.5 3.1 Construction

Construction disturbances over the intertidal zone could impact marine animals and their habitats near the lower end of the Single Conveyor as it approaches the 990-foot pier that extends to water depths of approximately -50 feet **MLLW**. All pile driving will be conducted using a vibratory hammer and/or load proofing with an impact hammer. Within the intertidal zone, pile driving typically creates the highest construction noise levels while barges and other heavy equipment create the largest disturbances of nearshore marine habitats. Agency-approved work windows will be adhered to during in-water work to minimize impacts to important resources such as migrating juvenile salmon.

A thin band of saltmarsh vegetation is present along the storm berm located between the approximately ordinary high water **OHW** and **MHHW** marks. This vegetation is adjacent to a freshwater wetland area that will be impacted by the construction of a stormwater catch basin and associated diffuser pipes. No piles will be driven within the freshwater or saltmarsh wetland areas; therefore, impacts to these valuable habitats will be minimized.

Previous macrovegetation studies indicate that the pier alignment and construction vessels will likely bisect patches of *Z. japonica* eelgrass from about +4 feet to +1 foot **MLLW**. Any piles driven through the patches will likely destroy or displace eelgrass immediately under pile footprints. Similarly, if it is necessary for barges to go aground, eelgrass may be lost in areas of excessive sediment compression.

The Applicant has stated the preferred method of construction across the beach will be to drive piles during high tide to avoid grounding of barges, but this may not be possible during all water-based work periods. Because of the dynamic nature of eelgrass patches on this beach, the extent of disruptions can be difficult to predict. However, depending on the presence of eelgrass at the time of construction (the species is seasonal and likely shifts in this area due to currents and wave action), the

potential direct impact to this eelgrass from pile driving would be less than six square feet (assuming that a dozen 18 inch diameter piles will be installed across a zone that is 25 percent covered with eelgrass). This could increase to slightly more than 21 square feet if all piles were placed in existing eelgrass patches.

Additional losses may also occur as a result of barge grounding. In all likelihood, this decrease would be temporary. Recolonization would occur the following season after the beach returns to pre-construction grade. Because of the variability of eelgrass within the middle intertidal zone, an additional macrovegetation survey will be conducted prior to construction to more accurately define potential impacts to this species.

Alignment and depth of the Pier were chosen to directly avoid impacts to native eelgrass (*Z. marina*). Given the deeper water that *Z. marina* occupies (-1 to -20 feet MLLW), grounding of barges during construction activities can be avoided. Therefore, no impacts to *Z. marina* are anticipated.

Fuel spillage during construction activities and operation of the Conveyor is possible. However, since fueling of vessels will not occur on site, any spill or leak would be limited to that contained within the tug or ship (barges do not contain fuel). **BMPs** will be implemented in marine areas to minimize the risk of fuel spills and other potential sources of contamination. An agency-approved spill prevention and response plan including provisions for on site containment equipment (including a boom) will be developed prior to any construction activities. Spill prevention and spill response procedures will be maintained throughout operation of the Conveyor. Such spills or leaks are possible but unlikely to have any long-term impact on aquatic species.

3.5 3.1.1 Fish

Pile driving produces waterborne noises that may injure or cause behavioral disturbances to fish, marine mammals and diving seabirds. Interim criteria have been developed by the Fisheries Hydroacoustic Working Group (made up of NOAA Fisheries, USFWS, and several state transportation agencies) to protect marine species that use nearshore habitats (FHWG 2008). In-water noise levels are measured differently than noise levels measured in air, which are typically used to assess impacts on humans and are weighted (dBA) to correspond to the way humans hear certain frequencies. Noise levels underwater are not weighted (dB) and thus measure all frequencies unmodified within the range of interest, which may extend below and above the audible range of many organisms (WSDOT 2004).

In-water noise levels associated with pile installation and other aspects of the Proposed Action will temporarily elevate noise levels above existing background noise levels (112 dB to 114 dB). To minimize the underwater noise during pile driving, a vibratory hammer would be used for the majority of pile installations. However, an impact hammer which produces much higher levels of noise, will be used to proof load the piles.

Based on existing acoustic studies and waterborne sound modeling, fish may alter their normal behavior, which includes minor startle response and avoidance of

Additional details of the waterborne noise analyses conducted for the pier and Conveyor is provided in Section 3.7 Threatened and Endangered Species.

project construction activities. Data indicate that juvenile salmonids do not appear particularly susceptible to impact pile driving, making it unlikely that injury will occur to these species. Conducting all in-water work during agency-approved work windows when few juvenile salmonids are present will further limit exposure of these fish to pile driving noise.

Other marine species, particularly sea perches, are susceptible to injury caused by change in pressure (barotrauma) and mortality during impact driving of large diameter steel piles. A vibratory hammer will minimize most impacts as will a bubble curtain to be used when proofing with an impact hammer is needed. To further protect fish, a soft-start approach using the vibratory and impact pile driving hammers will be utilized to encourage fish to move away from the area prior to initiation of pile driving. It is expected that Forage fish, spawning areas for herring, surf smelt and Pacific sand lance will not be impacted by proposed in-water work; none are proximal to the Proposed Pier site (Hart Crowser 2013).

However, fish species without swim bladders (such as flatfish) are not susceptible to the concussive pressure waves produced by impact pile driving. Bladderless species such as English sole, rock sole, sand sole and starry flounders are expected to be the dominant species residing on sand flats.

Juvenile and subadult rockfish may be attracted to the area of the proposed overwater structure and existing native eelgrass and *Z. japonica* eelgrass beds. These species will likely be temporarily displaced from the pier footprint during the two-month construction period, after which re-colonization would occur. Permanent loss of benthic and epibenthic fauna will be small and limited to areas where piles are placed.

3.5 3.1.2 Marine Mammals

The Fisheries Hydroacoustic Working Group (FHWG 2008) has also identified underwater noise threshold criteria for determining injury exposure to pinnipeds and whales from underwater noise. Further sound modeling conducted in the biological evaluation and acoustic measurements collected by the U.S. Navy (at the Explosive Handling Wharf four miles to the south) were used to gauge the impacts of pile driving at the Proposed Pier to marine mammals (Navy 2013b). See Chapter 3.07 Threatened and Endangered Species for additional details of the waterborne noise analyses conducted for the Proposed Pier.

Harbor seals, California sea lions and Steller sea lions are unlikely to be injured by impact pile driving. These animals are unlikely to occupy areas of such intense construction activities and vessel traffic, plus the zone of injury is very close to the pile driving. Required monitoring of marine mammals during pile driving may reduce the marine mammals' potential exposure to noise.

See Section 3.7 Threatened and Endangered Species.

The threshold criteria for noise-related behavioral disturbances of marine mammals are substantially lower than other species as more fully described in Section 3.7 Threatened and Endangered Species. Underwater acoustic measurements and sound modeling efforts suggest that these marine mammals modify their behavior much further away from the pile (3 to 13 miles). To further minimize potential effects to marine mammals,

a Marine Mammal Construction Monitoring Plan would be implemented during construction to monitor the presence of pinnipeds within designated disturbance and injury zones. If pinnipeds are spotted within the injury zones, pile driving would cease until the animals have left the respective zones (Hart Crowser 2013b).

3.5 3.1.3 *Shellfish and Benthic Species and Habitats*

Project construction will result in the destruction of isolated areas of marine benthic habitat and species in the footprint of each pile (between 18 and 30 inches in diameter). Pilings will displace approximately 734 square feet of benthic habitat between +6 feet and -64 feet **MLLW**. Because of the greater number of piles used for the pier supports for the Conveyor, the majority of this area (613 square feet) would be below depths of -30 feet **MLLW**.

Temporary disturbance of benthic resources within the intertidal zone are typical when work barges are used as a platform to construct the overwater Conveyor. The preferred method is driving piles during high tide to avoid grounding of barges. Nonetheless, barges will likely drop spuds (anchors) to hold position while working in a given area. This grounding will disrupt substrate, resulting in a short term compression of beach sediments that could eliminate or alter the nature of benthic biota in these localized areas. A typical barge (155 feet by 50 feet; 7,750 square feet) may be required to ground during low tide to offload the large crane required for installation of the support piles and Conveyor truss sections in the nearshore. All alterations of benthic habitat and species assemblages caused by barge grounding and/or timber mats will be temporary and limited to the in-water construction period.

After in-water work is completed, daily tidal inundations will quickly restore bottom habitats to their pre-construction grade. Because of the relatively isolated nature of physical grounding within the large, broad sand flat, recruitment sources of benthic species will be readily available to recolonize altered habitats once the in-water construction period is completed and pre-construction grades are restored. Studies investigating dredge and backfill sites in Puget Sound have found that the diversity and health of the benthic assemblage readily recover, restoring them to their similar pre-dredge/backfill community (McCauley 1977; Richardson 1977; Romberg 1995).

3.5 3.1.4 *Seabirds*

Seabirds, particularly the diving birds, would be susceptible to barotraumatic injury associated with impact pile driving. Underwater sound criteria for injury and specific protocols for monitoring marbled murrelet, a species listed as threatened under the **ESA**, has been developed by the **USFWS** and would have similar applicability to other diving birds.

This is consistent with reported observations found during the Navy's first year of construction of the Explosive Wharf Handling (EWH-2) (Navy 2013b). Four miles south of the Proposed Pier site, the Navy conducted five months of intensive bird monitoring efforts and did not find signs of distress in marine birds. Some of the birds flushed during initial hammer impact, especially those closest to the construction

See Section 3.7 *Threatened and Endangered Species* for additional analyses of potential impacts to marbled murrelet.

site, but most resumed or continued normal behavior during the remaining period of impact driving. Some diving birds, including Barrow's goldeneye, bufflehead, horned grebe and hooded merganser, were observed feeding or transiting close to the pile (less than 50 m) during impact driving operations. Pile driving did not appear to have any lingering effect on marine bird behavior. Whether seabirds avoided the construction zone or tolerated the noise levels, surveys and observations suggested that neither the Navy's use of impact or vibratory hammers or bubble curtain resulted in distress or injury to any bird species at the Navy site. The pile driving program at this site drove all piles with a vibratory hammer and used an impact hammer only for proofing. A soft start protocol for impact pile driving as well as a bubble curtain was also used (Navy 2013b).

At a previous pile-driving project at the Hood Canal Bridge, seabirds exhibited similar behavioral patterns with initial flushing during impact driving. Data indicated no significant impacts to seabirds as the result of impact pile driving.

As part of permitting requirements, it is likely that a similar marbled murrelet monitoring program, as well as soft-start and bubble curtain protocols, will be required for all in-water pile driving.

3.5 3.1.6 Indirect Impacts

Indirect impacts would involve ecological and food web interactions between species. For example, injuries or avoidance of fish resulting from pile driving could have an indirect impact to marine mammals and seabirds that rely on those fish resources in their diet. Similarly, changes in benthic or epibenthic production resulting from spills or barge groundings could have indirect impacts on juvenile salmon or other marine resident species that occupy the sand flats and rely on those food resources. No indirect impacts associated with the in-water construction period are anticipated.

3.5 3.2 Project Operations

Impacts to marine areas from proposed mining operations would be limited to those associated with tugs, barges and ships during the loading of sand and gravel for marine transport. The loading process includes the pier Conveyor over the intertidal zone, the loading of aggregate to vessels berthed at the pier, and transportation effects away from the load-out facility.

3.5 3.2.1 Mining

Direct and indirect impacts to marine aquatic resources (fish, shellfish, mammals, birds and macrovegetation) from activities at the Upland extraction area and Conveyor(s) footprints to the Operations Hub are not anticipated. The Meridian Extraction Area is located approximately two miles inland from the marine shoreline.

3.5 3.2.2 Operations Hub

Direct and indirect impacts to marine aquatic resources (fish, shellfish, mammals, birds and macrovegetation) from the Operations Hub, located over three miles from the marine shoreline, are not anticipated.

3.5 3.2.3 Central Conveyor (Upland)

Direct and indirect impacts to marine aquatic resources (fish, shellfish, mammals, birds and macrovegetation) from the upland Twin Conveyors and initial portions of the Single Conveyor are not anticipated.

3.5 3.2.4 Central Conveyor (Shoreline) and Pier

The Conveyor's approach and the pier itself, which commences at the **OHW** mark and extends approximately 990 feet over shoreline and water to the load-out facility, has a number of direct impacts.

Some direct impacts will affect specific groups of animals or plants while other potential impacts would affect the project nearshore environment. For example, fuel spillage during operation of the Conveyor is possible. However, as stated previously, since fueling of vessels will not occur on site, any spill or leak would be limited to that contained within the tug or ship (barges do not contain fuel). **BMPs** will be implemented in marine areas to minimize the risk of fuel spills and other potential sources of contamination. An agency-approved spill prevention and response plan including provisions for on site containment equipment (including a boom) will be developed prior to any construction activities. Spill prevention and spill response procedures will be maintained throughout operation of the Conveyor. Such spills or leaks are possible but unlikely to have any long-term impact on aquatic resources.

MARINE VEGETATION. In the Pier and Pier approach area, accidental aggregate spills along the overwater portions of the Conveyor may bury existing eelgrass resources. This will be minimized by the enclosed design of the Conveyor in all overwater marine areas. The alignment of the Conveyor was also designed to avoid the native eelgrass (*Z. marina*); therefore, any accidental spills will likely miss this species. Barge aggregate spills, if they occur, will not impact marine macrovegetation since the barges will be moored in water depths between -50 and -80 feet **MLLW**. This depth is beyond any eelgrass colonies and deeper than most Puget Sound macrovegetation can grow.

Accidental fuel spills are addressed above but could potentially coat the eelgrass fronds or other macrovegetation and inhibit its photosynthesis and growth.

The presence of the Conveyor will cast limited shadows on portions of the adjacent beach, subtidal bottom areas and eelgrass beds. During the major growth periods of spring and summer, shadows from the Conveyor and pier (including vessels) are not expected to reach the large patch of the native eelgrass (*Z. marina*) north and east of the pier except in the early morning. However, due to the Conveyor alignment and its proximity to patches of *Zostera japonica* (*Z. japonica*) eelgrass, some shading of this species is likely to occur (Hart Crowser 2013).

Given the height of the pier (22 feet above **MLLW**), width of the pier (13 to 18 feet), and average sun angle, shading from the pier will traverse marine waters along the pier alignment throughout each day, and remain over any specific eelgrass patch for a maximum of one to two hours each day. *Z. japonica* eelgrass occurs in isolated patches within a 250 foot wide zone across which the shadow will traverse (Hart Crowser 2013). However, no single portion will be shaded throughout the entire day.

It is conservatively predicted that light availability may fall below thresholds necessary for optimal eelgrass production for periods of one to two hours per day in a zone of about 30 feet in width over the *Z. japonica* eelgrass band (Hart Crowser 2003). This approximate 7,500 square feet area may reduce growth of eelgrass. Production of eelgrass at higher intertidal elevations is limited by desiccation (drying out), not by light levels. Thus, it is probable that there will be a negligible reduction in *Z. japonica* eelgrass productivity as a direct result of shadows cast by the Conveyor.

Shading from the two open support platforms and from mooring dolphins will not reach areas of native eelgrass (*Z. marina*) during a majority of the day. The shadow from the northern mooring dolphin and from the outer support tower will reach adjacent eelgrass beds briefly during early morning, when the sun is very low in the eastern sky. Because of the low sun angle, light refraction off the water surface will be great under these circumstances, and the amount of photosynthetically active radiation reaching the bottom (and eelgrass) will likely be below the threshold for photosynthesis with or without the project structures (Hart Crowser 2003). Thus, the effect of shading on native eelgrass (*Z. marina*) is expected to be minimal.

FISH. Several studies have shown that juvenile salmon are reluctant to migrate beneath piers and floats where there are sharp contrasts between open, lighted areas and darker areas beneath piers. Fish will often swim around the structure (Simenstad 2006). Studies of shading effects at ferry terminals in Puget Sound have also shown that the contrast between light and dark areas usually approaches 85 percent or greater before avoidance by migrating juvenile salmon is observed (Southard et al. 2006). Given the initial height of the overwater Conveyor (22 feet above **MLLW**) and relatively narrow width (13 to 18 feet), shading will be minor and well below the thresholds that elicit avoidance.

MARINE MAMMALS. No marine mammal haulouts are present in the vicinity of the Proposed Pier. Operational noise and activities may cause some behavioral avoidance (or attraction) as specimens approach the facility, but given the Proposed Pier's height above the water, airborne noises will be low after construction activities are completed.

SHELLFISH AND BENTHIC COMMUNITY. The overwater Conveyor could impact marine resources and habitats over the intertidal and shallow subtidal zones, altering drift cell processes and longshore sediment transport. Changes in sediment grain size profiles could alter the existing benthic community and epibiota. To prevent alterations in drift cell dynamics, the preliminary design proposed spacing the pilings sufficiently apart, with the overwater Conveyor designed to elevate the above the **OHW**. Over most of the intertidal zone, support bents (piles) 100 feet apart are composed of four piles situated parallel to the shore and the longshore transport direction. By substantially allowing current and natural sediment transport to occur unimpeded under the Conveyor, no impacts to these processes are anticipated to occur.

The overwater portion of the Conveyor will be fully enclosed. However, if some sand and gravel is spilled at discharge points, it would add sand and gravel to a sand and gravel beach, rendering any impacts to be minimal, localized and quickly dispersed by wave action. In deeper water (deeper than -30 feet MLLW), spilled sand and gravel could alter the nature of the benthic fauna and epibiota in localized areas. The steep slope of the seafloor at the load-out transfer point will deter accumulation of sand and gravel and not adversely impact larger infauna such as geoducks (Westley 1975). Juvenile salmon, normally associated with shallow nearshore habitat, would also not be impacted from a load-out discharge point approximately 1,000 feet offshore in water depths generally greater than 40 feet.

3.5 3.2.5 Marine Transportation

Subject to market demand, the applicant anticipates that a maximum of six barges per day and six ships a month loading at the pier up to 300 days a year. Such an increase in Hood Canal marine traffic would not significantly increase the potential for marine mammal collisions, particularly given the slow-moving nature of project vessels. Also, with barges and ships moored approximately 1,000 feet from MHHW and in water greater than 60 feet deep, there will be no direct or indirect impacts to migrating juvenile salmon or other fish occupying the intertidal zone.

Direct and indirect impacts to macrovegetation from Marine Transportation are not anticipated. Arrival and departure of barges will occur at the Proposed Pier in deep water. Barge and tug mooring will be in water between -50 and -80 feet MLLW.

3.5 3.3 Indirect Impacts

Indirect impacts would involve ecological and food web interactions between species. For example, changes in migratory patterns of juvenile salmon resulting from shading or aggregate spills could have an indirect impact to higher level predators that rely on those fish resources in their diet. Similarly, changes in benthic or epibenthic production resulting from aggregate or chemical spills, or changes in drift cell dynamics could also have indirect impacts on juvenile salmon or other marine resident species that occupy the sand flats and rely on those food resources. Accidental fuel spills could affect the attractiveness of the eelgrass and other macrovegetation as a food source or a spawning substrate. However, no indirect impacts associated with the in-water operations are anticipated.

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3.6 TERRESTRIAL PLANTS AND ANIMALS

The Proposed Project would be located in a commercial tree farm where many different species of plants and animals reside. The effect of displacement by and disturbance from the various activities associated with the mining, processing and conveying of sand and gravel to the Proposed Pier on the tree farm's plants and animals, along with construction activities, especially the common and State-listed Priority Species, are discussed here.

Impacts on wildlife and fish species listed under the Endangered Species Act (**ESA**), including federally designated critical habitats are discussed in Section 3.7 Threatened and Endangered Species. Impacts on marine plants and animals are found in Section 3.5 Marine Plants and Animals, while impacts on wetlands and streams are found in Section 3.4 Water.

3.6 1 Regulatory Overview and Permits

Federal, state and county regulations protect and regulate wildlife habitat and wetlands. The U.S. Army Corps of Engineers (**USACE**) oversees federally-mandated regulations under the Clean Water Act (**CWA**), in coordination with Washington State and Jefferson County.

3.6 1.1 Federal

The **ESA** protects federally-listed species and their habitats. The **ESA** also provides indirect protection for non-listed species sharing these habitats. For example, old growth forest habitat may be protected for Northern Spotted Owls, a federally-listed species. At the same time, such protections could also indirectly protect other animals and bird species using old growth forests.

The federal Migratory Bird Treaty Act (**MBTA**) protects migratory birds from harm by prohibiting actions that “result in pursuit, hunting, taking, capture, killing, possession or transportation of any migratory bird, bird part, nest or egg thereof.” The **MBTA** protects active nests of migratory birds.

3.6 1.2 State

The Washington Department of Natural Resources (**WDNR**) administers regulations for **ESA**-listed plant species in Washington State. The **WDNR**'s Washington Natural Heritage Program maintains a status database of endangered, threatened and sensitive plants by county in Washington State. The Program also establishes and protects Natural Area Preserves and Conservation Areas that protect listed and rare plants and ecosystems in Washington State.

3.6 1.3 County

Jefferson County regulates critical areas, including Fish and Wildlife Habitat Conservation Areas (**FWHCAs**) through JCC Chapter 18.22. Jefferson County **FWHCAs** are identified areas of critical importance to the maintenance of endangered, threatened or sensitive species of fish, wildlife, plants and/or species of local importance (JCC 18.22.200). Designated **FWHCAs** relevant to impacts on habitat and terrestrial species of local importance (not state- or federally-listed) include:

- Areas with which species of local importance have a primary association;
- Rivers and streams not otherwise protected under the Washington State Forest Practices regulations that have **FWHCAs** protected according to stream type; and
- A 150-foot buffer that extends landward from the ordinary high water OHW mark of marine shorelines.

The Proposed Meridian Extraction Area is located within the Wahl-Meridian Mineral Resource Land Overlay (**MRLO**) district approved by the **Ordinance**, which contains requirements for protection of **ESAs** within the **MRLO**. The **Ordinance** prohibits mining in wetlands and fish and wildlife habitat areas or their buffers, and requires submission of a Habitat Management Plan. (Ordinance, Section 2, Condition 1(a)).

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Section 3.8 Land Use. The following goals and policies are applicable to this discussion of the Proposed Project's impacts on terrestrial plants and animals:

ENVIRONMENT ELEMENT GOAL

- ENG 7.0 Protect Jefferson County's natural heritage, including native vegetation and unique landforms.

ENVIRONMENT ELEMENT POLICIES

- ENP 7.2 Encourage the protection and acquisition of priority sites and habitats which protect native ecosystems.
- ENP 7.4 Native vegetation should be used whenever possible in habitat restoration projects and linking of open space areas.
- ENP 7.5 Encourage the utilization of native vegetation and drought-tolerant species to reduce water consumption and landscape maintenance costs

ENVIRONMENT ELEMENT GOAL

- ENG 12.0 Protect and enhance fish and wildlife habitat throughout Jefferson County.

ENVIRONMENT ELEMENT POLICIES

- ENP 12.1 Participate in multi-jurisdictional processes with community representation for development of coordinated watershed and habitat conservation plans to serve as the basis of land use decisions that may affect fish and wildlife habitat.
- ENP 12.2 Land use decisions should recognize the priority of the protection and enhancement of fish and wildlife habitat in accordance with proposed listings of threatened and endangered species under the Federal Endangered Species Act.

- ENP 12.3 Buffers for fish and wildlife habitat areas should be consistent with the best available science for habitat protection.
- ENP 12.4 Promote the protection of wildlife habitat corridors that connect otherwise isolated habitat areas.
- ENP 12.5 Promote best management practices to protect fish and wildlife habitat in land use regulations related to septic systems, drainage, forest practices, agricultural practices, industry, and other development.
- ENP 12.6 Coordinate with appropriate agencies to avoid adverse impacts to fish and wildlife habitat in the review and approval of development proposals.
- ENP 12.7 Cooperate and coordinate in habitat restoration efforts with regional organizations such as the Hood Canal Coordinating Council.

3.6 2 Affected Environment

The upland portion of the Proposed Project would be located within a 22,000-acre block of a commercial tree farm on the Upper Coyle Peninsula. The block is divided, north-south, by State Route 104. The Proposed Project would be south of the highway. Most of this area was first logged in the early 1900's, with most of the logging having taken place in the 1930's. After a significant forest fire in 1939, much of the forest re-seeded naturally. Currently, the area is managed as commercial forestland with periodic logging of small acreage units (+/- 200-acres) and predominant replanting of Douglas fir.

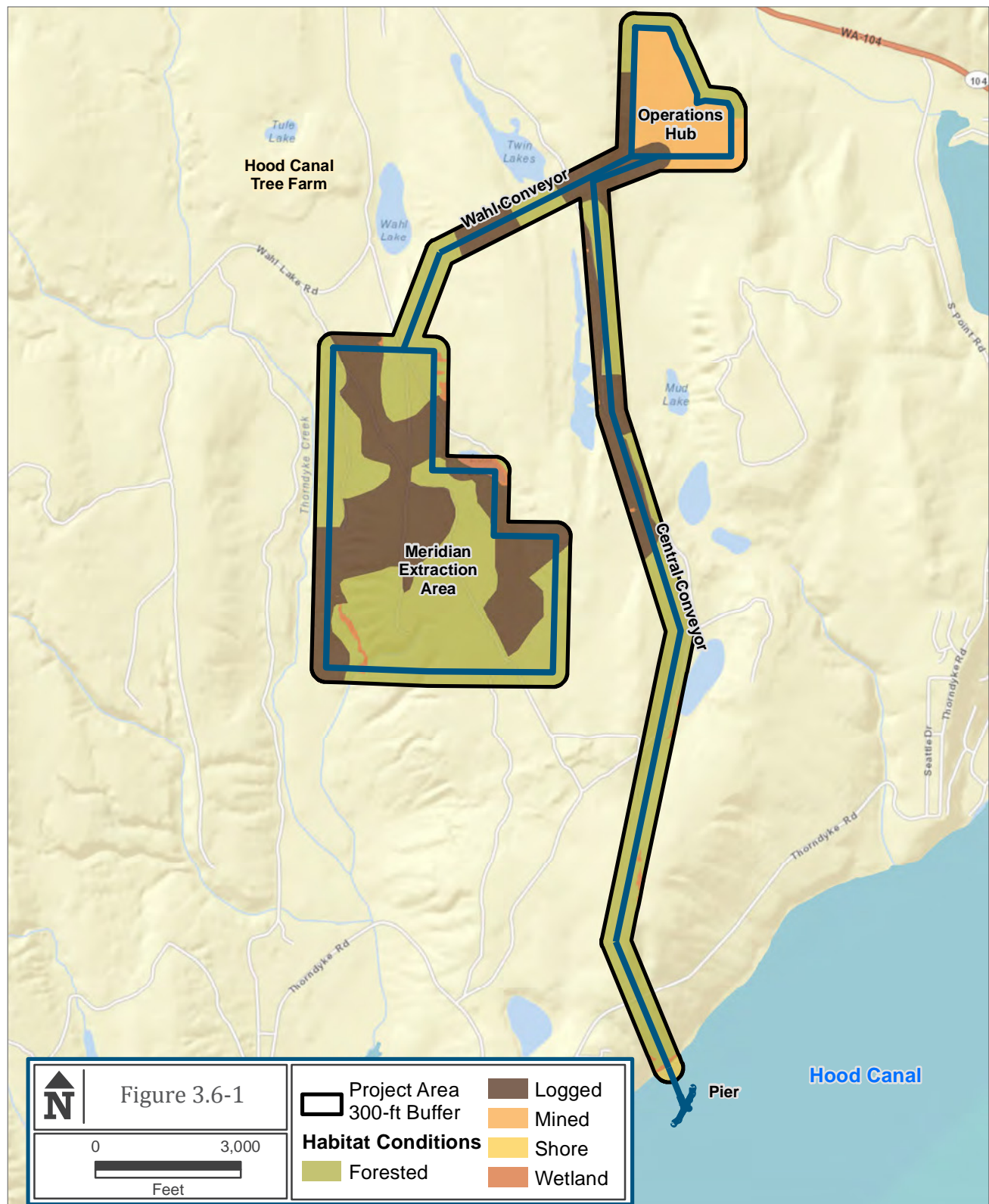
Much of the commercial forestland where the Meridian Extraction Area the Proposed Central Conveyor would be have been logged within the past year to 20 years. The area is largely dominated by Douglas fir (*Pseudotsuga menziesii*), Western hemlock (*Tsuga heterophylla*) and Western white pine (*Pinus monicola*). Understory vegetation is diverse throughout the area. Habitat areas include a tall, thick, well-developed shrub layer dominated by salal (*Gaultheria shallon*) and patches of rhododendron (*Rhododendron albiflorum*). Most of the shrub community includes the common red and evergreen huckleberry (*Vaccinium spp.*), salal, Oregon grape (*Mahonia nervosa*) and sword fern (*Polystichum munitum*). The first section of the Proposed Wahl Conveyor (0.2-miles "little Wahl") would also fit the description above; the rest of Wahl would be built on an existing forestry service road.

See Figure 3.6-1

The Proposed Operation Hub would be located on 100-acres where the Shine Pit had operated. Originally opened in 1959 to supply sand and gravel for the construction of the Hood Canal Bridge and State Route 104, the Shine Pit operated continuously until 2012, when the current mining operator moved to a location further west into the tree farm, on an area north of where the Meridian Extraction Area would be located. Currently, the Shine Pit operator is in the process of closing out the pit, which includes removing structures and re-establishing forest by planting Douglas firs, as is required by their underlying **WNDR** Reclamation (mining) Permit.

Terrestrial habitats and associated wildlife species that may be most affected by the Project are located within surrounding 1/3 mile of the Meridian Extraction Area, the route of the Wahl Conveyor, Operations Hub, and the route of Central Conveyor. Generally, 1/3-mile out is where the noise generated by the Proposed Project would attenuate (lower) to the ambient (background) noise levels.

See Section 3.9 Noise for further details regarding ambient background levels, attenuation rates and construction/operation noise used for the upland noise analysis affecting wildlife can be found in the Biological Evaluation for this project (Hart Crowser 2013).



Habitat Conditions The area proposed for mining (Meridian) and the Central Conveyor currently contain a mix of forested and logged habitat, and some wetland habitat. The Operations Hub, previously used as part of the Shine Hub, presently does not provide habitat. The area of the Pier provides shore and wetland habitat. **Source:** GeoEngineers.

3.6 2.1 Special Status Plant Species

The Washington Natural Heritage Program database lists rare and protected plants by county for Washington State (WDNR 2013). There are no previous records of special status plant species having been found in the Proposed Project area. Only a few of the plant species from this list have suitable habitat within the Proposed Project area; they are listed in Table 3.6-1, and none have been observed while biologists have been onsite.

Table 3.6-1 Protected Plant Species that have Suitable Habitat in the Project Area

Scientific Name	Common Name	State Status*	Type of Suitable habitat
<i>Boschniakia hookeri</i>	Vancouver ground-cone	R1	Lowland conifer forest, parasite of hemlock roots
<i>Carex comosa</i>	bristly sedge	S	Low elevation wetlands
<i>Carex stylosa</i>	long-styled sedge	S	Low elevation wetlands, historic records only
<i>Erythronium quinaultense</i>	Quinault fawn-lily	T	Edges of moist coniferous forests
<i>Parnassia palustris</i> var. <i>neogaea</i>	northern grass-of-parnassus	S	Stream edges, seeps, moist meadows, disturbed forest lands
<i>Poa laxiflora</i>	loose-flowered bluegrass	S	Moist meadows, stream edges, mossy rocks
<i>Potamogeton obtusifolius</i>	blunt-leaf pondweed	S	Submerged lake edges, sloughs, slow-flowing streams
<i>Woodwardia fimbriata</i>	giant chain fern	S	Stream banks, wet road banks, moist bluffs
Key: T = Threatened. Likely to become endangered in Washington; S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state; R1 = Review group 1. Of potential concern but needs more field work to assign another rank. Source: WDNR 2013			

3.6 2.2 Terrestrial Wildlife (Vertebrates)

Forest habitat within the project area has been disturbed by timber harvesting for over 100 years. The surrounding area is a patchwork of rural development, residential development and timber-harvested lands. The only large mammal wildlife species known to currently inhabit the project area, and travel from adjacent forested areas, are black-tailed deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), and cougar (*Felis concolor*) (Resources Northwest 2003). Historically, Roosevelt elk (*Cervus elaphus*) most likely inhabited the project area, although none are known to exist there today (Resources Northwest 2003). Small mammals such as raccoon, bobcat, mice, mountain beaver, squirrels and rats use habitats in and around the project area and aggregate near streams and wetlands. The forested area also provides habitat for amphibians, reptiles and terrestrial mollusks (snails and slugs). There are no known or mapped threatened or endangered terrestrial wildlife in the Upland part of the Proposed Project (WDFW 2013).

3.6 2.3 Birds

The local chapter of the Audubon Society maintains a list of birds that have been observed in Jefferson County. Birds that likely use or fly over the upland project area include woodpeckers, owls, hummingbirds, raptors, corvids and passerines. Species that commonly use forested habitats for perching, nesting, feeding and/or roosting include the American kestrel, turkey vulture, red-tailed hawk, Cooper's hawk, peregrine falcon, mourning dove, band-tailed pigeon, rock pigeon, barn owl, great-horned owl, Western screech owl, American crow, common raven, Steller's jay, Anna's hummingbird, rufus hummingbird, red-breasted sapsucker, downy woodpecker, hairy woodpecker, northern flicker, pileated woodpecker and a large number of passerines species (Audubon 2014).

3.6 2.3.1 State Protected Species

Priority species identified from the Washington State **PHS** (WDFW 2013) list that might be affected by the Proposed Project area include three birds:

BALD EAGLE. The Single Conveyor will pass approximately a half mile south and west of a known bald eagle nesting site located near the shoreline, as identified in the July 2013 **WDFW PHS** database and in a bald eagle assessment completed in 2004 and early 2005 (Sharpe 2005b). Eagles have been observed in and near the project area foraging during low tides (Hart Crowser 2013). Habitat within the vicinity of the Proposed Pier and Conveyor is suitable for bald eagles. Alteration of forested shoreline habitat of these species may directly affect the presence of bald eagles within the project area.

According to the **PHS** database managed by **WDFW** (WDFW 2013), two bald eagle nests have been documented along the shoreline within the vicinity of the project to the southwest. Additional nests have been identified north and south of the project area, approximately 2 miles and 1.5 miles respectively. On July 9, 2007, bald eagles were delisted and officially removed from the federal list of Endangered and Threatened species (72 FR 37345). Bald eagles are now considered a species of concern by the U.S. Fish and Wildlife Service (**USFWS**) and a state sensitive species.

Bald eagles are large birds of prey found throughout the lower 48 contiguous United States and Alaska. Local bald eagle populations vary seasonally with migrating eagles traveling south for the winter. Migrant eagles will often congregate during migration in areas where food sources are abundant. Bald eagles are often observed perching on large trees and snags along rivers and streams where they forage on fish, waterfowl, small mammals, and carrion. Bald eagles are typically monogamous, mating with the same partner for life. A breeding pair establishes a territory that encompasses an area of food abundance. Bald eagles build large stick nests in conifer trees and occasionally in deciduous trees or on cliffs. Nests are often located near the top of the largest tree with an unobstructed view of open water. Breeding and nesting activities occur from January 1 through August 15. Nests are most common near marine shorelines, but also occur on rivers and lakes. Nesting activity usually occurs in January and February with hatching occurring in April and May. Fledglings will typically leave the nest in mid-July, but usually remain at or near the nest until mid-August (USFWS 2007).

OSPREY. According to the **PHS** database managed by WDFW (WDFW 2013), the closest osprey nest to the Proposed Central Conveyor is located approximately one mile west of the lower portion of the Thorndyke Creek watershed. It is unclear if the nest is still active after being documented in 1991. Habitat within the vicinity of the Proposed Pier and Conveyor is suitable for osprey. Alteration of forested shoreline habitat of these species may directly affect the presence of osprey within the project area.

Ospreys do not have a federal status but are a state monitored species. Ospreys are large birds of prey found throughout the lower 48 contiguous United States and Alaska. Local osprey populations can vary seasonally with migrating osprey traveling south for the winter. Ospreys generally prefer shallow water areas with fish and can include: rivers, lakes, reservoirs, lagoons, swamps and more. The nesting habitat must include an adequate supply of accessible fish within a maximum of about 12-miles of the nest. Ospreys require nest sites in open surroundings for easy approach with a wide, sturdy base and safety from ground predators. (Cornell 2014a).

WOOD DUCK. According to the **PHS** database managed by WDFW (WDFW 2013), wood duck breeding occurrence has been documented approximately one mile to the west of the Proposed Conveyor at the head of Thorndyke Bay. Habitat within the vicinity of the Proposed Pier and Conveyor is suitable for wood duck. Alteration of forested riparian habitats may directly affect the presence of wood duck within the project area.

Wood ducks do not have a federal status or a state status. Wood ducks are boxy-shaped with a crested head, a thin neck and a long broad tail, and are found year round in Washington State. Wood ducks generally prefer bottomland forests, swamps, beaver ponds and are common along streams of all sizes. Preferred habitat is open water alternates with thick vegetative cover in which the ducks can hide and forage. Typically Wood ducks pair up in January and most birds arriving at breeding grounds in the spring are already paired. These birds nest in holes in trees or in nest boxes. Nesting cavities can have openings that range from 4 inches across to 2 feet across and have depths that vary in size (Cornell 2014b).

3.6 3 Proposed Action: Direct and Indirect Impacts

3.6 3.1 Construction

Project construction activities may impact wildlife species in the upland project area through vegetation clearing, disturbance to wetlands or wetland buffers, noise from construction, and potential spills from construction vehicles.

Construction of the Proposed Central Conveyor will be completed primarily from existing gravel forestry service roads. In some locations along the Central Conveyor route, new gravel-surfaced service roads would be constructed to align closer to the Conveyor route, requiring some clearing of vegetation and possibly grading. Vegetation clearing will also occur where Conveyor pile footings and foundations would be constructed. In such cases, the vegetation removal would be permanent. The

loss of this vegetated habitat through direct clearing for the access road and Conveyor supports would be small scale, localized and not likely to impact wildlife given the undisturbed vegetation in surrounding areas.

Construction of the Central Conveyor will also involve clearing of vegetation along the Conveyor alignment itself. Electrical and control wiring will be installed along the Conveyor access road. Staging activities for Conveyor construction may also involve vegetation clearing, though utilizing recently cleared lands from timber harvesting will minimize vegetation removal. For all these types of clearing, vegetation removal is temporary, as new vegetation will be allowed to occupy these areas upon completion of construction.

During removal of shrubs and trees, some bird nests may be lost. Efforts will be made to minimize the removal of trees during construction to reduce loss of habitat. Some amphibians, reptiles and terrestrial mollusks may be lost during construction activities, while other more mobile species are expected to move away from the construction zone, thereby avoiding impacts.

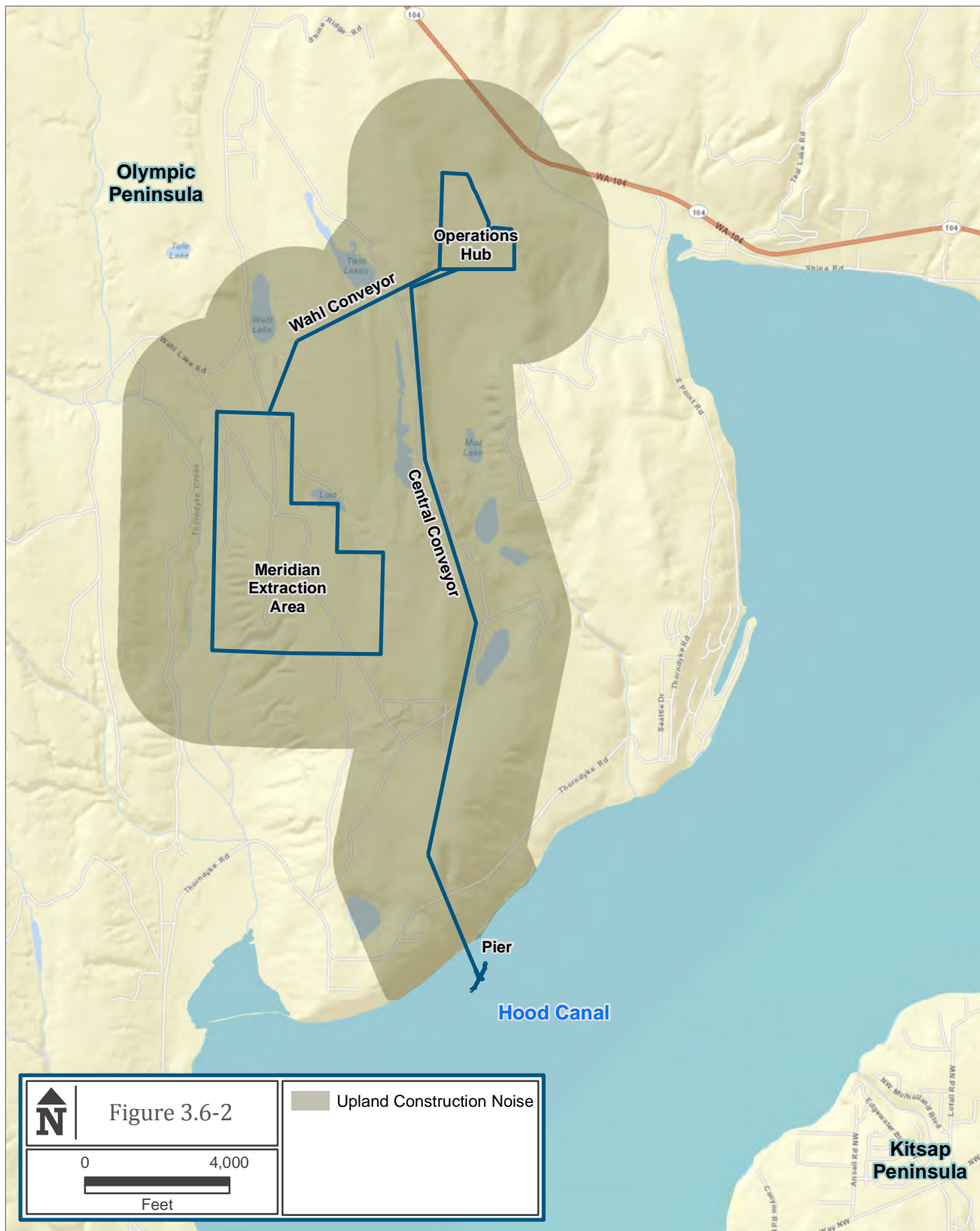
Following construction, as vegetation similar to that removed is allowed to re-establish, effects to wildlife would be limited. In other cases, vegetation replaced by new types (e.g., cleared areas instead of forest along road rights of way) may have higher or lower value to the animals occurring in such areas.

See Figure 3.6-2

For evaluating the effects on wildlife, the upland project area was defined by the extent of airborne noise around the Central Conveyor during the construction phase of the project. Other project effects, such as clearing activities and operational noise, take place in smaller areas and are therefore analyzed within that particular context. The upland project area was generally determined by noise because levels have the largest potential zone of disturbance.

See Section 3.9 Noise for a discussion of noise impacts.

Noise associated with construction activities along the Central Conveyor may result in short-term avoidance by wildlife species. While small mammals will likely avoid construction areas, increased noise levels during construction are likely to temporarily disturb or alter migration patterns of large mammals. Construction noise may temporarily disrupt feeding and migration and result in short-term avoidance by bird species within the immediate project area. Increased noise levels during construction may temporarily disrupt foraging, nesting, calling and flight behavior of birds within the immediate vicinity of the project area. However, these potential construction impacts to both wildlife and bird species will be temporary, highly localized and will cease once construction is complete. Displaced animals and birds will likely return to the area once construction is complete.



Construction Noise Impacts—Conveyor and Pier Noise thresholds are depicted as the worst case for construction noise levels.

See Section 3.4 Water for an expanded discussion of wetlands and streams.

Animals that occur within such localized areas or that use surface waters nearby may be negatively affected by possible contamination (accidental oil and grease spillage from construction machinery, dust, etc.). Effects may include mortality, temporary illness, stress or disruption of the reproduction cycle. Construction activities will be located away from permanent water sources such as Thorndyke Creek (1.3 miles or more away). Given the physical distance between construction activities and animals that use surface water in their life cycle (wetlands and streams) potential spills are unlikely to reach such areas. Furthermore, proper implementation of Best Management Practices (BMPs) and quick cleanup will prevent or minimize any potential effects of spills to animals, wetlands or water quality.

Construction activities may result in short-term avoidance by bird species (including bald eagles, osprey and wood ducks) during construction but their breeding and nesting activity is not expected to be affected. Increased noise levels may temporarily disrupt their foraging behavior in the immediate vicinity of the project area; however, these potential effects would be temporary, highly localized and cease once construction is complete.

3.6 3.2 Operations

Direct and indirect impacts to wildlife and vegetation resulting from operational activities may include:

- Increased noise during extraction and processing activities at the Meridian Extraction Area and the Operations Hub (direct);
- Impediment to wildlife migratory patterns and increased noise from the Central Conveyor (direct);
- Impacts to vegetation under the approach to the Pier (direct); and,
- Shading impacts to vegetation under the Central Conveyor (indirect).

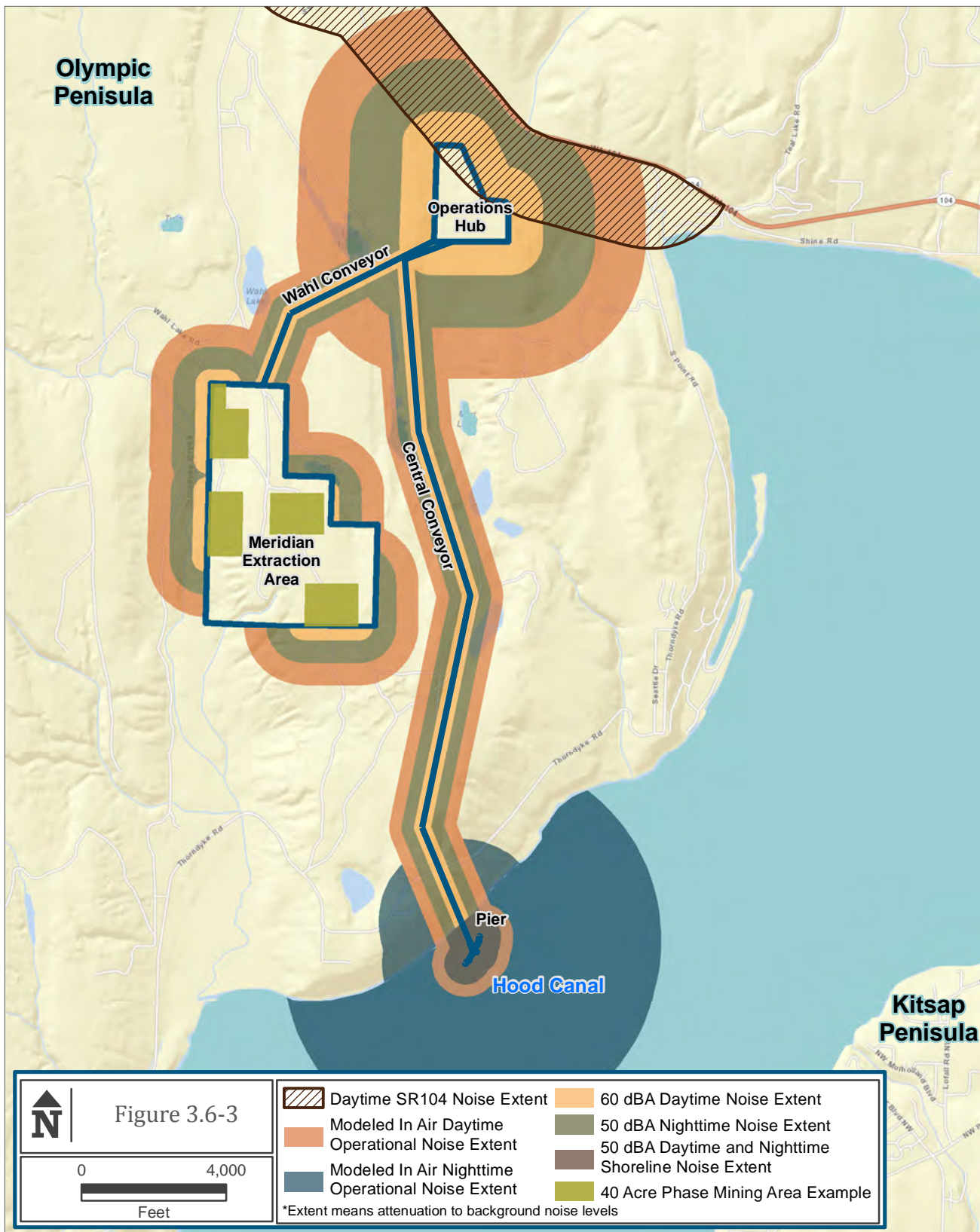
3.6 3.2.1 Mining (Meridian Extraction Area)

As described in Chapter 1, mining of aggregate in the Proposed Meridian Extraction Area would occur in maximum 40-acre segments. Depth of excavation would be limited to 10 feet above the seasonal high water table. When extraction in a segment is complete, commercial forestry would be re-established through planned, permitted and bonded reclamation activities.

See Figure 3.6-3

Mining operations may affect the migratory pattern of deer, bear and cougar due to the loss of forested habitat and increased noise, but these large mammals would tend to avoid the area. Small mammals would also avoid the area and tend to move into adjacent forested habitat. Some amphibians, reptiles and terrestrial mollusks will move away from the new mining areas to adjacent habitat, but slower, less mobile variety may expire. Most birds would also be expected to avoid the area and use adjacent forested habitat for roosting, feeding and nesting. Some species, including gulls and crows, may be attracted to the open habitat and human disturbance.

There are no anticipated, measureable, adverse indirect effects from mining operations on terrestrial plants and animals.



Operational Noise Impacts—Conveyor and Pier Daytime and nighttime noise thresholds are depicted along with the worst case for operational noise levels.

3.6 3.2.2 Operations Hub

The activities at the Proposed Operations Hub would be located within an area already used as a processing center. They would be conducted per the Washington Department of Ecology (**Ecology**) administered National Pollutant Discharge Elimination System (**NPDES**) general Sand and Gravel Permit and County Stormwater permit(s) conditions (see Section 3.4 Water). Therefore, no significant impacts to terrestrial plants and animals which utilize or depend upon surface waters are anticipated.

Noise had been generated from sand and gravel processing activities at the then-operating Shine Pit, which recently moved. For that reason, wildlife and birds are likely to be acclimated to these longstanding noise conditions. Noise levels from the Proposed Operation Hub are anticipated to be similar to levels measured and modeled during a 2002 noise study (Enviroanalysis 2002) which was found to be 47 dBA at 100-feet from the edge of the operation, as depicted in Figure 3.6-3. Therefore, it is unlikely that noise generated from activities under the Proposed Project would have a significant and measurable impact to wildlife and bird species in the vicinity of the Proposed Operations Hub. No additional direct or indirect impacts to terrestrial plants and animals are anticipated to occur from operations at the Operations Hub.

3.6 3.2.3 Central Conveyor

The Proposed Central Conveyor will have a minimum two-foot ground clearance below the return belt for wildlife crossings. However, topographic features will provide more than two-foot clearance in many locations along the Central Conveyor (Krazan 2003). Four-foot ground clearance crossings will be developed every 300 feet along the entire length of the Central Conveyor to accommodate larger mammals. To ensure ease of passage for larger animals, these crossings will be increased to at least six feet in height every 900 feet (Krazan 2003; Resources Northwest 2003).

Although the Conveyor may cause some delay in the movements of wildlife, it is anticipated that both small and large mammals will be able to pass under the Conveyor throughout its traverse across the landscape (Resources Northwest 2003). If deterred by the Conveyor's presence, most mammals are expected to follow the Central Conveyor until a passable area is encountered. No direct endangerment to wildlife is anticipated with the presence of the Central Conveyor.

See Section 3.9 Noise regarding potential noise impacts.

Noise from the Conveyor may also result in altered behavior and avoidance of terrestrial wildlife and birds. It is estimated that the Central Conveyor transfer points will have a noise level of 60 dBA at 100 feet (worst case scenario) (based on measured noise levels at the previously operating Shine Pit and noise will extend approximately 912 feet before it fades to background levels, as illustrated in Figure 3.6-3. Animals may cross under the Conveyor or move into habitat away from the structure to avoid noise disturbance that can disrupt migration, feeding and reproduction in mammals. Noise can also affect vocal communications of birds, if they are within zones where noise levels are elevated above ambient levels. However, operational noise of the

Central Conveyor is anticipated to be intrusive (to the human ear) but is not expected to negatively impact wildlife as they tend to assimilate to new noise patterns (Krazan 2003). For comparison, an alarm clock is estimated to have a dBA of 80 at 2 feet, while light traffic has a dBA of 50 and is considered to be “quiet”.

Indirectly, the Central Conveyor will produce some shade. While such shade may affect the types or vigor of replacement vegetation surrounding the Conveyor, such indirect effects are expected to be minimal since high levels of light would still reach vegetation. Operations of the Central Conveyor will have a minimal impact to vegetation surrounding the Central Conveyor following construction. No other indirect effects to vegetation and wildlife are anticipated from operations of the Central Conveyor.

3.6 3.2.4 Pier

Once the Proposed Project is operational, vegetation located below the Conveyor approach to the pier will require regular trimming or cutting to ensure vegetation does not grow into the structure of the Conveyor. As described in the Krazan report (Krazan 2003), long-term solutions to vegetation maintenance include transitioning from a young forested system to a scrub-shrub dominated area that requires little to no maintenance. No other direct effects to upland vegetation and wildlife from operation of the Proposed Pier are anticipated.

No indirect effects to upland vegetation and wildlife from operation of the Pier and Pier Approach are anticipated.

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3.7 THREATENED AND ENDANGERED SPECIES

The federal government's Endangered Species Act (**ESA**) addresses fish and wildlife species listed as threatened or endangered and utilizes the Essential Fish Habitat (**EFH**) to identify important habitats. The state of Washington also lists "Priority Species" as those endangered, threatened, sensitive and candidates for listing. Information regarding species occurrence, life history and habitat requirements is based upon literature reviews, site-specific surveys, correspondence with federal and state agencies, and review of state and agency websites.

Qualitative and quantitative assessments were utilized to evaluate direct and indirect impacts to various fish and wildlife species or their habitat(s) by the Proposed Project's upland and shoreline components, which include extraction, processing, transporting by Conveyor and constructing and operating a Pier for loading sand and gravel onto barges and ships.

3.7 1 Regulatory Overview and Permits

The Proposed Project is subject to federal, state and county regulations pertaining to threatened and endangered species, including those protected by federal and state lists.

3.7 1.1 Federal

The National Marine Fisheries Service (**NMFS**) and the U.S. Fish and Wildlife Service (**USFWS**) ensure compliance with the **ESA** to conserve and protect fish, wildlife and plant species (and their designated critical habitats) that are listed as threatened or endangered. **NMFS** is generally responsible for marine species; **USFWS** is responsible for all other federally listed wildlife and plant species. Key definitions of the **ESA** include:

- "take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or attempt to engage in any such conduct (16 U.S.C. § 1532);
- "harm" as significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavior patterns such as breeding, feeding or sheltering; and,
- "harass" as actions that create the likelihood of injury to listed species that would significantly disrupt normal behavior patterns not limited to breeding, feeding or sheltering.

Section 7 of the **ESA**, enforced by the U.S. Army Corps of Engineers (**USACE**), requires that any action by a federal agency shall not be "likely to jeopardize the continued existence of any [listed] species or result in the destruction or adverse modification of habitat of such species..." The **ESA** requires consultation with **USFWS** and **NMFS** to determine the likelihood of a Proposed Project's negative impacts on federally listed species.

In addition to the **ESA**, the Magnuson-Stevens Fishery Conservation and Management Act (**MSFCMA**) (16 U.S.C. § 1801-1882 et seq.) requires federal agencies to consult with **NMFS** about activities that may adversely affect federally-listed fish species, designated critical habitat, and **EFH**. Through the **EFH** provision, it protects the habitats necessary for spawning, breeding, feeding or growth to maturity for federally managed fisheries within state waters.

EFH is defined as those waters and substrate necessary for fish to spawn, breed, feed or grow. “Waters” include aquatic areas and their associated physical, chemical and biological properties that are or have been used by fish. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities (NMFS 1999).

The Migratory Bird Treaty Act (**MBTA**) protects migratory birds from harm by prohibiting actions that “result in pursuit, hunting, taking, capture, killing, possession, or transportation of any migratory bird, bird part, nest or egg thereof.” Though delisted from the **ESA**, bald eagles (*Haliaeetus leucocephalus*) are protected under both the **MBTA** and the **Bald and Golden Eagle Protection Act** (16 U.S.C. § 668), which prohibits the taking of bald eagles through pursuit, shooting, poison, killing, trapping, collecting, disturbance or transportation.

The Marine Mammal Protection Act (**MMPA**) prohibits the taking of all marine mammal species, including **ESA**-listed species. The **MMPA** also allows for provisional incidental takes and other regulated takings. The **MMPA** defines “take” as the attempt or act of hunting, killing, capture, and/or harassment of any marine mammal. Projects involving the potential to take marine mammals may be issued an Incidental Harassment Authorization or a Letter of Authorization for such actions.

This Proposed Action will require (National Environmental Policy Act (**NEPA**) review, National Historic Preservation Act (**NHPA**) Section 106 review, an **ESA** Section 7 consultation, and an **EFH** review, through application with **USACE**.

3.7 1.2 State

The Washington Department of Natural Resources (**WDNR**) administers regulations for **ESA**-listed plant species in Washington State. The **WDNR**’s **Washington Natural Heritage Program** maintains a status database of endangered, threatened and sensitive plants by county in Washington State. The program also establishes and protects Natural Area Preserves and Conservation Areas that protect listed and rare plants and ecosystems in the state.

The Washington Department of Fish and Wildlife (**WDFW**) keeps the Washington State Priority Habitats and Species (**PHS**) list which must be compared to the locations of all project components. Priority species include “state Endangered, Threatened, Sensitive and Candidate species; animal aggregations (e.g., heron colonies, bat colonies) considered vulnerable; and, species of recreational, commercial or tribal importance that are vulnerable.” (WDFW 2013).

The bald eagle (*Haliaeetus leucocephalus*) is classified by states, “Sensitive species are any wildlife species native to the state that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats.” (WDFW 2013b).

WDFW regulates the use, diversion, obstruction or changes to waters of the state, including the overwater portion of the Proposed Pier through the Hydraulic Project Approval (HPA) Program (Ch. 77.55 RCW, Ch. 220-110 WAC).

3.7 1.3 County

Jefferson County regulates critical areas including Fish and Wildlife Habitat Conservation Areas (FWHCAs) (JCC 18.22 et seq.). Jefferson County FWHCAs are identified areas of critical importance to the maintenance of endangered, threatened or sensitive species of fish, wildlife, plants and/or species of local importance (JCC 18.22.200). Designated FWHCA relevant to impacts on habitat and terrestrial species of local importance (not state or federally-listed) include:

- Areas with which species of local importance have a primary association.
- Rivers and streams not otherwise protected under the Washington State Forest Practices regulations that have FWHCAs protected according to stream type.
- A 150-foot buffer that extends landward from the ordinary high water mark (OHWM) of marine shorelines.
- Surf smelt (*Hypomesus pretiosus*), Pacific herring (*Clupea pallasii*) and Pacific sand lance (*Ammodytes hexapterus*) spawning areas.

Jefferson County **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Chapter 3.08 Land and Shoreline Use. The following goals and policies are applicable to the Proposed Project’s impacts on threatened and endangered species:

ENVIRONMENT ELEMENT GOAL

- ENG 1.0 Manage, protect, enhance, and conserve water resources through a comprehensive watershed management program that is integrated with recovery plans for fish species proposed for listing under the ESA.

ENVIRONMENT ELEMENT POLICY

- ENP 1.2 Participate in the Jefferson County Water Resources Council and other collaborative watershed and salmon habitat conservation planning processes with state, federal and tribal governments and local stakeholders, in order to integrate water resource management for human needs with fish and wildlife habitat protection and restoration.

ENVIRONMENT ELEMENT GOAL

- ENG 12.0 Protect and enhance fish and wildlife habitat throughout Jefferson County.

ENVIRONMENT ELEMENT POLICIES

- ENP 12.2 Land use decisions should recognize the priority of the protection and enhancement of fish and wildlife habitat in accordance with proposed listings of threatened and endangered species under the Federal Endangered Species Act.

- ENP 12.3 Buffers for fish and wildlife habitat areas should be consistent with the best available science for habitat protection.
- ENP 12.5 Promote best management practices to protect fish and wildlife habitat in land use regulations related to septic systems, drainage, forest practices, agricultural practices, industry, and other development.

ENVIRONMENT ELEMENT GOAL

- LNG 25.0 To manage stormwater to improve drainage, control stormwater quality and quantity, protect shellfish beds, fish habitat and other natural resources and to reduce nonpoint sources of pollution.

In addition, the Shoreline Master Program (SMP) requires that a project proposal be evaluated for consistency with certain Shoreline designation policies and performance standards pertaining to the over-water portion of the Proposed Project (Aquatic Environment, SMP 4.101); the upland portion of the Proposed Project within 200-feet of Ordinary High Water (Conservancy Environment, SMP 4.103); and the use designation (Industrial and Port Facilities, SMP 5.90) including:

AQUATIC ENVIRONMENT MANAGEMENT POLICIES

- Aquatic developments should not locate in areas where the ecological quality of the shoreline environment would be significantly degraded.
- Aquatic developments should make minimal and appropriate use of approved pesticides, herbicides, antibiotics, vaccines, growth stimulants, or other chemicals. Operators shall receive prior review and approval for their use from the appropriate federal and state agencies.
- Only Federal and State approved anti-fouling agents should be used in aquatic developments.

INDUSTRIAL AND PORT FACILITIES PERFORMANCE POLICIES

- Since industrial docks and piers are often longer and greater in bulk than recreational and residential piers, careful planning must be undertaken to reduce the adverse impact of such facilities on other water dependent uses and shoreline resources.

INDUSTRIAL AND PORT FACILITIES PERFORMANCE STANDARDS

- Industrial development shall be located, designed, constructed, and operated in such a manner that it would minimize adverse effects on aquatic life.
- Industrial developments shall comply with all federal, state, regional, and local requirements regarding air and water quality. No pollution of air by fly-ash, dust, vapors, smoke, or other substances shall be permitted that are harmful to health, animals, vegetation, or other property, or that can cause excessive soiling.
- Objectionable noise that is due to volume, frequency, or beat shall be muffled or otherwise controlled. Air raid sirens and related apparatus used solely for public purposes are exempt from this requirement.
- Industrial facilities shall assure that no direct or reflected glare is visible from adjacent properties, streets, or water areas.

3.7 2 Affected Environment

3.7 2.1 Federally Protected Species

The Proposed Project has the potential to impact 18 species federally listed as threatened or endangered under the ESA, as described in the Biological Evaluation (BE) for this project (Hart Crowser 2013).

Table 3.7-1 ESA-Listed Species Potentially Occurring In or Near the Proposed Project Area

Species	Federal Status	Date of Listing	Critical Habitat in Project Area	Preliminary Findings Summary
Puget Sound Chinook salmon (<i>Oncorhynchus tshawytscha</i>)	Threatened (NOAA)	June 28, 2005	Yes, designated Sept. 2, 2005	NLAA/NAM
Hood Canal Summer-run chum salmon (<i>Oncorhynchus keta</i>)	Threatened (NOAA)	June 28, 2005	Yes, designated Sept. 2, 2005	NLAA/NAM
Puget Sound Steelhead Trout (<i>Oncorhynchus mykiss</i>)	Threatened (NOAA)	May 11, 2007	Yes, proposed Jan. 14, 2013	NLAA/NAM
Coastal-Puget Sound Bull trout (<i>Salvelinus confluentus</i>)	Threatened (USFWS)	Nov. 1, 1999	No	NLAA
Bocaccio (<i>Sebastes paucispinis</i>)	Endangered (NOAA)	April 28, 2010	Yes, proposed Aug. 6, 2013	NLAA
Canary rockfish (<i>Sebastes pinniger</i>)	Threatened (NOAA)	April 28, 2010	Yes, proposed Aug. 6, 2013	NLAA
Yelloweye rockfish (<i>Sebastes ruberrimus</i>)	Threatened (NOAA)	April 28, 2010	Yes, proposed Aug. 6, 2013	NLAA
Pacific eulachon (<i>Thaleichthys pacificus</i>)	Threatened (NOAA)	March 18, 2010	No	NE
Green sturgeon-Southern DPS (<i>Acipenser medirostris</i>)	Threatened (NOAA)	April 7, 2006	No	NE1
Marbled murrelet (<i>Brachyramphus marmoratus</i>)	Threatened (USFWS)	Oct. 1, 1992	No	NLAA
Northern spotted owl (<i>Strix occidentalis caurina</i>)	Threatened (USFWS)	June 26, 1990	No	NE
Steller sea lion (<i>Eumetopias jubatus</i>)	Threatened (NOAA)	Nov. 26, 1990	No	NLAA
Southern resident Killer Whale (<i>Orcinus orca</i>)	Endangered (NOAA)	Nov. 18, 2005	No	NE
Humpback whale (<i>Megaptera novaeangliae</i>)	Endangered (NOAA)	Dec. 2, 1970	No	NE
Leatherback turtle (<i>Dermochelys coriacea</i>)	Endangered (NOAA)	June 2, 1970	No	NE
Loggerhead sea turtle (<i>Caretta caretta</i>)	Threatened (NOAA)	July 28, 1978	No	NE
Green sea turtle (<i>Chelonia mydas</i>)	Endangered (NOAA)	July 28, 1978	No	NE
Olive Ridley sea turtle (<i>Lepidochelys olivacea</i>)	Endangered (NOAA)	July 28, 1978	No	NE

Key: NLAA = May affect, not likely to adversely affect; NAM = No adverse modification (applies to Critical Habitat); NE = No effect

Of the 18 species considered in the BE, eight were considered not likely to be present in the project area. Because no barriers or obstructions exist to restrict their distribution in Hood Canal, these eight species rarely observed or no longer documented as present, are still considered in this analysis:

- Pacific eulachon (*Thaleichthys pacificus*)
- Green sturgeon (*Acipenser medirostris*)
- Southern resident killer whale (*Orcinus orca*)
- Humpback whale (*Megaptera novaeangliae*)
- Leatherback sea turtle (*Dermochelys coriacea*)
- Loggerhead sea turtle (*Caretta caretta*)
- Green sea turtle (*Chelonia mydas*)
- Olive Ridley sea turtle (*Lepidochelys olivacea*)

Though possible, it is extremely unlikely that these eight species occur in the project area. Pacific eulachon and green sturgeon were eliminated from further analysis because they are not likely to be present in Hood Canal (NMFS 2009; Longenbaugh 2010). The four species of sea turtles are not known to be present. The humpback whale may have been present historically, but there have been no recent sightings. The Southern Resident killer whale, also historically sighted, is considered rare (NMFS 2006; Navy 2012), though they have been present throughout much of Puget Sound. Non-listed transient killer whales have been sighted in Hood Canal and often cannot be distinguished from southern residents (NMFS 2006). These eight species have been given a “no effect” determination in the **BE**, and are not analyzed further herein.

The remaining **ESA**-listed species are known or more likely to be present in the project vicinity:

- Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*)
- Hood Canal summer-run chum salmon (*Oncorhynchus keta*)
- Puget Sound steelhead trout (*Oncorhynchus mykiss*)
- Coastal-Puget Sound bull trout (*Salvelinus confluentus*)
- Bocaccio (*Sebastes paucispinis*)
- Canary rockfish (*Sebastes pinniger*)
- Yelloweye rockfish (*Sebastes ruberrimus*)
- Marbled murrelet (*Brachyramphus marmoratus*)
- Northern spotted owl (*Strix occidentalis caurina*)
- Steller sea lion (*Eumetopias jubatus*)

3.7 2.2 State Protected Species

Priority species identified from the Washington State PHS list that might be affected by the Proposed Project area include five fish, three birds and four invertebrates.

Table 3.7-2 Washington State Priority Species Potentially Occurring In or Near the Proposed Project Area

Species	State Status	Date of Listing	Preliminary Findings Summary
Fall chum salmon (<i>Oncorhynchus keta</i>)	N/A (PHS Listed)	June 28, 2005	NLAA
Coho salmon (<i>Oncorhynchus kisutch</i>)	N/A (PHS Listed)	June 28, 2005	NLAA
Coastal cutthroat trout (<i>Oncorhynchus clarki</i>)	N/A (PHS Listed)	May 11, 2007	NLAA
Steelhead trout (<i>Oncorhynchus mykiss</i>)	N/A (PHS Listed)	Nov. 1, 1999	NLAA
Pacific sand lance (<i>Ammodytes hexapterus</i>)	N/A (PHS Listed)	April 28, 2010	NLAA
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Sensitive (also Federal Species of Concern)	April 28, 2010	NLAA
Osprey (<i>Pandion haliaetus</i>)	Monitored	April 28, 2010	NLAA
Wood duck (<i>Aix sponsa</i>)	N/A (PHS Listed)	March 18, 2010	NLAA
Dungeness crab (<i>Cancer magister</i>)	N/A (PHS Listed)	April 7, 2006	NLAA
Pacific geoduck (<i>Panopea abrupta</i>)	N/A (PHS Listed)	Oct. 1, 1992	NLAA
Hardshell clam (general)	N/A (PHS Listed)	June 26, 1990	NLAA
Oyster beds (general)	N/A (PHS Listed)	Nov. 26, 1990	NLAA
Key: NLAA = May affect, not likely to adversely affect			

The Proposed Project and areas in and around the project may directly or indirectly impact threatened and endangered species. The project area is generally divided into two separate areas: upland and shoreline (in-water).

A noise analysis with the largest potential zone of disturbance determined the in-water project area (Hart Crowser 2013). In-water noise provides a conservative area in which to evaluate project impacts on nearshore resources, such as the effects of pile driving on marine mammals, birds and fish. The resulting in-water project area includes the waters and shorelines of Hood Canal extending approximately eleven miles to the south and eight miles to the north of the Proposed Pier site, encompassing approximately 30.5 square miles.

Details regarding sound criteria, isopleth determinations and injury/disturbance thresholds used for the noise analysis can be found in the **BE** for the Proposed Project (Hart Crowser 2013). Other project effects such as benthic community displacement are confined to construction activities immediately surrounding the Pier.

Similarly, the upland project area was defined by the largest potential zone of disturbance from airborne noise around the Operations Hub and Central Conveyor during the construction phase of the Proposed Project. That area entailed 1,656 feet (based on an average noise level of 45 dBA for background noise and 83 dBA for construction noise) on either side of the Central Conveyor from the Hood Canal shoreline to the Operations Hub. Other project impacts, such as operational noise, are analyzed within their more confined context.

*See Figure 3.6-2 in Section
3.6 Terrestrial Plants and
Animals*

Further details regarding ambient noise background levels, attenuation rates, and construction/operational noise used for the upland noise analysis can be found in the **BE** for this project (Hart Crowser 2013) as well as in Section 3.9 Noise.

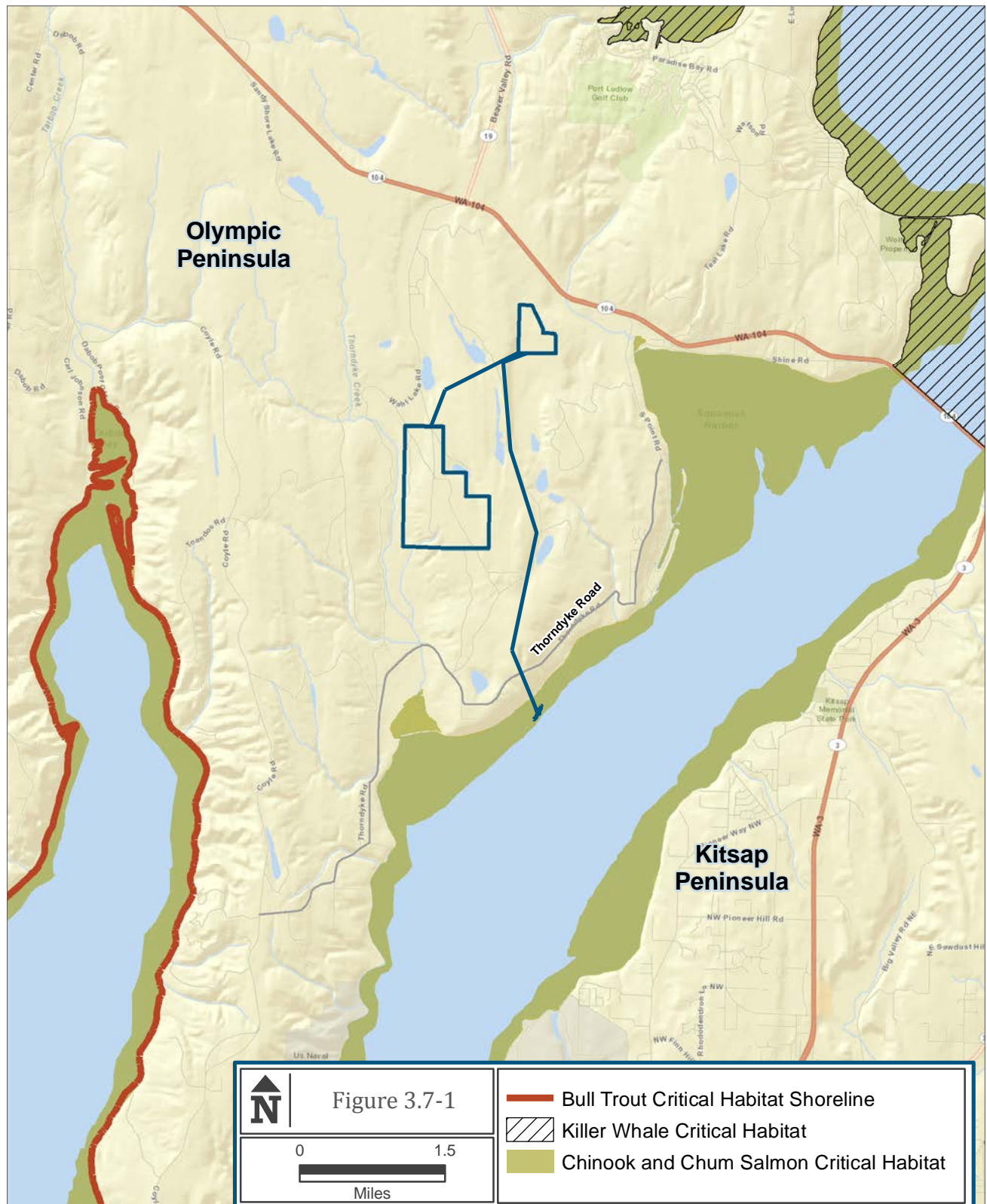
3.7 2.3 Federal Species

The following summarizes the presence of federally-listed species within the Proposed Project areas.

3.7 2.3.1 Puget Sound Chinook Salmon

Identified stocks of Puget Sound Chinook salmon are found in four watersheds within Hood Canal (Skokomish, Hamma Hamma, Duckabush and Dosewallips) river basins. All four watersheds are located south of the project location. Spawn timing of Hood Canal stocks of Chinook salmon indicate a seasonal presence of adults within the canal between late July and mid-October. Adults are rarely nearshore-oriented and are not expected to commonly occur in the intertidal waters near the Proposed Project area. However, juvenile Chinook have a prolonged presence in the nearshore and may occur within the in-water project area as early as mid-February, extending into July (Duffy 2003; Weinheimer 2011). Estuarine and marine areas of Hood Canal, including the project area, lie within the designated critical habitat for Puget Sound Chinook salmon (StreamNet 2013).

See Figure 3.7-1



Critical Habitats Chinook and chum salmon critical habitat is within the project area. There is no bull trout or killer whale critical habitat within the project vicinity. **Source:** NOAA and USFWS

3.7 2.3.2 Hood Canal Summer-Run Chum Salmon

Two distinct runs of spawning chum salmon are found in Hood Canal. The earlier, ESA-listed summer run enters rivers in late August and September, while the later-run fall chum move upstream from October through November (Williams 1975). Summer-run chum salmon have been found in seven Hood Canal drainages (Lilliwaup Creek and the Skokomish, Union, Hamma Hamma, Duckabush, Dosewallips, and Big and Little Quilcene rivers).

See Figure 3.7-1

Chum salmon spend more of their life history in marine waters than other Pacific salmonids. Estuarine residency is the most critical phase in the life history of juvenile chum. They remain close to the surface, rearing in shallow eelgrass beds, tidal creeks, sloughs or other productive estuarine areas for several weeks between January and July (SSDC 2007). Therefore, Hood Canal summer-run chum likely occur in the in-water project area. Critical habitat for Hood Canal summer-run chum salmon occurs in the project area and along portions of the shorelines in Hood Canal both north and south of the project site (StreamNet 2013).

3.7 2.3.3 Puget Sound Steelhead

According to the PHS database managed by WDFW (WDFW 2013), winter runs of steelhead have been documented in a pair of small, unnamed creeks located approximately 1.2 miles north and 2 miles south of the proposed Central Conveyor; and in Thorndyke Creek located 1.4 miles away from the Proposed Conveyor. Thorndyke Creek is located 500 feet or more to the west of mining activities associated with the Proposed Conveyor project.

Wild juveniles typically spend two full years or more in fresh water before outmigrating during the spring. Because of their large size at outmigration, steelhead typically prefers the open water rather than the nearshore (Hartt 1986). This is consistent with several juvenile salmonid studies conducted within the nearshore of Hood Canal, where very few juvenile steelhead have been observed (Moore 2010). The occasional adult steelhead may be found year-round in Hood Canal due to the presence of both winter and summer-run fish. It is therefore unlikely that juvenile steelhead would commonly occur in the project area; however, adult steelhead may be present in small numbers.

Estuarine and marine areas in Hood Canal and the project area lie within proposed critical habitat for Puget Sound steelhead. In addition, Thorndyke Creek and the two small unnamed creeks in the vicinity of the Proposed Pier alignment contain proposed critical habitat for documented Puget Sound steelhead (WDFW 2013c). Final designated critical habitat has not been designated yet for steelhead.

3.7 2.3.4 Puget Sound Bull Trout

Hood Canal bull trout are separated into three distinct stocks based on geographical separation, and are all located within the Skokomish River basin (approximately 40 miles south of the Proposed Project site). Of the three stocks, only the South Fork Skokomish stock is thought to contain anadromous forms that may use nearshore areas near the Proposed Pier alignment. Therefore, it is possible that bull trout from this system could be present in the project area. There is no overlap between the project area and designated critical habitat for bull trout in Hood Canal (StreamNet 2013).

See Figure 3.7-1

3.7 2.3.5 *Bocaccio*

Relatively shallow water depths and a lack of confirmed observations in Puget Sound for approximately seven years (74 FR 18516) make it unlikely that adult bocaccio will occur in any abundance in the project area (Drake 2010). Adult bocaccio commonly inhabit waters at depths of 160 to 820 feet, but can be found at approximately 40 to 1,570 feet (the end of the Proposed Pier reaches 45-foot water depths before dropping off quickly to depths of approximately 260 feet. However, critical habitat (both deepwater and nearshore) has been proposed for bocaccio within the project area and had not been finalized as of May 5, 2014 (78 FR 47635).

3.7 2.3.6 *Canary Rockfish*

With the absence of associated catch records, and no recent scientific surveys of Hood Canal waters, the prevalence of rockfish in the waters in the project area remains unknown. However, Drake concluded that canary rockfish as a whole occur in low and decreasing abundances in Puget Sound and therefore have a low potential to occur within the Hood Canal project area (Drake 2010). Adult canary rockfish typically inhabit waters at depths of 160 to 820 feet, but some may occur as deep as 1,400 feet (again, much greater than the project depth) (74 FR 18516). Both deepwater and nearshore critical habitat have been proposed for canary rockfish within the project area but had not yet been finalized as of May 5, 2014 (78 FR 47635).

3.7 2.3.7 *Yelloweye Rockfish*

Yelloweye rockfish are abundant from southeast Alaska to central California but are currently extremely rare in Puget Sound. Yelloweye rockfish is a deep-water species most common at depths of 300 to 590 feet (though they can inhabit waters of 80 to 1,560 feet). Hood Canal had the greatest frequency of yelloweye rockfish observed in both trawl and scuba surveys conducted by **WDFW** (Palsson 2009). DeLacy (DeLacy 1972) and Miller and Borton discovered 113 documented yelloweye rockfish records from Puget Sound associated with sport catch. Of these, 14 occurred in Hood Canal waters; one in the 1930s and 13 in the 1960s (Miller 1980). Separate investigations of historic fish catch records reported only 14 known instances of yelloweye captures in Hood Canal (Palsson 2009). Therefore, yelloweye rockfish have the potential to occur in the project area in very low numbers. Deepwater critical habitat has been proposed for yelloweye rockfish within the project area but has not been finalized as of May 5, 2014 (78 FR 47635).

3.7 2.3.8 *Marbled Murrelet*

Low numbers of marbled murrelets have been observed in Hood Canal and in areas near the Proposed Pier site. A total of 34 marbled murrelets were observed (Sharpe 2005a) between May 10 and September 22 during the breeding season between Thorndyke and Suquamish bays in the general vicinity of the proposed facility; two at a station adjacent to the proposed facility. In addition, Hart Crowser observed up to 22 marbled murrelets in late October 2011 during bird and marine mammal monitoring within Hood Canal at the southern tip of the Toandos Peninsula (Navy 2012). Despite the low numbers, it is likely that marbled murrelets occur occasionally within the in-water project area. The nearest critical habitat to the Proposed Pier

alignment is located in the foothills of the Quilcene Range west of Quilcene Bay, approximately nine miles from the proposed facility. There is no critical habitat for marbled murrelets within the upland project area nor has one been designated for marbled murrelets in marine waters (USFWS 2013).

3.7 2.3.9 Northern Spotted Owl

Old growth forest habitat typically associated with spotted owl presence is not present within the footprint of the proposed conveyer, which is located on an active commercial tree farm. According to the PHS database, spotted owl occurrences have been documented approximately 6.5 miles to the west of the Proposed Conveyer footprint on the west shore of Quilcene Bay (WDFW 2013a) while the nearest nesting and roosting habitats are approximately 11 miles to the west within the foothills of the Quilcene Range of the Olympic Mountains (Forsman 1997). The Proposed Conveyer route will not intrude on a WDFW-established spotted owl buffer zone that begins approximately 0.7 miles west. Critical habitat has not been designated for Northern spotted owl in marine waters (77 FR 71875).

3.7 2.3.10 Steller Sea Lion

According to the PHS database managed by WDFW (WDFW 2013), no Steller sea lion haul-out areas have been documented in Hood Canal. However, during marine mammal monitoring in 2011, 7 Steller sea lions were observed in the water or hauled out on structures on the eastern shore of Hood Canal (Navy 2012). Animals were observed in October 2011, which is consistent with other sightings that found the species in the canal during the fall months. Although Steller sea lions are not common in Hood Canal, their presence has been documented in recent years. Therefore, it is possible that Steller sea lions may be present in the project area. There is no Steller sea lion critical habitat in Washington State (NOAA 2013a). Furthermore, as of December 2013 Steller sea lions have been de-listed but are included here to avoid re-working this draft EIS and BE (NOAA 2013b).

A full description of federally listed species and their critical habitat can be found in the BE for the Proposed Project (Hart Crowser 2013).

3.7 2.4 Washington State Species

The following summarizes the presence of state-listed species within the Proposed Project areas.

3.7 2.4.1 Salmonids

According to the PHS database managed by WDFW (WDFW 2013), the two small unnamed creeks and Thorndyke Creek contain small runs of coastal cutthroat trout, fall chum salmon and coho salmon using creeks for spawning and rearing.

3.7 2.4.2 Forage Fish

Larval, juvenile and adult Pacific herring (*Clupea pallasii*) and Pacific sand lance (*Ammodytes hexapterus*) are important forage fish for juvenile, subadult and adult salmonids (Healey 1991; Stick 2009).

Section 3.5 Marine Plants and Animals describes the presence, timing and location of non-threatened or endangered marine species.

Section 3.6 Terrestrial Plants and Animals has more information on bald eagles, osprey, wood ducks.

3.7 2.4.3 Bald Eagle

The Single Conveyor will pass approximately a half mile south and west of a known bald eagle nesting site located near the shoreline, as identified in the **WDFW PHS** database in July of 2013 and in a bald eagle assessment completed in 2004 and early 2005 (Sharpe 2005b). Eagles have been observed in and near the project area foraging during low tides (Hart Crowser 2013). Three perch trees, identified just east of the Conveyor alignment, will be retained.

3.7 2.4.4 Osprey

According to the **PHS** database managed by **WDFW** (WDFW 2013), the closest osprey nest to the proposed Central Conveyor is located approximately one mile west of the lower portion of the Thorndyke Creek watershed. It is unclear whether the nest is still active after being documented in 1991.

3.7 2.4.5 Wood Duck

According to the **PHS** database managed by **WDFW** (WDFW 2013), wood duck breeding occurrence has been documented approximately one mile to the west of the Proposed Conveyor at the head of Thorndyke Bay.

Section 3.5 Marine Plants and Animals discusses further details regarding marine invertebrates in the project area.

3.7 2.4.6 Invertebrates

According to the **PHS** database managed by **WDFW** (WDFW 2013), marine invertebrate species such as hardshell clams, Dungeness crab and geoducks have been documented in the lower intertidal and shallow subtidal areas of the Proposed Pier, and would cross approximately 150 feet of a low density, inactive commercial geoduck. Additional information on geoduck presence can be found the **BE** for the Proposed Project (Hart Crowser 2013).

3.7 2.4.7 EFH Species

Groundfish, coastal pelagic and salmonid fish species that have designated **EFH** in Puget Sound are listed in Table 3.7-3. While some may occur in the in-water project area, salmonids, cottids (sculpins), flat fish and forage fish are the most likely to be found in this area. Refer to the relevant **EFH** designations (Casillas 1998; PFMC 1998a; PFMC 1998b; PFMC 1999) for life history stages of these species that may occur in the project area.

Table 3.7-3 EFH Species Potentially Occurring in the Project Area

Groundfish Species			Coastal Pelagic Species	Salmonid Species
spiny dogfish <i>Squalus acanthias</i>	Pacific ocean perch <i>Sebastes alutus</i>	cabezon <i>Scorpaenichthys marmoratus</i>	northern anchovy <i>Engraulis mordax</i>	Chinook salmon <i>Oncorhynchus tshawytscha</i>
big skate <i>Raja binoculata</i>	quillback rockfish <i>Sebastes maliger</i>	lingcod <i>Ophiodon elongates</i>	Pacific sardine <i>Sardinops sagax</i>	coho salmon <i>Oncorhynchus kisutch</i>
California skate <i>Raja inornata</i>	redbanded rockfish <i>Sebastes babcocki</i>	kelp greenling <i>Hexagrammos decagrammus</i>	chub mackerel <i>Scomber japonicus</i>	Puget Sound pink salmon <i>Oncorhynchus gorbuscha</i>
longnose skate <i>Raja rhina</i>	redstripe rockfish <i>Sebastes proriger</i>	sablefish <i>Anoplopoma fimbria</i>	market squid <i>Loligo opalescens</i>	
spotted ratfish <i>Hydrolagus collii</i>	rosethorn rockfish <i>Sebastes helvomaculatus</i>	jack mackerel <i>Trachurus symmetricus</i>		
Pacific cod <i>Gadus macrocephalus</i>	rosy rockfish <i>Sebastes rosaceus</i>	Pacific sanddab <i>Citharichthys sordidus</i>		
Pacific hake <i>Merluccius productus</i>	rougheye rockfish <i>Sebastes aleutianus</i>	butter sole <i>Pleuronectes isolepis</i>		
black rockfish <i>Sebastes melanops</i>	sharpchin rockfish <i>Sebastes zacentrus</i>	curlfin sole <i>Pleuronichthys decurrens</i>		
bocaccio <i>Sebastes paucispinis</i>	splitnose rockfish <i>Sebastes diploproa</i>	Dover sole <i>Microstomus pacificus</i>		
brown rockfish <i>Sebastes auriculatus</i>	stripetail rockfish <i>Sebastes saxicola</i>	English sole <i>Pleuronectes vetulus</i>		
canary rockfish <i>Sebastes pinniger</i>	tiger rockfish <i>Sebastes nigrocinctus</i>	flathead sole <i>Hippoglossoides elassodon</i>		
China rockfish <i>Sebastes nebulosus</i>	vermilion rockfish <i>Sebastes miniatus</i>	petrale sole <i>Eopsetta jordani</i>		
copper rockfish <i>Sebastes caurinus</i>	yelloweye rockfish <i>Sebastes ruberrimus</i>	rex sole <i>Errex zachirus</i>		
darkblotched rockfish <i>Sebastes crameri</i>	yellowtail rockfish <i>Sebastes flavidus</i>	rock sole <i>Pleuronectes bilineata</i>		
greenstriped rockfish <i>Sebastes elongates</i>	shortspine thornyhead <i>Sebastolobus alascanus</i>	sand sole <i>Psettichthys melanostictus</i>		
starry flounder <i>Platichthys stellatus</i>	arrowtooth flounder <i>Atheresthes stomias</i>			

3.7 3 Proposed Action: Direct and Indirect Impact

3.7 3.1 Construction Direct Impacts

All pile driving will be restricted to the agency-approved work window to protect federally listed salmonids that may be present within the project and action areas. The work window is anticipated to extend from July 16 to February 15. While construction of the Pier and associated structures is expected to take about two months, listed species in the upland, shoreline and in-water project areas could be directly impacted by:

- In-water and upland noise from pile driving;
- Marine water quality degradation;
- Marine sediment quality degradation;
- Loss of prey resources;
- Loss of benthic habitat;
- Loss of EFH habitat; or,
- Loss of critical habitat.

3.7 3.1.1 In-Water Noise

In- and over-water construction of the Pier and gantry are expected to take two months and occur during the agency-approved work window (July 16 to February 15) when the fewest juvenile salmonids are expected to be present in the project area. A small number of federally or state-listed adult and juvenile salmonids may occur in the project area during construction. Pile driving and work vessel activity during construction may cause short term disturbance of salmonids, rockfish, marbled murrelets and Steller sea lions. To minimize in-water levels that will temporarily elevate above existing background noise levels, a soft-start approach using the vibratory and impact pile driving hammers will be utilized to encourage fish to move away from the area prior to initiation of pile driving. Details of noise modeling parameters and results for all federally listed species can be found in the BE for this project with the below detailed modifications (Hart Crowser 2013).

In-water noise levels are measured differently than noise levels measured in air, which are typically used to assess impacts on humans and are weighted (dBA) to correspond to the way humans hear certain frequencies. Noise levels underwater are not weighted (dB) and thus measure all frequencies unmodified within the range of interest, which may extend below and above the audible range of many organisms (WSDOT 2013).

Projected in-water noise can be measured against stated thresholds for both “disturbance” and “injury” to listed species within the project area. In-water noise levels associated with pile installation and other aspects of the proposed action will temporarily elevate noise levels above existing background noise levels (115 dBRMS) (Hart Crowser 2013). To minimize the underwater noise during pile driving, a vibratory hammer will be used for the majority of pile installations. However, an impact hammer will be used to proof load the piles. Therefore, using the most conservative approach, noise exposure modeling used source level data for a single impact pile driving rig to predict the distances to disturbance and injury thresholds.

Details of noise modeling parameters and results for all federally listed species can be found in the BE prepared for this project (Hart Crowser 2013). The Hart Crowser BE used a 2009 study prepared for the California Department of Transportation to estimate noise levels for 30-inch steel piles (ICF Jones 2009). These noise level estimates are different than the noise level estimate presented for 30-inch steel piles in WSDOT Biological Assessment (BA) Manual (WSDOT 2013).

For purposes of this draft EIS, Table 7-9 within the WSDOT BA Manual was used to identify noise levels for steel pile impact driving. It is assumed that 30-inch steel piles have a noise level of 195 dB_{RMS} at a distance of 0.03 mile (50 meters). A bubble curtain, or equivalent, will be utilized to decrease the noise level and it is assumed the bubble curtain (or equivalent) will reduce the noise levels by 10 dB_{RMS} (WSDOT 2013).

Animal disturbance and injury thresholds are presented in the WSDOT BA Manual, and have been incorporated into the underwater noise assessment (2013) for this Draft EIS. Table 3.7-4 below lists the threshold levels for animals potentially within the project area and the distances to disturbance and injury attenuation for both the vibratory and impact hammers. The noise calculators prepared by USFWS and NMFS were used to determine the distances. Currently there are no thresholds for disturbance or injury to marbled murrelets, and fish and no injury thresholds to cetaceans and pinnipeds from the use of vibratory hammers.

Table 3.7-4 Construction Noise – Species Thresholds

Species	Threshold Levels	Distance to Attenuation Vibratory Hammer ¹	Distance to Attenuation Impact Hammer ¹ (30-inch diameter)
Marbled murrelet	Disturbance Impact: 150 dB _{RMS}	Currently no thresholds for vibratory noise	1.3 miles
	Injury Impact: 202 dB SEL		26 feet
Fish ≥ 2 Grams	Disturbance 150 dB _{RMS}	Vibratory noise should not cause disturbance ²	6 miles
	Injury 187 dB Cumulative SEL	Vibratory noise should not cause injury ²	0.2 miles
Fish < 2 Grams	Disturbance 150 dB _{RMS}	Vibratory noise should not cause disturbance ²	6 miles
	Injury 183 dB Cumulative SEL	Vibratory noise should not cause injury ²	0.4 miles
Cetaceans	Disturbance (Vibratory) 120 dB _{RMS}	621 miles	N/A
	Disturbance (Impact) 160 dB _{RMS}	N/A	0.3 miles
	Injury 180 dB _{RMS}	N/A	71 feet
Pinnipeds	Disturbance (Vibratory) 120 dB _{RMS}	621 miles	N/A
	Disturbance (Impact) 160 dB _{RMS}	N/A	0.3 miles
	Injury 190 dB _{RMS}	N/A	15 feet

Notes: Distance attenuation levels were determined based on a bubble curtain, or equivalent, being used to reduce the noise levels by 10 dB_{RMS}.

¹ Determined using the noise calculators prepared by USFWS (marbled murrelet) and NMFS (Fish). Available from the WSDOT Biological Assessment Guidance (<http://www.wsdot.wa.gov/Environment/Biology/BA/BAGuidance.htm>) website.

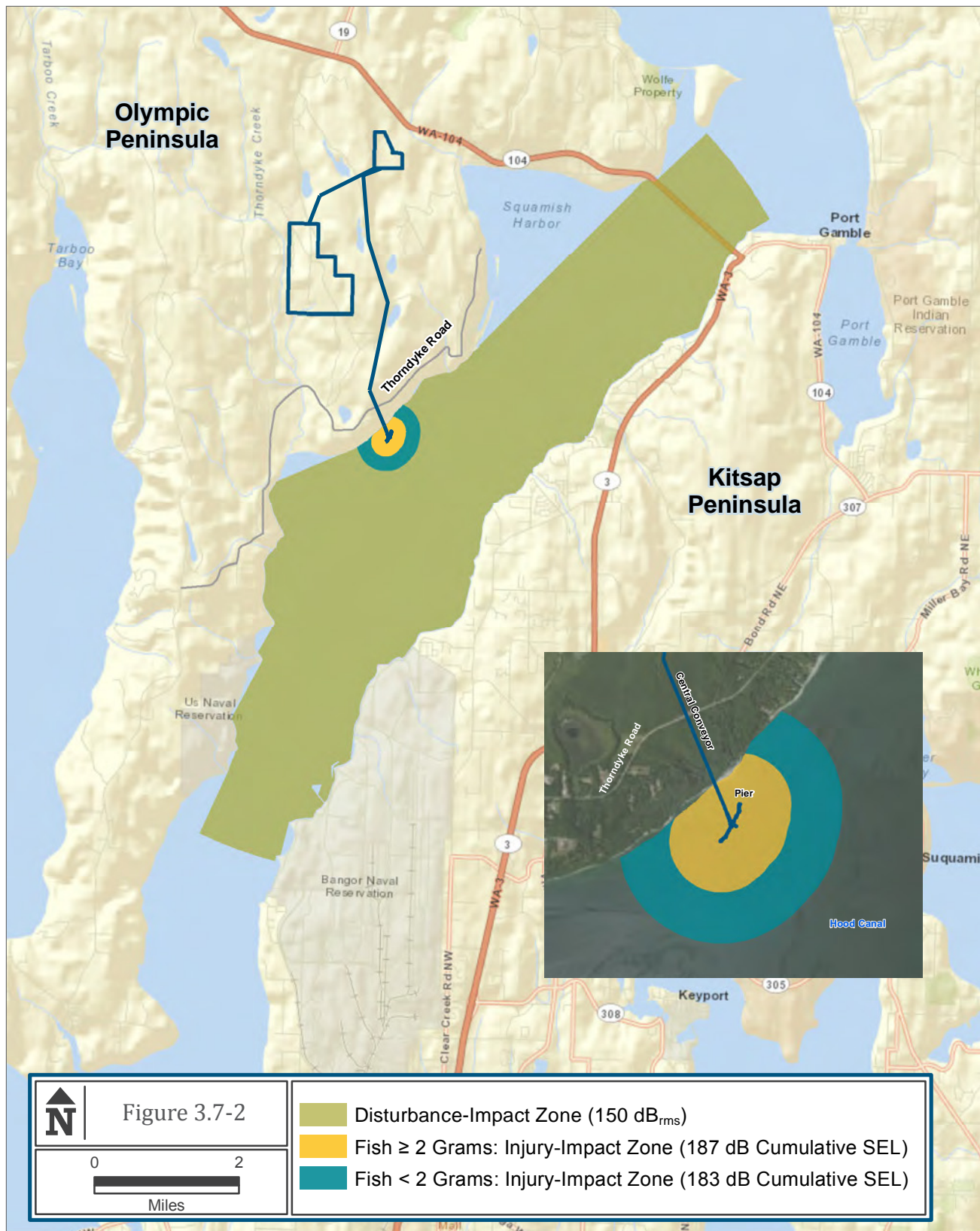
² According to the WSDOT Biological Assessment Guidance, impacts on fishes or other aquatic organisms have not been observed in association with vibratory hammers. As such, vibratory driving of piles is generally considered less harmful to aquatic organisms and is the preferred method.

See Figure 3.7-2 **NMFS** has identified underwater noise threshold criteria for injury to fish greater than 2 grams as 187 dB Cumulative Sound Exposure Level (SEL) and the threshold criteria for fish less than 2 grams as 183 dB Cumulative SEL. The disturbance threshold for all fish is identified as 150 dB_{RMS} (WSDOT 2013). Modeling showed the 187 dB Cumulative SEL injury zone for fish greater than 2 grams to be within 0.2 miles of the pile driving with sound attenuating devices. For fish less than 2 grams the injury zone (183 dB Cumulative SEL) is within 0.4 miles of the pile driving with sound attenuating devices (FIGURE X). The 150 dB_{RMS} fish behavioral disturbance zone for impact driving was calculated to be 6 miles.

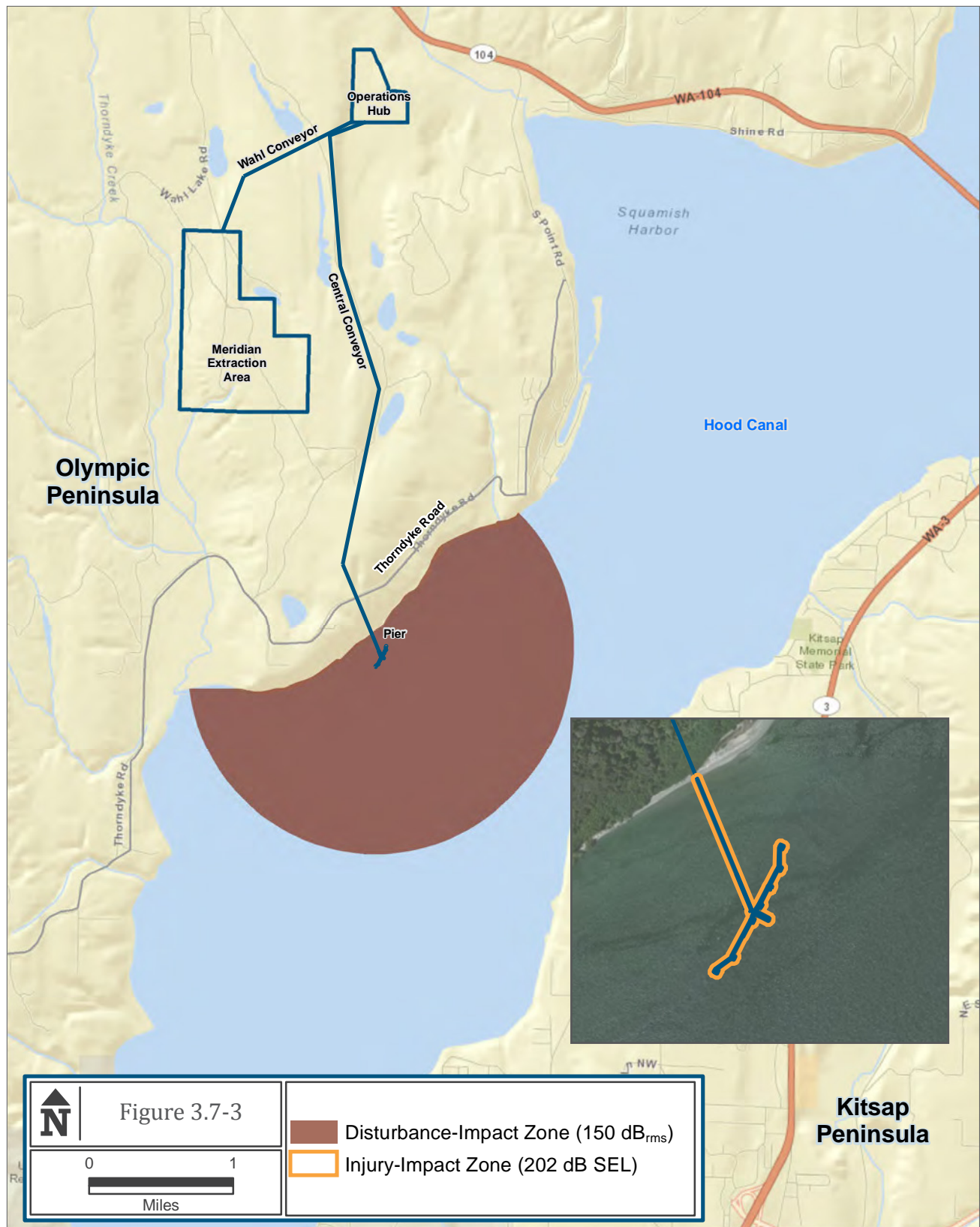
Salmonids in the vicinity of the Proposed Pier may display a startle response upon the initial start-up of pile driving, and would then likely avoid the immediate area during pile driving activities. Based on studies outlined in the BE for this project, Puget Sound Chinook, Hood Canal summer-run chum, Puget Sound steelhead and Coastal-Puget Sound bull trout may alter their normal behavior, including minor startle response and avoidance of the immediate project area as a result of project construction activities (Feist 1996; Ruggerone 2008; Illingworth 2012). However, it is unlikely that pile driving would injure these four species of salmonids.

Adult **ESA**-listed rockfish typically reside in waters deeper than 160 feet, at least 800 feet away from the closest pile driving activities associated with the project. Rockfish are therefore not expected to be affected by project activities. Although adult and juvenile rockfish are unlikely to be affected from vibratory pile driving, it is possible that small numbers of larval yelloweye rockfish, canary rockfish and bocaccio could be affected. However, the concentration of larval rockfish in the immediate vicinity of the Proposed Pier is expected to be extremely small due to Hood Canal currents that readily disperse this stage of rockfish life history (NMFS 2003; Navy 2011). The percentage of affected larval fish will be so small that it will not affect the abundance, productivity or spatial structure of the Puget Sound/Georgia Basin DPSs of yelloweye rockfish, canary rockfish or bocaccio (Navy 2011).

See Figure 3.7-3 Currently, no thresholds have been established by **USFWS** to assure protection of marbled murrelets from underwater noise generated by the vibratory installation of piles (FHA 2012). Nevertheless, a guidance threshold of 150 dB RMS has been established to minimize behavioral disturbance. It applies to both impact and vibratory pile driving and is considered a guidance measure, not a criterion, relative to foraging marbled murrelets (Navy 2012). Modeling indicates the peak injury threshold of 202 dB would not be exceeded during impact pile driving beyond a distance of two meters from the pile. Since it is unlikely that marbled murrelets would come that close no injury to this species is expected. Pile driving could cause short-term behavioral disturbance (150 dB RMS guidance threshold) to marbled murrelets over a distance of 1.3 miles. Adherence to an agency-approved Marbled Murrelet Construction Monitoring Plan will minimize the potential behavioral and injurious effects (if any) to marbled murrelets as a result of pile driving and construction activities.



Fish Construction Noise Impact Area The underwater injury and underwater disturbance zone for fish greater than or equal to two grams and for fish less than two grams, extends outward from the pier. These are temporary impacts that will only occur during construction.



Marbled Murrelets Construction Noise Impact Area The underwater injury zones for marbled murrelets are adjacent to the pier and the underwater disturbance zones extend further. These are temporary impacts that will only occur during construction.

NMFS identified underwater noise threshold criteria for determining pinnipeds' injury exposure as 190 dB RMS (WSDOT 2013) at 10 meters, without sound attenuating devices. Steller sea lions typically would avoid human activity and the immediate construction area and are therefore unlikely to occur near the Proposed Pier, enhancing the low likelihood of being injured by impact pile driving noise within 15 feet.

For pinnipeds, the behavioral disturbance threshold is 160 decibels on the Richter magnitude scale for impact pile driving; 120 dB RMS for continuous noise such as vibratory pile driving (Navy 2012). Illingworth and Rodkin (Illingworth 2012) took acoustic measurements in Hood Canal during impact driving (36 inch piles, larger than for this project) with an air bubble curtain, which reduced the behavioral disturbance zone for marine mammals from 13 to 3 miles, blocked only by topographic barriers.

Although Steller sea lions have been documented in Hood Canal, the numbers are considered so low as to not be adversely affected by in-water noise generated from project activities. If Steller sea lions enter the disturbance zone during the project, pile driving and removal activities may cause a startle response or interruption of foraging (behavioral disturbance) from project-related noise not yet attenuated to the disturbance threshold. Once project construction activities are complete, any effects to Steller sea lions would discontinue. Adherence to a federal agency approved Marine Mammal Construction Monitoring Plan will minimize the potential behavioral and injurious effects to Steller sea lions.

See Figure 3.7-4

Impacts to Southern resident Killer whales from increased marine traffic will be analyzed during the Federal permitting and NEPA process.

3.7 3.1.2 Upland and Over-Water Noise

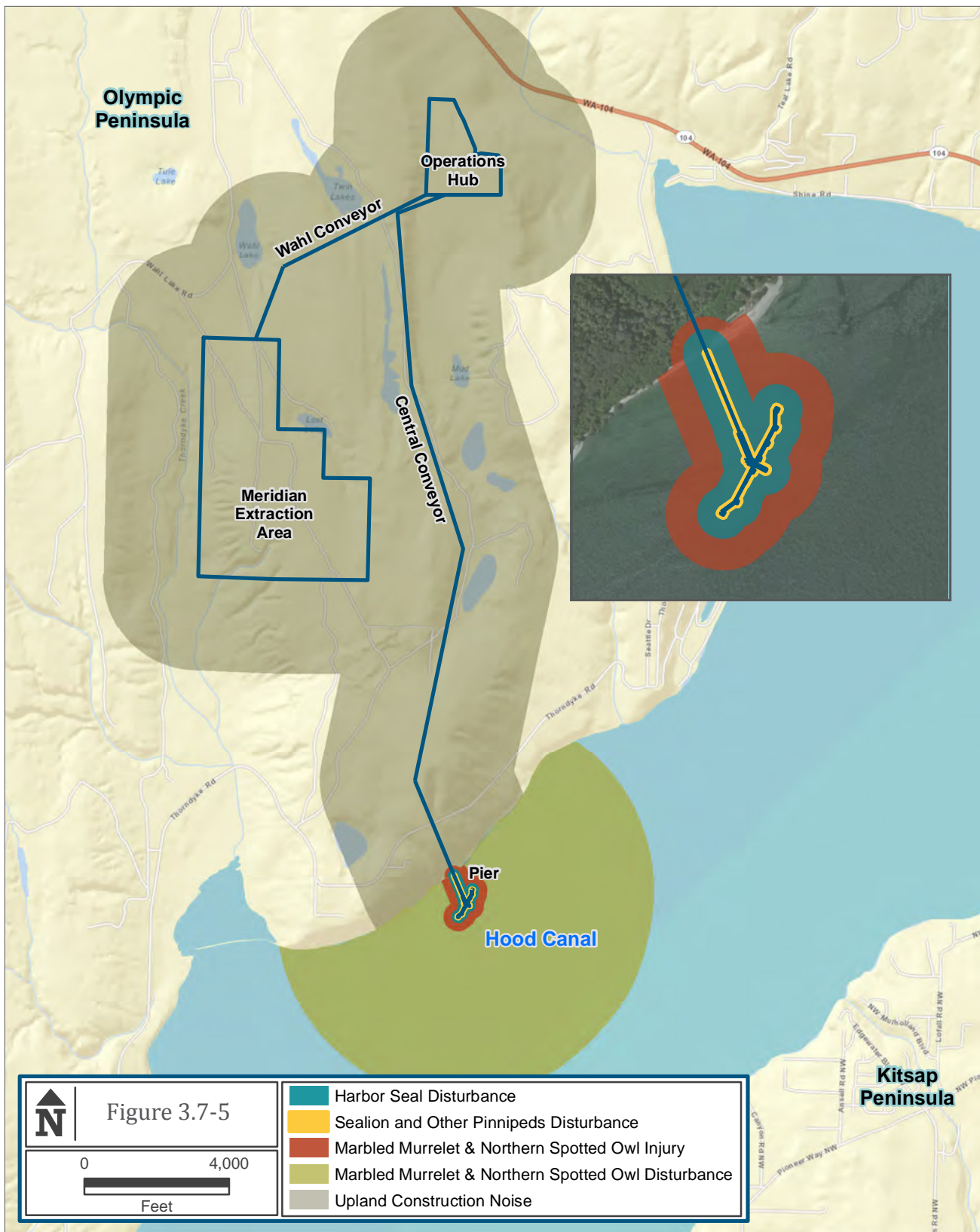
Upland construction will not adversely affect nesting or roosting habitats for marbled murrelets or northern spotted owls. Analyses have determined that proposed construction noise from the Conveyor footprint will extend approximately 3.77 miles before attenuating to background levels. This is well removed from documented nesting and roosting sites for both species in the upland project area, as discussed in the BE for this project (Hart Crowser 2013).

See Figure 3.7-5

Construction activities may result in short-term avoidance by bald eagles during the two month construction window but their breeding and nesting activity is not expected to be affected. Increased noise levels may temporarily disrupt their foraging behavior in the immediate vicinity of the project area; however, these potential effects would be temporary, highly localized and cease once construction is complete.



Pinnipeds Construction Noise Impact Area The underwater injury zones for pinnipeds are adjacent to the pier and the underwater disturbance zones extend further. These are temporary impacts that will only occur during construction.



In-Air Construction Disturbance and Construction Noise Impacts In-air construction noise could disturb or cause injury to animal species in the area. These are temporary impacts that will only occur during construction.

3.7 3.1.3 Marine Water Quality

Further analysis on project effects on water quality can be found in Section 3.3 Marine Shoreline.

Because of the relatively silt free nature of sediments in the intertidal and shallow subtidal areas, little material is expected to be suspended in the water column during pile driving and other construction activities (Hart Crowser 2013). However, turbidity may exceed background levels within the immediate vicinity of construction and could exceed turbidity criteria for state water quality standards (WAC 173 201A-210). Because of tidal fluctuations and strong nearshore currents (Hart Crowser 2013), any potential water quality exceedances would likely be temporary and highly localized. Depending on tidal stage, local currents will disperse suspended sediments from pile driving operations at a moderate to rapid rate, making it unlikely to directly affect juvenile or adult salmonids, or listed rockfish that may be present. Furthermore, foraging by marbled murrelets or Steller sea lion would not be impacted by these highly localized, temporary elevated turbidities.

3.7 3.1.4 Marine Sediment Quality

Further analysis on project effects on marine water quality can be found in Section 3.3 Marine Shoreline.

Hollow steel piles will be used for Pier construction will not introduce or leach contaminants into the sediment surrounding the project site. With sediment quality good and relatively free of contaminants in the project Pier area, there would be no resuspension of contaminants due to pile driving activities.

3.7 3.1.5 Prey Resources

Project construction within the footprint of each of 18 or 30 inch diameter pile will remove approximately 734 square feet of potential benthic and epibenthic prey resource substrate for listed salmonids. However, as discussed in the **BE** for this project, the loss of benthic habitat will be partially offset by pilings with a vertical hard substratum habitat upon which invertebrate and algal colonization will occur. In subtidal areas, this will likely introduce new and additional juvenile salmonid prey resources that will contribute to the primary and secondary productivity of the water column passing the site (Hart Crowser 2013).

Additional details on habitats and species can be found in Section 3.5 Marine Plants and Animals.

The Pier could bisect patches of *Zostera japonica* (*Z. japonica*) eelgrass within a zone from about +4 feet **MLLW** to +1 foot **MLLW** (Hart Crowser 2013). Piles driven through the patches would destroy or displace eelgrass immediately under pile footprints. The loss of eelgrass productivity reduces support for epiphytic zooplankton, a prey resource for juvenile salmonids. However, depending on the presence of *Z.japonica* at the time of construction, and assuming that a dozen 18 inch diameter piles will be installed across a zone 25 percent covered with eelgrass, the potential direct impact to eelgrass from pile driving is less than 6 square feet (Hart Crowser 2013). Grounding of work barges during construction of the overwater portions of the Conveyor will disrupt the marine bottom layer (substrate), resulting in a short term compression of beach sediments that could alter the localized nature of benthic biota. Although the preferred method of construction will be to drive piles during high tide (to avoid grounding of barges), barges will likely drop pile anchors to hold position while working in a given area. At such time, it is possible that some of these pile anchors will drop on patches of Japanese eelgrass. Detailed analysis of potential construction impacts to invasive and native eelgrass can be found in the **BE** for this project (Hart Crowser 2013).

Alignment and depth of the Pier were chosen to directly avoid impacts to native eelgrass (*Z. marina*) through displacement or construction/operational effects (e.g. shading from vessel operations or scouring due to vessel movements). Therefore, no long-term impacts to native eelgrass are anticipated.

Adult salmonids, marbled murrelets and Steller sea lions prey upon forage fish. Pile driving and work barge activities during Pier construction may result in short-term and localized disturbances to forage fish species in the project area (e.g., flight response and avoidance of the construction area).

No spawning areas have been documented in proximity of the Proposed Pier alignment for another forage fish, Pacific sand lance. Based on limited historic use of their spawning habitat in the project area, any temporary grounding of construction equipment on the upper intertidal beach is expected to result in negligible effects. **WDFW** may require a pre-construction forage fish survey at the location of the Proposed Pier alignment in order to ensure nominal impacts to forage fish spawning.

The Proposed Project may also affect upland prey resources for listed species. However, the Conveyor route is far removed from most local streams and does not directly impact freshwater wetlands. **BMPs** will be used to control site erosion reducing any potential turbidity effects. Therefore, construction activities are unlikely to adversely affect aquatic biota prey potentially utilized by listed upland species. Location of pilings and construction techniques will minimize any impacts to the disturbed riparian wetland that occurs along the toe of the bluff, reducing impacts to wetland prey resources (e.g., amphibians and insects) for listed upland species.

See Section 3.4 Water for further details of wetland impacts and Section 3.3 Marine Shorelines for impacts on the marine shoreline.

3.7 3.1.6 Benthic Habitat

Grounding of work barges during construction of the overwater portions of the Pier will disrupt substrate. This may result in a short-term compression of beach sediments that could alter the nature of the benthic biota in these localized areas. However, the preferred method of construction across the beach will be to drive piles during high tide to avoid grounding of the barges. Nonetheless, barges will likely be required to drop pile anchors to hold position while working in a given area. There is a possibility that some of these pile anchors will drop on *Z. Japonica* patches.

3.7 3.1.7 Essential Fish Habitat

Proposed actions may have short-term, highly localized impacts to the **EFH** of several federally managed species commonly found in nearshore littoral areas (e.g. English sole, rock sole, starry flounder) (See Table 3.7-3). There is also the possibility that juvenile and subadult rockfish may be attracted to the proposed overwater structure. These species will likely be temporarily displaced from the Pier footprint during the construction period, but would recolonize afterward. Food resources may be reduced until benthic and epibenthic invertebrates have the chance to recolonize, which could begin within 72 hours and fully recover within four to six weeks (VanBlaricom 1982; Price 2011). Permanent loss of benthic and epibenthic fauna will be small and limited to areas where piles are placed. No permanent alteration of existing **EFH** will occur outside

of the clusters of piles that will be placed approximately every 100 feet along the length of the access Pier, and along the length of the docking and gravel loading portions of the Pier. This placement interval is not expected to interfere with the natural drift and movement of sediments in the region along the Toandos Peninsula (Anchor 2003).

3.7 3.1.8 Critical Habitat

Puget Sound Chinook salmon and Hood Canal summer-run chum salmon are the only listed species with designated critical habitat within both the upland and in-water project areas. Puget Sound steelhead, bocaccio, canary rockfish and yelloweye rockfish have proposed critical habitat within the project area. A full description of the Primary Constituent Elements (PCEs) for the salmonid species can be found in the **BE** for this project (Hart Crowser 2013).

Direct effects to nearshore critical habitats for salmonids are expected to be temporary, highly localized, and limited to the Proposed Pier footprint during the two-month construction period. These include the following:

Temporary avoidance by salmon of the construction area, ceasing once construction is completed. Construction activities will take place during approved work windows outside of the juvenile salmon outmigration period. Thus, project construction is not expected to have significant effects within nearshore critical habitat for Chinook salmon, summer-run chum salmon or steelhead.

The Pier was designed to avoid interference with the natural littoral drift of sediment and natural processes affecting recruitment and productivity of benthic, epibenthic and zooplankton communities along the Toandos Peninsula. As a result, project construction is not expected to affect the migratory corridors or create substantial impediments to intertidal and littoral movements of Chinook, summer-run chum or steelhead.

Based on the analyses provided in the **BE** for this project (Hart Crowser 2013), the Proposed Project has the potential to affect only nearshore marine habitat, one of the six PCEs for Chinook and summer-run chum salmon. The Proposed Project could affect four of the six PCEs for steelhead—freshwater spawning habitat, freshwater rearing habitat, freshwater migration and nearshore marine habitat. The **BE** concluded that the Proposed Project will result in no net degradation of any PCEs for Chinook, summer-run chum or steelhead (Hart Crowser 2013).

Of the three PCEs for adult and juvenile rockfish, the Proposed Project has the potential to temporarily affect only water quality. Essential rockfish habitat is not present within the project area and not expected to be present during construction. The **BE** concluded that the Proposed Project will result in no net degradation of any PCEs for adult or juvenile bocaccio, canary rockfish or yelloweye rockfish (Hart Crowser 2013).

3.7 3.2 Operations

Direct and indirect effects to listed species resulting from operational activities in the upland and in-water project areas of the Central Conveyor and Pier include:

- Noise during operations (direct)
- Impacts to water quality (indirect)
- Impacts to migratory behavior due to shading (indirect)
- Impacts to benthos and eelgrass due to shading (indirect)
- Impacts to critical habitat

3.7 3.2.1 Mining

No measureable change and thus no adverse effects are anticipated to occur to the water quality, quantity of the local aquifer, or Thorndyke Creek as a result of mining activities (GeoResources 2009; GeoResources 2013). Correspondingly, no adverse direct effects are anticipated to occur to salmonids utilizing Thorndyke Creek. Surface water in the upland action area will not be affected by mining operations since the lowest depth of excavation will be ten feet above the seasonal high water table, well above the bed elevation of Thorndyke Creek and more than 500 feet away (laterally) to the creek channel (GeoResources 2009).

Further analysis on project effects on water quality can be found in Section 3.3 Marine Shoreline.

Mining operations are far enough removed from other unnamed creeks in the vicinity of the Proposed Project that no measurable adverse impacts to water quality or quantity are anticipated. Geological investigations concluded that, based on results of site reconnaissance, subsurface explorations, groundwater monitoring, review of the available data and professional experience, the mining operations involved with this Proposed Project will have no measureable adverse impacts, cumulative or otherwise, to the surface or groundwater systems in the project area (GeoResources 2009; GeoResources 2013).

See Section 3.4 Water for detailed project effects on freshwater in the project area.

No direct effects to critical habitat for Puget Sound Chinook salmon, Hood Canal summer-run chum salmon or Puget Sound steelhead resulting from increased mining are expected.

INDIRECT EFFECTS

There are no anticipated significant adverse indirect effects from mining operations.

3.7 3.2.2 Operations Hub

Processing within the reconfigured 100-acre Operations Hub located within the former Shine Pit area will have no measureable direct or indirect adverse impacts, cumulative or otherwise to listed species or their critical habitats within either the immediate upland area, or in-water project areas.

3.7 3.2.3 *Central Conveyor*

The proposed Central Conveyor alignment in the upland area does not cross any lakes or wetlands, but would intersect with several small seasonal/ephemeral streams, natural drainage courses and wetland buffers. The elevated Conveyor would span local drainages and be equipped with pans under the return belt at specific locations such as transfer points. This would minimize potential spillage of sand and gravel into upland area watercourses and reduce any impacts to listed species that utilize waters downstream of these drainages.

The Conveyor and associated forestry service maintenance roads do not represent a significant impervious area within the drainage basins. Surrounding habitats consist of previously logged and replanted land and native soils that will allow ready infiltration of stormwater. Based on the nature of the sand and gravel soils, the distance from the infiltration areas, and the direction of groundwater flow, no adverse impacts to Thorndyke Creek or any local creeks from increased runoff volumes from this project are expected. Therefore, no adverse impacts are anticipated to listed species that utilize these watercourses.

The proposed Central Conveyor alignment has been designed to avoid the three eagle perch trees, located adjacent to the project area.

INDIRECT EFFECTS

There are no anticipated measureable adverse indirect effects from operations of the Central Conveyor.

3.7 3.2.4 *Pier*

Tugs, barges and ships of varying sizes will be used to transport sand and gravel from the Proposed Pier. Subject to market demand, up to six barges could be loaded per day, up to 300 days annually. During mooring operations, barges and ships will be tug assisted and not maneuver under their own power. Two tugs may be used for ships or larger barges. The assist tugboats will be stationed offshore during loading operations. A small watercraft capable of operating a spill containment boom (also stored on site) along with other safety and maintenance equipment will remain on site.

See Section 3.3 *Marine Shoreline* for further details on propeller wash.

Propeller wash from tugboats assisting in mooring operations could cause an increase in turbidity. This scouring, or stirring, of sediment from propeller wash is anticipated only when the propeller is directed toward the shoreline in waters shallower than 50 feet (Anchor 2003). Tugs will generally operate over 150 feet offshore from the mooring dolphins in waters depths ranging from 60 to 110 feet. Furthermore, during loading operations tugs, will generally be oriented parallel to the shoreline, or with their propeller facing away from the shoreline. Therefore, scouring impacts from propeller wash would be short-term and localized to the immediate area and should not have an impact on turbidity, shoreline processes or beach stability (Anchor 2003). Because scouring impacts are likely to be minimal, turbidity increases will be minimal

and subject to the composition of the substrate materials and tidal dispersion. Any potential turbidity increases resulting from these actions would be transient, highly localized and not expected to yield acute or chronic exceedances of state turbidity criteria. Therefore, impacts to listed species (i.e., displacement, avoidance or decreased foraging opportunities) would be minimal.

INDIRECT EFFECTS

Most noise generated during normal operations will be airborne and unlikely to impact salmonid behavior in waters surrounding the project area. Also, due to its modern design, combined with regular monitoring and maintenance, the Conveyor itself is expected to generate relatively little airborne noise. Sound level measurements and monitoring conducted in support of the Proposed Project indicate that there would be no significant noise impact from the project (Enviroanalysis 2011).

See Section 3.9 Noise for further details on sound and noise levels generated by the Proposed Project.

Underwater noise from marine traffic and operations is unlikely to adversely affect juvenile salmonids, which are normally associated with the shallow nearshore habitat. The Pier and associated vessel traffic will be approximately 1,000 feet offshore in water generally greater than 60 feet deep.

Marbled murrelet foraging is likely to occur in proximity to Pier operations and marine vessel traffic. When approached by vessels, marbled murrelets, like most seabirds, will either swim or fly away from the vessel's path, or dive under water. Noise generated by proposed over-water operation, like that noise from the Conveyor and Pier offloading activities could result in minor disturbance to flight behavior between marine waters and upland areas. In the Puget Sound region, however, marbled murrelets have been observed in association with developed areas, suggesting a tolerance to noise sources and magnitudes characteristic of urban and industrial land uses. Should disturbance caused by the Conveyor or marine vessel operations extend to upland areas, it would be localized and minimal given the expected frequency of daily marine traffic movements of less than six vessels, plus tugboats, per day of operation. Furthermore, because the project is using 18 and 30 – inch steel piles that will be installed with a vibratory hammer and proofed, the anticipated effects on marbled murrelets is expected to be minimal.

Reduction in prey abundance and disruption of juvenile salmonid migratory behavior may result from the shadowing effects from large over-water structures built on nearshore habitats in the Puget Sound (Ono 2010). Although the Conveyor will be covered, shading effects will be minimized by utilizing open steel girders and grated decking for the maintenance walkway. In addition, due to the height of the Pier (+22 feet MLLW) and its width (13 to 18 feet), its shade will move throughout each day, further minimizing impacts to prey resources and migratory behavior of juvenile salmonids.

The Pier will cast shadows on portions of the adjacent beach and subtidal bottom areas; however, shadowing effects to eelgrass beds are expected to be limited. Movement of shadows cast by the Proposed Pier was determined anecdotally during site visits in 2007 (Hart Crowser 2008). Given the average sun angle onto the height and width of the Pier, shading will traverse marine waters throughout each day and will remain

over any specific eelgrass patches a maximum of one or two hours. The non-native Japanese eelgrass occurs in isolated patches within a 250 foot wide zone across which the shadow will traverse, but no one portion will be shaded throughout the entire day. Nor will shading from the two open support platforms and mooring dolphins reach areas of native eelgrass (*Z. marina*) during a majority of the day. Therefore, the effect from shading is expected to be minimal. Further details regarding shading effects from the Proposed Pier can be found in the **BE** for this project (Hart Crowser 2013) and in Section 3.5 Marine Plants and Animals.

Minor increases in turbidity could result from possible small spills of sand and gravel into Hood Canal. Such spills, if they occur, can cause listed species to avoid the area. However, strong tidal exchanges and currents in the project area will quickly dissipate any small increases in turbidity. Furthermore, transported sand and gravel will be relatively free of fine materials, further minimizing any potential turbidity or significant effects on listed species.

In water deeper than 30 feet below the **MLLW**, small amounts of sand and gravel that may spill during loading operation could alter the nature of the benthic fauna and epibiota in localized areas to favor an assemblage adapted to a coarser substrate. However, the steep slope of the seafloor at the transfer point will likely prevent any accumulation of sand and gravel resulting from potential spillage. Therefore, rates of accumulation will not be great enough to adversely affect larger infauna, such as geoducks (Westley 1975). Juvenile salmonids normally associated with shallow nearshore habitat would unlikely be affected by discharges 1,000 feet offshore in 40-plus feet water.

Fuel spillage during operation activities of the Conveyor is possible. Since fueling of vessels will occur at homeports (i.e., Seattle, Everett or Port Angeles) and not occur on site, there is little potential for large fuel spillages. Impacts to water quality from small spills or leaks are unlikely to have a long term impact. BMPs will be implemented in the marine areas to minimize the risk of fuel spills and other potential sources of contamination. Spill prevention and spill response procedures will be prepared in advance and maintained throughout operation of the Conveyor.

No Pacific sand lance spawning areas have been documented in proximity of the Proposed Pier (see Section 3.5 Marine Plants and Animals).. Once constructed, operation of the Pier is expected to result in negligible effects on the spawning success of Pacific sand lance, which would be limited to where bluff stabilization and protection measures are installed (approximately 100 linear feet along the toe of the bluff) Anchor report (Anchor 2003) states that these measures will not impede the recruitment of sediments along the shoreline either north or south of this location. In addition, a negligible amount of riparian vegetation (along 50 feet of the shoreline) will be removed during construction. Proposed construction and operation are expected to have limited effects on substrate composition and abundance along

adjacent intertidal habitats or potential upper beach spawning areas. Similarly, the effects of project operations also would be limited relative to Pacific herring and their related spawning habitats in the project action area.

Indirect effects to critical habitat related to project operations include the following:

- Minimal effects to nearshore migratory corridors will occur due to the shading, height and design of the Pier. Thus, project construction and operations will not degrade nearshore critical habitat for Chinook salmon, summer-run chum salmon or steelhead.
- The Pier was designed (e.g. spacing of pilings) to avoid interference with the natural littoral drift and natural processes affecting recruitment and productivity of benthic, epibenthic and zooplankton communities along the Toandos Peninsula. As a result, project operations will not affect the migratory corridors or create substantial impediments to intertidal and littoral movements of Chinook, summer-run chum or steelhead.
- Localized decreases in benthic and epibenthic productivity may temporarily reduce food abundance for juvenile salmon, steelhead or juvenile rockfish. These temporary decreases will occur during approved work windows when few juvenile salmon or steelhead will be in the vicinity of the Proposed Pier alignment. Recovery of these communities is expected to occur quickly; permanent loss of benthic and epibenthic habitats as the result of pile placement will be small and at least partially replaced by new hard pile substrates colonized by epibiota. Thus, overall, Pier operations are not expected to degrade food sources within nearshore critical habitat for Chinook, summer-run chum, steelhead or the three species of listed rockfish (Hart Crowser 2013).

The Pier will require artificial lighting as part of standard operations. Artificial lighting at night can alter the feeding, schooling, predator avoidance and migratory behaviors of fish (Simenstad 2001). Lighting of the Conveyor and Pier across marine habitats would be restricted to the minimum required to conform to applicable safety requirements (e.g., U.S. Coast Guard, OSHA, Washington Industrial Safety and Health Act). Direct lighting of the water surface also would be minimized with shielding. Pier lighting would be turned off except as required for loading operations, maritime safety and navigation. Therefore, no significant adverse impacts to listed species are anticipated resulting from overwater lighting on the Conveyor and Pier.

Further details regarding effects of lighting from the Proposed Pier can be found in Section 3.10 Aesthetics, Light and Glare.

3.7 3.2.5 Marine Transportation

According to federal guidelines, vessels calling at the Pier may release greywater within the confines of Hood Canal (EPA 40 C.F.R 122.3a) but as a mitigation measure the Applicant, as part of their Marine Operation Plan (MOP), will prohibit discharge of greywater by vessels associated with this project. Greywater from dishwasher, galley, laundry, bath and washbasin drains if they did occur would be limited and intermittent. If discharged, substantial currents present in this portion of Hood Canal will quickly disperse any plumes of grey water; short term acute or chronic effects on

See Section 3.3 Marine Shoreline for further discussion on marine water quality.

listed biota are therefore unlikely. The anticipated low frequency of these discharges make it unlikely for significant impacts to levels of fecal coliform, nutrients, and organic matter in marine waters near the Pier site (GeoEngineers 2008).

To reduce the potential for introductions of nonindigenous species, vessels calling at the Pier will be subject to the **WDFW** ballast water management program laws and rules (Ch. 77.120 RCW; WAC 220 777 090 and 095). Among these restrictions are requirements for vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore (open ocean, not Hood Canal) before they are allowed to discharge ballast into waters of the state, minimizing the risk of introducing exotic species or potential deleterious effects to listed species. U.S. Coast Guard also regulates ballast water discharge by vessels in U.S. waterways.

Aquatic antifouling paints are commonly used on hulls of barges and ships calling at the Proposed Pier. Such paints are considered pesticides because they combat pests such as barnacles and algae (WSDA 2011). These pesticides are highly regulated federally by the **EPA** and statewide by the Department of Agriculture. While marine water quality could be impacted from leaching of metals and tributyltin (**TBT**) found in antifouling paint, no significant adverse impacts are anticipated given the relatively limited berthing of barges, ships and tugboats at the Pier. Furthermore, strong currents and tidal exchanges in the project area will reduce the potential for accumulation of metals and **TBT** within the water column and substrate. No antifouling paint will be applied on site, further reducing the risk of leaching or introducing metals and **TBT** into the environment.

No direct effect on listed species from potential degradation of water quality is anticipated.

INDIRECT EFFECT

Since no significant adverse impacts to water quality are expected from leaching of antifouling paints, no associated indirect impacts to listed species are anticipated.

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- WSDOT (Washington State Department of Transportation). 2013. Biological Assessment Preparation for Transportation Projects: Advanced Training Manual. February 2013.



3.8 LAND AND SHORELINE USE, Recreation, Consistency with Plan and Policies

The proposed project is located both within County-designated resource lands and a rural residential Hood Canal shoreline. This section summarizes construction and operational impacts to neighboring land uses, shoreline uses, and recreational uses in the vicinity of the proposed project, and identifies applicable land use regulations and policies.

The intent of this section is to provide a broad overview of the land use regulatory framework and impacts to existing land development; more detailed descriptions of specific topics within this Draft Environmental Impact Statement (**DEIS**) (i.e. air quality, noise, light and glare, aesthetics) provide a deeper analysis of the majority of regulations and policies and potential impacts discussed here. Although the Jefferson County **Comprehensive Plan** has been updated periodically, this discussion describes the **Comprehensive Plan** in effect on April 23, 2003, the date the Application was vested.

3.8 1 Regulatory Overview

The Proposed Project is subject to federal, state and county regulations addressing land use and shoreline use. As part of its review of this **DEIS** and the subsequent public hearing on the requested permits, Jefferson County will make a determination whether or not the requirements of its development regulations and comprehensive plan, as well as other applicable local, state, or federal laws and rules, are adequately analyzed and met. As a condition of any approval, the County may require that the Proposed Project be constructed and operated in accordance with the terms of the permits and approvals issued by the various agencies. (RCW 43.21C.240(1) and (2)).

3.8 1.1 Federal

Federal agencies have jurisdiction over certain shoreline and land use issues that are also addressed by state and county laws, policies and regulations. In addition to any involvement in the State Environmental Policy Act (**SEPA**) process, federal permits and licenses will require a separate, independent environmental review conducted pursuant to the requirements of the National Environmental Policy Act (**NEPA**).

The U.S. Army Corps of Engineers (**USACE**) will administer the **NEPA** review due to the Proposed Project's pier component and the **USACE**'s jurisdiction over navigable waters of the United States. **USACE** will also exercise its authority granted under the Section 404 of the Clean Water Act (**CWA**) (33 USC §1251) as well as the **Rivers and Harbors Act of 1899**.

Aspects of federal regulations governing shoreline uses are discussed in more detail in Section 3.3 Marine Shorelines.

Details of MSHA's oversight are contained in Section 3.2 Earth.

In addition, the Mine Safety and Health Administration (**MSHA**) oversees the project's mining operations. The Federal Mine Safety & Health Act of 1977 (**Mine Act**) (Public Law 91173, as amended by Public Law 95164), mandates periodic mine inspections; development of and compliance with health and safety standards; oversight by **MSHA** of mine accident investigations, violations and complaints; and review of mine operating plans, and education and training programs.

3.8 1.2 State

The Proposed Project will bring into play several State laws and regulations. The Washington State Growth Management Act (**GMA**) (Ch. 36.70A RCW), establishes a comprehensive framework for managing growth and coordinating land use planning with infrastructure. The **GMA** requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, and preparing comprehensive plans and implementing them through development regulations.

One key land use aspect of the proposed project is the mineral resources component. The **GMA** mandates that mineral resources of long-term commercial significance be identified and conserved for future use, recognizing that lands containing such resources are a vital part of the landscape, history, ecology and economy of the State. These lands provide vital goods such as gravel, create jobs, generate billions of dollars of revenue, and can protect habitat for wildlife and water resources such as rivers and lakes.

The **GMA** envisions a high level of protection, requiring that counties adopt development regulations to assure the conservation of designated resource lands such as mineral resources, in part by restricting land uses on lands adjacent to the designated resource lands. The **GMA** seeks to strike a balance, recognizing that, while urbanization creates demand for sand and gravel resources, it may also encroach upon or build over those same resources, rendering them inaccessible. The **GMA** also recognizes that mining may conflict with or impact other land uses, through increased noise, dust, visual blight, traffic, road wear, and neighboring property devaluation. Un-reclaimed mines can have ongoing impacts. Property rights issues range from the right to mine and use the value of mineral resource land to the right to live in an area with a high quality of life and retain home values.

The WSMA is discussed in more detail in Section 3.2 Earth.

Similarly, in the Washington Surface Mining Act (**WSMA**) (RCW Chapter 78.44), the State recognizes that the surface extraction of earth minerals for commercial, industrial, or construction purposes is an activity essential to the economic wellbeing of the State. The **WSMA** provides that the usefulness, productivity, and scenic values of all lands and waters involved in surface mining within the State receive the greatest practical degree of protection and restoration. The **WSMA** requires that a permit application, including a reclamation plan, be submitted and obtained. The intent of the law, and its associated regulations, is to ensure that every surface mine (except those exempted by regulation) is operated in accordance with the mine sequence plan contained in the reclamation plan and is thoroughly reclaimed. The **WSMA** is administered by Washington Department of Natural Resources (**WDNR**), which has review, site inspection, and approval authority over all surface mining reclamation plans.

The Washington Department of Ecology (**Ecology**), under Section 401 of the Clean Water Act (**CWA**), oversees compliance with water quality laws. These laws include the **SMA** (RCW 90.58) and the Washington State Coastal Zone Management (**CZM**) program. The **CZM** program requires **Ecology** to determine whether the project complies with various state laws, including those relevant to this proposed project:

- **SEPA** (RCW 43.21C);
- **SMA** (RCW 90.58), including the County's local shoreline master program (**SMP**) (JCC 18.25);
- **CWA** (RCW 90.48); and,
- Clean Air Act (**CAA**) (RCW 70.94).

The **CZM**'s federal "consistency" process affords the public, local governments, state agencies and tribes an opportunity to review federal actions likely to affect Washington's coastal resources or uses. Any authorization, certification, license, permit or other form of permission for the proposed pier will require federal consistency review and approval. The conveyor and pier would be regulated for stormwater discharges, turbidity and spills as the result of in-water work under this program.

The CZM is discussed in more detail in Chapter 2.1.2.

The State **SMA** seeks to preserve the quality of water and aquatic habitat, encourage water-dependent shoreline land uses, and preserve the public's opportunity to enjoy shorelines. Although overseen by **Ecology**, the primary responsibility for administering the **SMA** is assigned to local governments through the mechanism of shoreline master programs, pursuant to **Ecology**'s rules that establish goals and policies implemented through use regulations.

The **SMA** designates the Hood Canal shoreline as a "Shoreline of Statewide Significance". For shorelines of state-wide significance, preference is given to uses in the following descending order of priority:

1. Recognize and protect the statewide interest over local interest.
2. Preserve the natural character of the shoreline.
3. Result in long term over short term benefit.
4. Protect the resources and ecology of the shoreline.
5. Increase public access to publicly owned areas of the shoreline.
6. Increase recreational opportunities for the public in the shoreline.
7. Provide for any other element as defined under RCW 90.58.100 deemed appropriate and necessary.

The County's **SMP**, adopted pursuant to the **SMA**, is discussed below in 3.8.4.2 and in Section 3.3 Marine Shorelines. No substantial development is permitted on the state's shorelines unless a permit is obtained from the local jurisdiction.

WDNR manages all publicly owned aquatic bedlands within the State, of which the deep water portions of the proposed project are a part. State law requires the Applicant to obtain an aquatic lands lease from the **WDNR** under RCW 79.110.

Applicant must also obtain a Hydraulic Permit Application (**HPA**) from the **WDFW**. The **HPA** Program regulates the use, diversion, obstruction or changes to waters of the state, including the overwater portion of the conveyor and pier.

The HPA is discussed in more detail Chapter 2.1.6

3.8 1.3 Jefferson County

3.8 1.3.1 Overview

Jefferson County is responsible for reviewing and ensuring that various environmental criteria are met under the Jefferson County **SMP**, Washington State **SMA**, Jefferson County Unified Development Code (**UDC**), including Jefferson County Critical Areas regulations, and **SEPA** compliance. Jefferson County's oversight includes requirements for environmental analysis, protection and mitigation measures, approval criteria for conditional uses, and public involvement.

Jefferson County's **Comprehensive Plan**, adopted pursuant to the **GMA**, outlines goals and policies to help define, direct and guide future growth and development throughout the County over the next 20 years, and identifies the major issues that influence future growth and development issues in order to use the County's resources in the most efficient way.

The Jefferson County **UDC** (Chapter 18 Jefferson County Code (JCC)) contains the regulatory provisions that implement the **Comprehensive Plan's** policies and objectives, including land use development standards and prescriptive criteria.

The proposed project will also require a Jefferson County Type 1 Stormwater Permit for the Meridian Extraction Area to address operational requirements during mining and ensure with the **UDC** Mineral Extraction and Processing Performance Standards.

The proposed project will require a Type III Shoreline Conditional Use Permit (**SCUP**), requiring a formal recommendation by the Jefferson County Hearing Examiner to **Ecology**, who will review the permit, determine if it complies with the **SMP**, and then approve, deny or modify the Hearing Examiner recommendations; this would then become an additional binding condition of approval for the Proposed Action.

SCUP and their criteria are discussed in detail in Section 3.3 Marine Shorelines.

In its recommendation on the **SCUP**, the Hearing Examiner must consider whether the proposed is consistent with certain performance standards, including:

- That the proposed use is consistent with the policies of RCW 90.58.020 and the policies of the Master Program.
- That the proposed use will not interfere with the normal public use of public shorelines.
- That the proposed use of the site and design of the project is compatible with other permitted uses within the area.
- That the proposed use will cause no unreasonable adverse effects to the shoreline environment in which it is to be located
- That the public interest suffers no substantial detrimental effect. In those limited instances where a conditional use is proposed, consideration shall be given to the cumulative impact of additional requests for similar actions in the area.

Building permits from Jefferson County to construct the conveyor systems would also trigger review of the proposed activities under the County's Critical Areas regulation of landslide, erosion, and seismic hazard areas. (JCC 18.22.160).

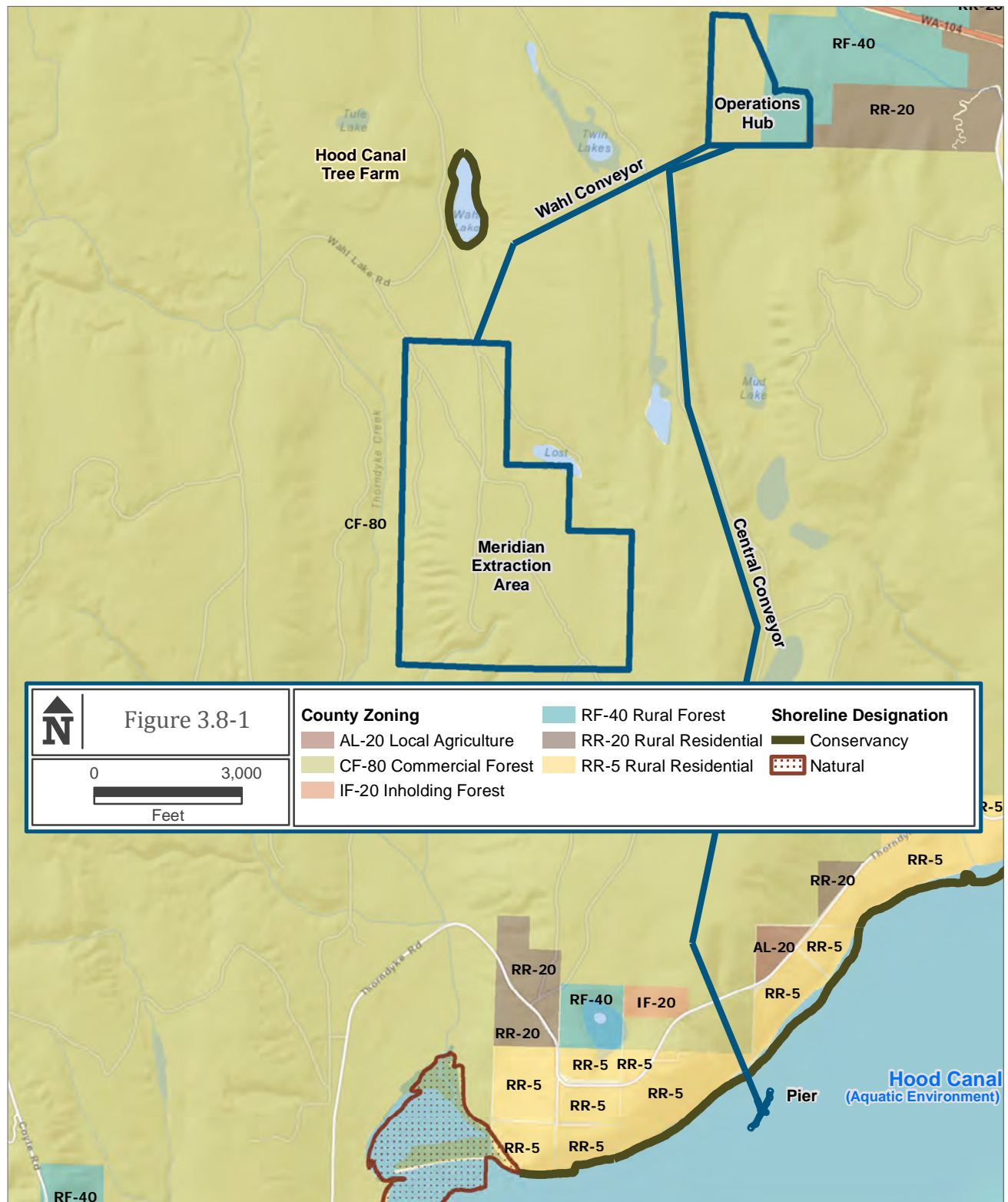
3.8 1.3.2 Uniform Development Code

The Jefferson County **UDC** focuses on three key areas—increased economic development opportunities, increased levels of environmental protection, and streamlined, less costly, more efficient development permitting system—through zoning, critical areas, land division, permit review processes, comprehensive plan amendment procedures, and development and performance standards for a wide variety of land use activities in the county. The **UDC** also implements the County's **Comprehensive Plan**'s policies and objectives, discussed in detail below.

Under the **UDC**, the Upland Area lies within Commercial Forest (CF 1:80) and Rural Residential (RR 1:5) zoning districts; a portion of the proposed pier is located over-water. The Jefferson County Planning Department has determined that the proposed project is appropriately characterized as a “Mineral Processing Activity Accessory to Extraction,” a conditional use per **UDC** Table 31, requiring approval of a **CUP**. The County Hearing Examiner will determine whether to approve the **CUP**, approve with conditions, or deny the **CUP**, based on the following criteria:

See Figure 3.8-1 for an illustration.

- The conditional use is harmonious and appropriate in design, character and appearance with the existing or intended character and quality of the development in the vicinity of the subject property and with the physical characteristics of the subject property;
- The conditional use will be served by adequate infrastructure including roads, fire protection, water, wastewater disposal, and storm water control;
- The conditional use will not be materially detrimental to uses or property in the vicinity of the subject parcel;
- The conditional use will not introduce noise, smoke, dust, fumes, vibrations, odors, or other conditions or which unreasonably impact existing uses in the vicinity of the subject site.
- The location, size, and height of buildings, structures, walls and fences, and screening vegetation for the conditional use will not unreasonably interfere with allowable development or use of neighboring properties.
- The pedestrian and vehicular traffic associated with the conditional use will not be hazardous to existing and anticipated traffic in the vicinity of the subject parcel;
- The conditional use complies with all other applicable criteria and standards of this Code and any other applicable local, state or federal law; and more specifically, conforms to the standards contained in Sections 4 and 6 of this Code;
- The proposed conditional use will not result in siting of an incompatible use adjacent to an airport or airfield.
- The conditional use will not cause significant adverse impacts on the human or natural environments that cannot be mitigated through conditions of approval.
- The conditional use has merit and value for the community as a whole.
- The conditional use is consistent with all relevant goals and policies of the Jefferson County **Comprehensive Plan**; and,
- The public interest suffers no substantial detrimental effect. Consideration shall be given to the cumulative effect of similar actions in the area.



County Zoning and Shoreline Designation A majority of the project area is located within the Commercial Forest zoning district encompassing the Hood Canal Tree Farm. The southeastern portion of the Operations Hub is zoned Rural Forest. Properties along the shoreline are zoned Rural Residential. The Shoreline Conservancy Environment extends 200-feet upland from the line of Ordinary High Water. The Shoreline Aquatic Environment encompasses all shorelines of the State within Jefferson County. **Source:** Jefferson County

The Shoreland Area is designated Rural Lands under the Jefferson County Comprehensive Plan and is zoned Rural Residential. The **SMP** designates the shoreline environment for the overwater portion of the conveyer as “Aquatic.” The adjacent upland portion is designated as “Conservancy.” The proposed use is classified as “Industrial and Port Facility” by the **SMP** and is allowed in the Conservancy and Aquatic Environments as a Conditional Use. (JCC 18.25.240 and 18.25.340).

The **UDC** regulates mine siting and operations. To protect such natural resource lands as mandated under the **GMA**, Jefferson County has designated an overlay district—a district that provides policies and regulations for certain land areas and uses which warrant specific recognition and management.

The Mineral Resource Lands Overlay District (**MRLO**) provides for the conservation of mineral lands of long-term commercial significance, “to aid in sustaining and enhancing mineral extraction and processing activities of long-term commercial significance by protecting designated lands from incompatible development and to allow for the continued contribution of mineral lands to the Jefferson County economy.” (JCC 18.15.020(3)).

New non-mining development is required to occur outside of any designated **MRLO** to ensure that other land uses do not preclude use of these vital resources, and to notify landowners of the existence of potential mining activities before developing their property.

In 2004, the County adopted the Wahl-Meridian **MRLO** district, designating the proposed Meridian Extraction Area as a Mineral Resource Lands of Long Term Commercial Significance, and attaching 15 specific measures to address environmental impacts of mining in the **MRLO** (Jefferson County Ordinance 08-0706-04 (**Ordinance**)).

3.8 1.3.3 Comprehensive Plan

The **Comprehensive Plan** contains several elements with goals and policies that are applicable to the Proposed Project. Goals address the general growth management intentions of the County while the policies are the specific guidelines. Some elements are discussed below, while some are addressed elsewhere in this **DEIS** (as noted):

- Land Use and Rural Element – See Sections 3.2 Earth, 3.11 Transportation, 3.12 Public Services, and 3.8 1.3.3.1 below.
- Natural Resource Conservation Element – See Section 3.8 1.3.3.2 below.
- Open Space, Parks and Recreation, and Historic Preservation Element – See Section 3.13, Archaeological and Cultural Resources.
- Economic Development Element – See Section 3.8 1.3.3.3 below.
- Environment Element – See Sections 3.1 Air, 3.2 Earth, 3.3 Marine Shorelines, 3.4 Water, 3.5 Marine Plants and Animals, 3.6 Terrestrial Plants and Animals, 3.9 Noise, and 3.10 Aesthetics, Light and Glare.

3.8 1.3.3.1 LAND USE ELEMENT. The purpose of the Land Use and Rural Element is to identify specific uses, densities and development regulations that protect rural character and are consistent with all other requirements of the **GMA**. The policies provide the basis for revising the development standards, land use and environmental protection ordinances such as the Critical Areas Ordinance and other development regulations.

The following are goals and policies pertaining to the Land Use Element, not otherwise addressed elsewhere in this **DEIS** as noted above:

INDUSTRIAL LAND USE GOAL

- LNG 12.0 Locate new natural resource-based industries in rural lands and near the resource upon which they are dependent, in accordance with RCW 36.70A.365.

INDUSTRIAL LAND USE POLICIES

- LNP 12.1 Encourage the establishment of sustainable natural resource-based industrial uses in rural areas to provide employment opportunities.
- LNP 12.2 Natural resource-based industries shall be located near the agricultural, forest, mineral, or aquaculture resource lands upon which they are dependent.

NATURAL RESOURCE LANDS GOAL

- LNG 13.0 Conserve and manage the forest, agriculture, aquaculture, and mineral resources of Jefferson County for sustainable natural resource-based economic activities that are compatible with surrounding land uses.

NATURAL RESOURCE LANDS POLICIES

- LNG 13.1 Conserve natural resource lands through land use designations and encourage resource-based industries that provide rural employment opportunities.
- LNG 13.3 Work with resource-based industries to achieve compliance with all applicable regulations to protect environmental values and to protect surrounding land uses.

RURAL CHARACTER GOAL

- LNP 18.0 Protect and foster the County's rural character. Rural character is defined by local rural lifestyle, local rural visual landscapes, resource productivity, environmental quality, and significant open space.

RURAL CHARACTER POLICY

- LNP 18.2 The maintenance of environmental quality is critical to the preservation of rural character. Develop and strictly enforce environmental functions which protect the value and functions of the environment.

RURAL CHARACTER GOAL

- LNP 21.0 Ensure that development is accomplished in a manner that protects the long-term habitability, historically significant areas, and natural beauty of Jefferson County.

RURAL CHARACTER POLICY

- LNP 21.2 Encourage project proponents to mitigate potential adverse impacts to public health, safety, and welfare as a result of a proposed project, action, or use concurrent with project development.

RURAL CHARACTER GOAL

- LNG 24.0 Foster sustainable natural resource-based industry in rural areas through the conservation of forest lands, agricultural lands, mineral lands, and aquaculture lands in order to provide economic and employment opportunities that are consistent with rural character.

RURAL CHARACTER POLICIES

- LNP 24.1 The County has identified resource lands as an integral part of rural character. Resource-based uses that are compatible with the conservation and sustainable use of the County's resources shall be permitted.
- LNP 24.2 Natural resource-based industry shall not interfere with the designated uses of surrounding lands.

This natural resource and water dependent use is located in a rural commercial forest and rural area in close proximity to the minerals it will procure and the water upon which it will be transported. The proposed conveyor corridor avoids impacts to environmentally sensitive areas within this corridor and is consistent with use of the area as commercial forest and mineral resource activities.

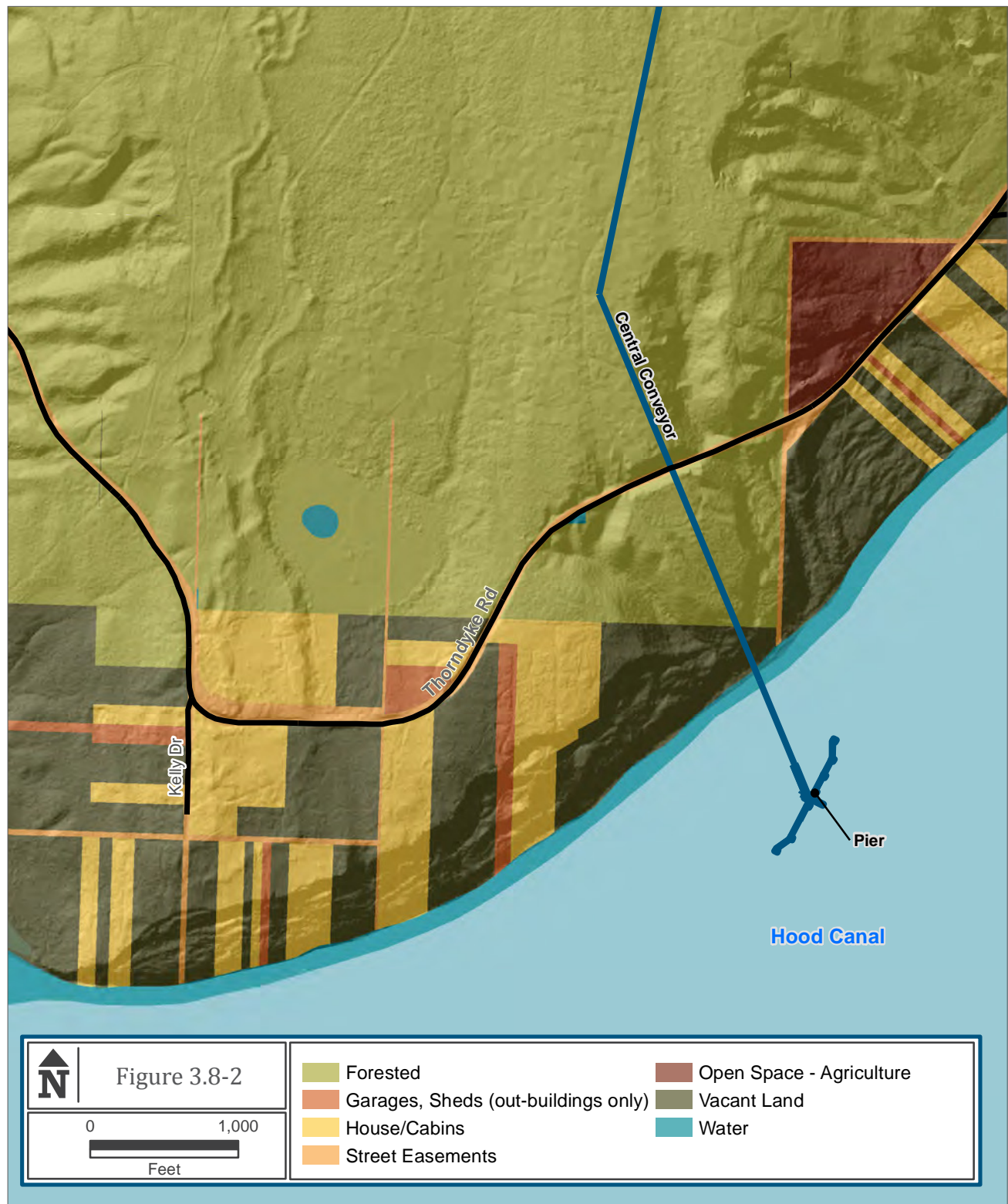
The Applicant has stated that when fully operational, shipping sand and gravel to intrastate and interstate markets, the proposed project will generate over 2000 direct and indirect family-wage jobs in mining, longshore, maritime, construction and ship-building trades.

The impacts experienced by existing rural uses and communities in the vicinity of the project area would vary based on their location. After the Central Conveyor crosses Thorndyke Road, it would traverse a 42-acre portion of the commercial tree farm, before it reaches a Rural Residential waterfront property on Manhattan Beach. This stretch of Hood Canal beach (some 1.3 miles long) has a scattered single-family homes and summer cabins along its shoreline.

See Figure 3.8-2

The upland portion of the Manhattan Beach area is heavily wooded with fir trees and thick understory brush and is occupied by single-family homes and summer cabins that tend to be built near the edge of the shoreline bluff. Given the local topography, it is not anticipated that the immediate area will experience substantial new residential development.

The marine load-out facility/pier is located within the SMP shoreline jurisdiction. The nearest uses are residential uses to the northwest (approximately 840-feet) and southeast (approximately 1,140- feet).



Structures/Development Patterns The conveyor's final 360 feet before the shoreline crosses applicant controlled, undeveloped 14.7 acre parcel designated as Rural Residential - 1 Dwelling Unit per 5 Acres (RR 1:5). The closest dwellings are approximately 1,050 southwest of the conveyor route and 3,100 feet northeast. **Source:** Jefferson County

A pier structure and resource-based load-out facility will be introduced into a sparsely developed rural shoreline, resulting in periodic increases in noise, light, and glare. The applicant expects that up to two barges may be loaded at the proposed Pier per day, at various times during the day or night, seven days a week, up to 300 days a year. It is anticipated that at least one barge would be loaded 228-258 days out of the overall 300 days the Pier would be utilized. Barge loading time would range from 1 to 8 hours, depending on the capacity of the barge. Typical barges of 5,000 to 7,000 tons can be loaded in 2-3 hours.

Once ships are available (anticipated to be 8 to 12 years in the future), it is estimated that ships would be loaded 42-72 days out of the overall 300 days the Pier would be utilized. Ship loading time would range from 8 to 24 hours, depending on ship capacity. The project application anticipates that up to six ships per month could be expected by Year 25. No barges would be loaded on days ships are loaded.

3.8 1.3.3.2 NATURAL RESOURCE CONSERVATION ELEMENT. The Natural Resource Conservation Element identifies three key issues to be addressed in the designation and conservation of mineral resource lands:

1. Classifying the types of mineral resources that are potentially significant in Jefferson County;
2. Defining the amount and long-term significance of aggregate that is needed to meet the demand of Jefferson County's projected population; and,
3. Determining how to balance a variety of land uses within mineral resource areas

A high degree of overlap exists between lands devoted to growing timber and land potentially containing commercial mineral deposits, with most mineral resources being located in forest resource lands. The County includes mineral extraction and primary processing as a permitted use on designated forest land, in order to protect mineral resource lands from the encroachment of incompatible development, conserve the mineral resource land base of Jefferson County, and allow for future utilization by the mining industry. The goals and policies outlined below provide a general direction for both the conservation of Jefferson County's natural resource lands and the enhancement of resource-based industries.

NATURAL RESOURCE LANDS GOAL

- NRG 1.0 Encourage the conservation of resource lands and the long-term sustainable use of natural resource-based economic activities throughout Jefferson County.

NATURAL RESOURCE LANDS POLICIES

- NRP 1.1 Designate lands where the preferred and principal land uses are resource-based economic activities as Natural Resource lands.
- NRP 1.2 Require land use activities adjacent to resource lands to be sited and designed so as to minimize conflicts with resource based economic activities.
- NRP 1.5 Support resource-based economic activities that comply with applicable federal, state, and local regulations.

- NPR 1.8 Locate natural resource-based economic activities throughout rural areas in close proximity to designated agricultural, forest, or mineral resource lands upon which they are dependent.

NATURAL RESOURCE LANDS GOAL

- NRG 2.0 Encourage resource-based economic activities that are compatible with environmental quality.

NATURAL RESOURCE LANDS POLICIES

- NRP 2.1 Regulate resource-based economic activities so as to mitigate adverse impacts to the environment and adjacent properties.
- NRP 2.3 Protect the environment from cumulative adverse impacts resulting from resource management practices.
- NRP 2.4 Provide incentives to encourage compliance with “best management practices” by resource-based economic activities.

MINERAL RESOURCE LANDS GOAL

- NRG 6.0 Conserve and protect Mineral Resource Lands for long-term economic use.

MINERAL RESOURCE LANDS POLICIES

- NRP 6.4 Mitigate conflicts with adjacent land uses by zoning and regulations including operation, siting, buffering and design requirements which minimize conflicts between mineral extraction/primary processing activities and land use activities located adjacent to designated mineral lands.

MINERAL RESOURCE LANDS GOAL

- NRG 7.0 Provide for mitigation of potential adverse impacts associated with mining extraction and processing operations.

MINERAL RESOURCE LANDS POLICIES

- NRP 7.1 Require environmental review on all mineral lands designation requests and/or conditional use permits.
- NRP 7.2 Provide for the following factors in mineral resource land use decisions:
 - a. The range of environmental impacts, including short-term and long-term effects arising over the lifetime of the proposal;
 - b. The ability of the site to confine or mitigate all operational impacts;
 - c. The compatibility of operations with adjacent land uses when mitigating measures are applied;
 - d. The capacity of transportation facilities to handle safely the transport of products from the site; and,
 - e. The adequacy of plans for reclamation of the site for appropriate future use.
- NRP 7.3 Develop standards and guidelines to identify and address the impact of mining operations on adjoining properties. Such conditioning should not have the intent of rendering mining operations economically unfeasible.

MINERAL RESOURCE LANDS GOAL

- NRG 8.0 Ensure that County mineral resource lands are restored to safe and useful condition with enhancement and mitigation of damage to the function and aesthetics of the environment and subsequent land uses.

MINERAL RESOURCE LANDS POLICIES

- NRP 8.1 Develop requirements for reclamation plans for mineral extraction activities. These requirements may exceed minimum State requirements.
- NRP 8.2 Ensure that reclamation plans preserve the safety, function and value of adjacent lands including aesthetic and environmental and water resource values
- NRP 8.3 Encourage reclamation plans which provide enhanced public value such as parks, playgrounds, open space, trails, wetlands, and fish and wildlife habitat.
- NRP 8.4 Encourage reclamation that occurs on an ongoing basis as mineral deposits are depleted.
- NRP 8.5 Avoid the potential for aquifer contamination in importing material used for reclamation backfill or storage and in approving subsequent land use activities on reclaimed mining lands.
- NRP 8.6 Establish standards for performance bonds unless otherwise required for reclamation activities to be provided prior to the initiation of mineral resource extraction land use activities.

MINERAL RESOURCE LANDS GOAL

- NRG 9.0 Preserve water resource quality and quantity in the regulation of mineral extraction activities.

MINERAL RESOURCE LANDS POLICIES

- NRP 9.1 Regulate mining operations to prevent adverse impacts to ground or surface water quality.
- NRP 9.2 Establish a preference for the protection of aquifers and recharge zones from the effects of surface mining in the event that adverse impacts cannot be avoided through best management practices.

The Meridian Extraction Area and Operations Hub are located in a designated mineral resource area, and the majority of the proposed conveyor would be located in an area zoned and managed as second-growth commercial forest. The Central Conveyor would support an existing resource-based use. The conveyor would transport high quality sand and gravel from the Operations Hub, a resource use that is already allowed.

Operation of the facilities includes conservation measures and environmental protection measures. Technical studies have evaluated the potential impacts of the project to the environment, and used to site the conveyor route to avoid environmentally sensitive areas as much as possible and to construct the conveyor with as little disturbance to the environment as possible. The Proposed Project will comply with applicable regulations to protect the environment, including plant and animal habitats.

The marine load-out facility/pier would be located within the **SMP** shoreline jurisdiction, in proximity to the water resource upon which it is dependent.

The proposed conveyor and pier have been designed and are proposed to be constructed using sound engineering and construction practices and will employ Best Management Practices wherever applicable.

The Applicant has stated that the high quality aggregate may also be used for ecological restoration projects in the Puget Sound region. This deposit represents one of the few sources of material similar in character to the existing natural material found on inland beaches.

Prior to commencing mining operations, a reclamation plan would be put in place requiring sequential and continual reclamation of prior mined areas. The reclamation plan will be required to be accompanied by a performance bond.

3.8 1.3.3.3 ECONOMIC DEVELOPMENT ELEMENT. The Economic Development Element promotes the development of new economic opportunities for citizens of Jefferson County and encourages growth within the capacity of the County's natural resources, and the public services and facilities to sustain it. The goals and policies encourage sustainable economic development activities that complement the rural nature of Jefferson County.

ECONOMIC DEVELOPMENT GOAL

- EDG 6.0 Encourage and support appropriate rural economic development throughout Jefferson County.

ECONOMIC DEVELOPMENT POLICIES

- EDP 6.2 Encourage the establishment of new sustainable natural resource-based activities in rural areas to increase employment opportunities.
- EDP 6.2.1 Natural resource-based activities shall be located near the agriculture, mineral, aquaculture, or forest resource upon which they are dependent.

ECONOMIC DEVELOPMENT GOAL

EDG 9.0 ENCOURAGE ECONOMIC DEVELOPMENT THAT CONSERVES NATURAL RESOURCES AND OPEN SPACES, PROTECTS ENVIRONMENTAL QUALITY AND ENHANCES JEFFERSON COUNTY'S OVERALL QUALITY OF LIFE. ECONOMIC DEVELOPMENT POLICIES

- EDP 9.1 Promote economic development that does not adversely impact the natural or built environment.
- EDP 9.2 Support and protect the economic value and long-term sustainability of Jefferson County's environmental resources.
- EDP 9.3 Develop and update land use policies that conserve resource lands and provide sustainable employment opportunities.

The purpose of the Proposed Project is to facilitate development of a natural resource-based activity near the mineral and water resources upon which it is dependent.

The Proposed Project will be a marine transportation system to deliver high quality aggregate material to local, regional, intrastate and interstate markets (e.g. Port Angeles, Seattle, Vancouver WA, California) for both construction and environmental mitigation/enhancement activities.

The Proposed Project will support the national, state and local economies by assuring and enhancing availability of high quality sand and gravel by the most economical and environmentally sensitive manner. The applicant states that the project will not only increase both direct and indirect local employment and local government tax revenues, but will also provide the citizens of the state with more affordable and practical approaches to needed public and private projects in the future. The proposed project would provide an alternative delivery system for these essential materials in the event of disruption of the existing surface transportation system.

3.8 1.3.3.4 RECREATIONAL USE. Several County policies and regulations address the issue of recreational use of the Proposed Project's shoreline and pier areas. The **SMP** requires that a project proposal be evaluated by the Hearing Examiner for consistency with certain Shoreline designation policies and performance standards pertaining to the over-water portion of the Proposed Project (Aquatic Environment, SMP 4.101), and the use designation (Industrial and Port Facilities, SMP 5.90), including:

AQUATIC ENVIRONMENT MANAGEMENT POLICIES

- The aquatic environment should be managed for appropriate use activities, allowing either multiple use or single dominant use in areas of unique conditions, while recognizing and ensuring compatibility with adjacent upland shoreline designations.
- All structures placed on the water's surface should have as low a profile as possible to minimize visual intrusion.
- Potential conflicts with adjacent uses such as commercial fishing, recreation, and navigation should be considered in the review of proposed aquatic developments. Developments should not be permitted where they would materially interfere with existing uses.

INDUSTRIAL AND PORT FACILITIES POLICIES

- Water dependent industries should be given priority over other industrial uses.
- Since industrial docks and piers are often longer and greater in bulk than recreational and residential piers, careful planning must be undertaken to reduce the adverse impact of such facilities on other water dependent uses and shoreline resources.

INDUSTRIAL AND PORT FACILITIES PERFORMANCE STANDARDS

- Only shoreline dependent industry shall be permitted on shoreline locations. The only exception to this rule shall be when other shoreline oriented industry can clearly demonstrate that no other site location is feasible.
- Industrial and port facilities shall be located, designed, constructed, and operated to minimize unnecessary interference with the right of adjacent property owners, as well as adjacent shoreline or water uses.

The **Comprehensive Plan's** Environmental Element Policies also touch on recreational uses:

ENVIRONMENT ELEMENT POLICIES

- ENP 4.1 Shorelines of statewide significance shall be managed according to the following order of preferred uses as established in the Shoreline Management Act (**SMA**) (RCW 90.58.020):
 1. Recognize and protect state-wide over local interests;
 2. Preserve the natural character of the shoreline;
 3. Achieve long-term over short-term benefits;
 4. Protect the resources and ecology of the shoreline;
 5. Increase public access to publicly owned areas of the shoreline;
 6. Increase recreational opportunities for the public on the shorelines; and,
 7. Provide for any other element as defined in RCW 90.58.100 and deemed appropriate or necessary.

The pier would be visible on Manhattan Beach, the beach from South Point (approximately 1.3 miles north) to the head of Thorndyke Bay (approximately 1 mile south).

Manhattan Beach, including the proposed pier location, has little public access, and recreational use of the beach is mostly limited to the residents, guests and vacationers of the homes and cabins located there. These people regularly walk along the beach, including the proposed pier location and would be able to continue to do so, although the character of the shoreline in the immediate vicinity of the pier would be altered.

Recreational boaters (e.g. sailboats, small fishing and pleasure boats, yachts and kayaks) often pass this stretch of Hood Canal beach. Due to the limited fishing opportunities, lack of mooring facilities and more attractive areas to explore, recreational boaters primarily frequent areas further south in Hood Canal, such as Thorndyke Bay. The Proposed Pier will not obstruct beach walkers or kayakers. The Pier structure has an approximately 20-foot clearance at low tide, and 10-foot at high tide. The proposed project will increase marine traffic in this northern portion of Hood Canal. Barge and ship loading and the associated northerly marine transit will add up to six barges per day, 300 days a year. In 8 to 12 years, it is anticipated six ships would call on the pier per month.

Much of the Proposed Project is on a private commercial tree farm, where the owner (also a signatory to the application) allows limited use by others for recreational activities (e.g. trail walking, hunting and fishing). The Applicant has stated that these activities are expected to be continued be allowed within the tree farm, during both the construction and operations of the Proposed Action.



3.9 NOISE

Sounds permeate our existence as a form of energy with myriad sources generating air vibration and pressure waves. Unwanted sound, or noise, while subjective, can affect the quiet ambience of rural communities by intruding or interrupting sleep, thought, conversation and enjoyment. Continued exposure to workplace noise over time can lead to gradual and permanent hearing loss, and is suspected of causing or aggravating other diseases and conditions, such as migraine headaches.

Congress kick-started public protection from adverse sound level exposure—noise—when it passed the Noise Pollution and Abatement Act in 1972, setting in motion over decades a multitude of local, state and federal regulations aimed at curbing noise levels affecting human health and wildlife. Exceeding permissible levels generated at the workplaces (occupational noise) and surrounding properties (environmental noise) is not permitted.

In the course of manufacturing construction grade sand and gravel, analysis of the Proposed Action's noise-generating industrial activities covers numerous project sources, including:

- loaders and other heavy equipment to extract sand and gravel and hoist onto conveyors;
- the crushing, washing and stockpiling of sand and gravel at the Operations Hub;
- transporting processed materials via electrically powered upland and shoreline conveyor belts; and,
- loading sand and gravel onto barges and ships from a Proposed Pier.

Noise impacts to animals and fish are evaluated in Chapter 3.04 Marine Habitat and Animals, Chapter 3.06 Terrestrial Plants and Animals (EPA 1980), and Chapter 3.07 Threatened and Endangered Species.

3.9 1 Regulatory Overview and Permits

Noise levels generated at the workplace (occupational noise) are regulated under federal and state requirements. The intent of occupational noise regulations is to limit worker exposure to potentially (short and long term) dangerous sound levels and intensity.

Noise levels generated from one property that can be heard from another property (environmental noise) are regulated under state, county and city requirements. The intent of environmental noise regulations is to assure quiet use and enjoyment of surrounding properties.

3.9 1.1 Federal

The Occupational Safety and Health Administration (**OSHA**) regulate safety standards for workplace exposure to sound (29 CFR 1910.95). Captains and crews on US-flagged vessels are subject to **OSHA** requirements while in navigable waters of the United States. The U.S. Coast Guard rules and regulations prevail over **OSHA** regulations aboard all US-flagged vessels to the extent the Coast Guard chooses to exercise jurisdiction.

The federal government regulates miner safety standards for workplace exposure to sound under the Mine Safety and Health Administration (**MSHA**) at all types of mines, including surface mines. (30 CFR 62.100)

OSHA and **MSHA** rules and regulations set limits on workers' exposure to high sound levels, limiting both the time and intensity allowed. Both prescribe specific methods and equipment to be used to prevent the occurrence, and reduce the progression, of occupational noise-induced hearing loss among workers.

3.9 1.2 State

The Washington State Department of Labor and Industry (**DOL**) adopted and administers federal **OSHA** worker safety standards, including those applicable to hearing loss prevention for workers. (Ch. 49.17 RCW, WAC 296-817).

Upland environmental noise is regulated by the Washington Department of Ecology (**Ecology**) (Ch. 70.107 RCW, Ch. 173-60 WAC). Ecology limits noise levels received at the property line of neighboring ("receiving") parcels. The maximum permissible environmental noise level depends on the types of land use of both the sound source and the receiving property. Three types of land use are designated: residential, commercial and industrial, with the Environmental Designation of Noise Abatement (**EDNA**) A, B and C respectively:

- "A" (**residential** homes, apartments, businesses, and public facilities where human beings reside and sleep, e.g. homes, parks, and hospitals);
- "B" (non-residential uses (**commercial**) requiring protection for human speech, e.g. hotels, restaurants, retail services and offices); and
- "C" (other areas of human activity where higher levels of noise may be anticipated, e.g. warehouses, **industrial**/manufacturing plants, agricultural and forestry lands).

Table 3.9-1 Washington State Maximum Permissible Environmental Noise Levels in dBA

Land Use of Noise Source	Land Use of Receiving Source			
	EDNA "A" (Residential)		EDNA "B" (Commercial)	EDNA "C" (Industrial)
	Day	Night*		
EDNA "A" (Residential)	55	45	57	60
EDNA "B" (Commercial)	57	47	60	65
EDNA "C" (Industrial)	60	50	65	70
*Between the hours of 10:00pm and 7:00am				

Ecology's maximum permissible environmental noise levels allow short-term exceedances in order to account for the variability inherent in noise generated by many commercial and industrial facilities. At any hour of the day or night the applicable Maximum Permissible Environmental Noise Levels (Table 3.9.1) may be exceeded at the closest receiving property line by no more than 5 dBA for 15 minutes, 10 dBA for 5 minutes, or 15 dBA for 1.5 minutes during any one-hour period (WAC 173-60-040). Thus, short term (1.5 minutes per hour) sound level maximums may not exceed 75 dBA during the day and 65 dBA during the night at residential receiving property line (WAC 173-60-040 (2)(c)(3)).

Warning alarms often found on heavy equipment and commercial vehicles as required by federal or state occupational safety rules and regulations, are exempt from the Washington State Maximum Permissible Environmental Noise Levels (WAC 173-60-050 (4)(e)).

Construction noise is exempt from compliance with Washington State Maximum Permissible Noise Levels (Table 3.9.1) during daytime hours of 7:00 a.m. to 10:00 p.m. (WAC 173-60-50(3)(a)). No exemption is granted for construction noise generated during weekday nights or weekend operations.

3.9 1.3 County

Jefferson County has adopted the State's Maximum Permissible Environmental Noise Level standards by reference (JCC 18.30.190). The County also requires mining extraction and reclamation activities that create a noise disturbance take place weekdays between 7:00 a.m. and 7:00 p.m. (JCC 18.20.240(2)(f)).

The **Ordinance** requires that all noise levels created from activities at the Operation Hub and Meridian Extraction Area and received at the closest residential property lines (**EDNA A**) comply with stricter noise requirements than the state noise standards. These stricter requirements include:

- Time frame for applicable noise limits for the daytime weekday and weekend operational hours ends sooner (7:00 p.m. instead of 10 p.m.);
- Lower weekday maximum permissible noise levels received at the closest neighboring property lines (57 dBA daytime, 47 dBA nighttime; both are 3 dBA less than adopted state levels);
- Lower weekend maximum permissible noise levels received at the closest residential property lines (47 dBA for both daytime and nighttime; both 3 dBA less than adopted state levels); and,
- Any planned, temporary exceedance of this standard must be authorized beforehand by the County's Administrator and be documented. (Ordinance, Section 2, condition 1).

Hood Canal shorelines are regulated by the County under its Shoreline Master Plan (**SMP**). The **SMP** shoreline jurisdiction applies to the centerline of Hood Canal. All of the shoreline between the Ordinary Highwater (**OHW**) line are designated as "Aquatic."

The County's **SMP** contains a specific noise standard that prohibits noise levels generated in the aquatic area from exceeding "50 dBA measured 100 feet from its

source.” (JCC 18.25.100 (3)(f)). Therefore, a noise level limit of 50 dBA at 100 feet (measured from the Pier) is applicable to the section of the Proposed Pier that is waterward of the **OHW** line.

In addition, the 1989 Jefferson County **SMP** requires that a project proposal be evaluated for consistency with certain Shoreline designation policies and performance standards pertaining to the over-water portion of the Proposed Project to the Extreme Low Tide Mark (**ELTM**) (Aquatic Environment, **SMP** 4.101); the upland portion of the Proposed Project (Conservancy Environment, **SMP** 4.103); and the use designation (Industrial and Port Facilities, **SMP** 5.90) including:

- The maximum level for noise generated in the Aquatic designation shall be 50 dBA at a distance of 100 feet. This standard shall not apply to vessels that are underway. All feasible methods shall be employed to minimize over-water noise generation (**SMP** 4.101 Aquatic Environment Performance Standard 6).
- Industrial facilities shall be located, designed, constructed, and operated to minimize unnecessary interference with the right of adjacent property owners, as well as adjacent shoreline or water uses (**SMP** 5.90 Industrial and Port Facilities Performance Standard 4).
- Objectionable noise that is due to volume, frequency, or beat shall be muffled or otherwise controlled (**SMP** 5.90 Industrial and Port Facilities Performance Standard 8).

The Proposed Project will require a Conditional Use Permit (**CUP**) and a Shoreline Conditional Use Permit (**SCUP**). Depending on the final design of the pier and loading facilities, the project may also require a variance from the aquatic noise standard for some noise generated at the point where gravel is being loaded into barges and/or ships. In its recommendation on the **CUP** and **SCUP**'s, the Jefferson County Hearing Examiner must consider whether the Proposed Project will introduce noise or other conditions or which unreasonably impact existing uses in the vicinity of the subject site. (JCC 18.40.530(1)(d)).

In order to address the environment in a comprehensive manner, the Comprehensive Plan's Environmental Element contains goals and policies including those for protection from noise conditions:

ENVIRONMENT ELEMENT GOAL

- ENG 8.0 Protect the habitability, environmental quality and natural beauty of Jefferson County from the adverse impacts of development with respect to noise and mitigate impacts based on the conditions.

ENVIRONMENT ELEMENT POLICY

- ENP 8.2 Include in the public planning process a discussion regarding limiting noise pollution impacts through ordinance provisions which may require appropriate mitigation such as vegetative buffers, setbacks, acoustical walls, and termination of activities.

3.9 2 Affected Environment

The mining of sand and gravel at the Meridian Extraction Area, processing at the Operation Hub, and the route of the Central Conveyor (except its final leg), would occur within the southern half of Thorndyke Block of the Hood Canal Tree Farm. Silviculture and tree harvesting has occurred on this commercial tree farm since prior to statehood. There are other private sand and gravel mining and processing operations in the Thorndyke Creek valley, where the Meridian Extraction Area would be located. The largest of these operations was started to replace the old Shine Pit which was closed for processing in 2013. There are also a few small sand and gravel borrow pits of less than 3 acres which are occasionally mined to build and maintain the private forestry service roads in the tree farm.

The proposed Operations Hub would be located a mile east of the Meridian Extraction Area, up and over an unnamed ridgeline, on 100-acres of land where the old Shine Pit operated.

The 14.7-acre rural waterfront property where the Proposed Pier would be situated is undeveloped. Rural waterfront residences and cabins on large lots front Hood Canal to the northeast and southwest of the Pier location. There are waterfront homes approximately 1.2 miles across Hood Canal on its eastern (Kitsap) side, generally built on far smaller lots. Naval Base Kitsap-Bangor (NBK Bangor) lays approximately 2.7-miles southeast from the Pier site, on the eastern shore of the Hood Canal.

Activities that would occur at the proposed Meridian Extraction Area, Operations Hub, and Central Conveyor and Pier are considered industrial noise sources (EDNA C). The closest existing residences with the greatest potential to be impacted by the Proposed Project are located approximately 2+ miles to the south of the Meridian Extraction Area (near Thorndyke Lake); approximately ½ mile northeast of the Operations Hub (adjacent to State Highway 104); and approximately 1,140-feet to the southwest (neighboring waterfront residence on Groves Way) and 840-feet to the northeast (neighboring summer cabin) of the Central Conveyor and Pier. The closest property lines (EDNA A) of those neighboring residences are even closer (MFG 2004; Environalysis 2011).

3.9 3 Proposed Action: Direct and Indirect Impact

Noise is composed of a range of frequencies, each occurring simultaneously at varying sound pressure levels. As measured by an electronic sound level meter, frequency-weighting combines the overall range of sound frequencies into a single sound measurement. The commonly used frequency-weighting for environmental noise is A-weighting, or “dBA”, which approximates how an average person hears sounds.

Sound is created when objects vibrate, resulting in a minute variation in surrounding atmospheric pressure called sound pressure. The human response to sound depends on the magnitude of a sound as a function of its frequency and time pattern. Magnitude describes the physical sound in the air (EPA 1974).

See Figure 3.9-1 The range of magnitude from the faintest to the loudest sound humans can hear is so large that sound pressure is expressed on a logarithmic scale in units called decibels (dB). A similar logarithmic scale is used to measure earthquakes (Richter Magnitude Scale). Because of the logarithmic decibel scale, a doubling of the number of sound sources, such as machinery or vehicles, increases noise levels by 3 dBA. Similarly, a tenfold increase in the number of sound sources will add 10 dBA. For example, a sound source of 60 dBA combined with another sound source of 60 dBA results in a combined sound level of 63 dBA, not 120 dBA.

Noise levels decrease with distance from the sound source and intervening buffers (attenuation), such as topography, ground surface texture and the presence of vegetation. For a fixed point source of sound, such as a rock crusher, noise levels will generally decrease between 6 and 7.5 dBA for every doubling of distance from the source (Enviroanalysis 2002; MFG 2004). For example, assuming a reduction of 6 dBA due to spreading of sound waves, a point source equal to 80 dBA at 50 feet would have a sound level of 74 dBA at 100 feet, 68 dBA at 200 feet, and 62 dBA at 400 feet (Epsilon 2006).

Noise levels will also decrease with distance from a linear source of sound, such as a conveyor system or highway, and with intervening buffers, such as topography, ground surface texture and the presence of vegetation. However, the attenuation will occur at a lower rate of between 3 and 5 dBA for every doubling of distance from the source (MFG 2004). The differences in the attenuation factor of a fixed point and line source are accounted for when modeling a project that has both types of sound sources.

Over water, noise levels also decrease with distance, but no additional attenuation is provided from intervening topography or vegetation. In calm conditions the transmission of sound is so unbuffered that distant conversations or other faint sounds are audible.

Loudness, compared to physical sound measurement, refers to how people subjectively judge a sound, and it varies from person to person. A listener often judges an increase of 10 dBA to be twice as loud. In general a noise level increase of:

- from 1 to 3 dBA is considered “not [noticeable] to barely noticeable”;
- from 3 to 5 dBA is considered “noticeable” to most people;
- from 5 to 7 dBA is considered “easily heard”; and,
- from 7 to 10 dBA and louder is considered “substantial”.

Tones, a steady periodic sound, such as a warning bell, are typically perceived as being louder than other sounds of the same decibel strength.

Weighted Sound Levels and Human Response

	SoundSource	dBA	Range of Human Response
140	Aircraft carrier operation	140	
	Jet takeoff (200 ft away)	120	Painfully loud
120	Riveting machine	110	Maximum vocal effort
	Shout (0.5 foot away)	100	
90	Heavy Truck (50ft. away)	90	
	Busy street	80	Hearing damage with continuous exposure
70	Freeway traffic (50 ft. away)	70	Telephone use difficult
	Air conditioning unit (20 ft)	60	
50	Light auto traffic	50	Quiet
	Library, bedroom	40	
30	Soft whisper	30	Very quiet
	Broadcasting studio	20	
10	Undefinable	10	Just audible
	Undefinable	0	Threshold of hearing

Figure 3.9-1

Sound Pressure Levels of Representative Noises One decibel of sound is the smallest difference an average person can detect, with every increase of 10 decibels perceived as twice as loud. Topography and other obstructions can further reduce the spread of sound while the presence of loud sounds, such as a busy highway, can drown out fainter sounds (called masking). **Source:** U.S. Council on Environmental Quality

To evaluate the noise impacts of the Proposed Project, specific studies were conducted on mining and processing activities, conveyor transport, Pier load-out activities and existing ambient noise levels on the properties surrounding the Proposed Project. Potential future noise impacts have been estimated using computer modeling. The modeling used to predict noise levels at the closest residential property lines (**EDNA A**) and loudness that would be experienced at the nearby residences took into consideration:

- Previous studies conducted at the then-operating Shine Pit, which measured comparable industrial equipment, conveyor systems and heavy machinery used in sand and gravel extraction and processing, along with a steady compliment of truck and trailers being loaded, coming and going from that operation;
- Noise levels measured as sand and gravel was placed in a ship and on barge at an existing sand and gravel load-out Pier (Sechelt B.C.);
- Noise levels measured at an conveyor transfer point along the route to an existing sand and gravel load-out Pier used for barge loading (Shelton, WA);
- Noise levels measured from the arrival and departure movements of a bulk carrier ship at an existing sand and gravel load-out Pier (Point McNeil, B.C.); and,
- Noise levels measured continually at various residences near the Proposed Pier waterfront location over a 48 hour period, during dry and light winds weather conditions.

The CadnaA™ (Computer Aided Noise Abatement Noise Prediction Software) noise model followed the methodology specified by the International Standards Organization (ISO 9613), which disseminates noise as if there were a wind blowing from each noise generating source towards each receiver. The noise modeling assumed a 7-day a week, 24-hours a day work schedule. It considered the strictest applicable local or state regulatory requirement to determine if any exceedance was expected. The noise modeling assumed the most conservative analysis (“worst case”) of potentiality of noise disturbing activity generated by the Proposed Action to estimate the effect of the loudness to a listener at a neighboring residence.

3.9 3.1 Construction

3.9 3.1.1 Occupational Noise

Because of the overlapping nature of federal **OSHA**, **MSHA**, and State occupational noise rules and regulations, construction workers will be required to strictly follow occupational noise standards, protocols and best management practices, including state regulations protecting workers from hearing loss, and **MSHA** and **OSHA** standards for workplace exposure to sound (EPA 1974). Federal enforcement rules, particularly **MSHA**, place the burden on any contractor and mine operator to ensure that all requirements are followed. Federal and state occupational health enforcement officers commonly inspect worksites involving heavy construction activities such as those that would be required to build the Proposed Action. The various Proposed Action construction worksites will comply with all applicable federal and state occupational noise rules and regulations.

3.9 3.1.2 Environmental Noise

State and County noise rules and regulations exempt construction activities from compliance with the maximum permissible environmental noise levels during weekday daytime work hours (7 a.m. to 7 p.m.) (WAC 173-60-50(3)(a)). The Applicant estimates that the construction activities associated with the Meridian Extraction Area, Operations Hub and Central Conveyor would be completed within a one year time frame. Specific construction activity timeframes would vary depending on the task required to complete. Construction of the in-water portion (e.g. pile driving) of the Proposed Pier is estimated to require two to three months to complete, subject to stoppage due to seasonal fishery restrictions.

Noise modeling (Enviroanalysis 2011) of the proposed Project determined that the increased noise levels generated from the various construction activities that would occur within the Meridian Extraction Area, Operations Hub, and along the majority of the Central Conveyor route would most likely be “noticeable” to bordering residences. This is due to distance from the construction activities, the intervening topography and nature of the type construction activities performed.

Under a worst case scenario (at night, when the ambient noise is at its lowest), construction of the final section of the Central Conveyor, particularly the bridge crossing over Thorndyke Road and the Pier (which involves pile driving and truss lifting), would generate a sufficient increase in noise levels that nearby residents would consider the noise they heard disturbing.

Table 3.9-2 illustrates those “worst case” conditions the model predicted. For example, the modeling predicted that the combined sound levels generated during the construction of the Proposed Pier would reach as high as 79 dBA.

Figure 3.9-2 shows the locations of the monitoring stations.

Construction would occur only during the daytime, but sound measurements taken for the noise model (Enviroanalysis 2011) recorded ambient noise levels as low as 35 dBA during quietest hour of the permitted 7 a.m. – 10 p.m. construction period. If the construction noise were to occur during that very quiet daytime hour, the increase in noise of 44 dBA (79 dBA - 35 dBA = 44 dBA) would be high enough that it would be beyond “substantial”. Most likely a listener would find it disturbing. It is expected that short-term spikes in noise generated from certain activities conducted during in-water construction, such as pile-driving impact testing, would be even more pronounced.

To minimize the disturbance to surrounding neighbors during construction of all components of the Proposed Action, the Applicant has agreed:

- To use only construction equipment that is in good working order, especially properly maintaining any noise muffling systems;
- Stage work efficiently to minimize the days needed to construct;
- Restrict all construction activities to the hours of 7 a.m. to 7 p.m. weekdays only—no work at night or on the weekends (this coincides with both state and county construction noise exemption timeframes); and,
- Further restrict the daily start of any construction activities for building of the Pier, to one hour past sunrise or 7 a.m., whatever time is later.



Noise Monitoring Locations Construction and operational noise levels were modeled for four residential receptor sites: Soaring Eagle Road (SLM-1), Groves Way (SLM-2), summer cabin (SLM-3), and along the eastern shore of Hood Canal (SLM-4).

Table 3.9-2 Distance of Receivers from Construction Activity and Maximum Construction Noise

Central Conveyor Construction			
Receiver	Existing Noise Levels Range of Hourly LEQs	Distance of Closest Part of Conveyor in Feet	Maximum Construction Noise (dBA)
SLM - 1 Soaring Eagle Road	26 - 52	1140	54 - 62
SLM - 2 Groves Way	25 - 49	4020	65 - 73
SLM - 3 Near Summer Cabin	30 - 53	840	68 - 76
Pier Construction			
Receiver	Existing Noise Levels Range of Hourly LEQs	Distance of Closest Part of Pier in Feet	Maximum Construction Noise (dBA)
SLM - 1 Soaring Eagle Road	26 - 52	1250	54 - 68
SLM - 2 Groves Way	25 - 49	3950	64 - 78
SLM - 3 Near Summer Cabin	30 - 53	1140	65 - 79
"Worst-case" potential construction noise is if all equipment needed to build the Pier, the Thorndyke Road bridge crossing and the final section of the conveyor is operating at once, not factoring in any attenuation due to intervening topography or vegetation. Source: Environalysis 2011			

3.9 3.2 Operations

Operations of the Proposed Project would include noise generating activities. This would occur at the Meridian Extraction Area during extraction and conveying of sand and gravel to the Operations Hub, processing at the Operations Hub, conveying the sand and gravel via the Central Conveyor to the Pier, and during loading on to barges and ships for maritime delivery.

3.9 3.2.1 Occupational Noise

All work-related activities of Proposed Action are subject to the rules and regulations of at least one of federal (**OSHA**, **MSHA**) and state (**DOL**) occupational safety regulatory agency. As noted above, the Applicant will have the burden of ensuring that all federal **OSHA**, **MSHA**, and State occupational noise rules and regulations are met, and all miners and workers strictly follow occupational noise standards, protocols and best management practices, and comply with field inspectors.

3.9 3.2.2 Environmental Noise

Table 3.9-3 2002 Measured Sound Levels of then-Operating Shine Pit Machinery in dBA

Process & Equipment	Sound Pressure Level at 50 Feet from Equipment	Equipment Included in Proposed Project
Working Face (CAT 980F)	83	No
Primary Crusher (Screens, Conveyors)	91	Yes
Wash Plant	82	Yes
Concrete Recycling Plant	88	No
Asphalt Plant	86	No
Gravel Truck (Loaded tandem on level surface at 25 mph)	69	No
Source: Environalysis 2011		

3.9 3.2.2.1 MERIDIAN EXTRACTION ACTIVITIES. The strictest maximum permissible environmental noise levels applicable for the Meridian Extraction Area are 47 dBA (nighttime) and 57dBA (daytime) measured at the closest residential property line (Ordinance, Section 2, condition 1), located near Thorndyke Lake, approximately two miles to the south of the proposed Meridian Extraction Area.

Mining activities at the Meridian Extraction Area would involve removal of vegetation and topsoil, and extraction of sand and gravel using heavy machinery (e.g. Caterpillar™ brand CAT 980F front-end loader). Aggregate would then be loaded onto the Little Wahl and Wahl Conveyors and conveyed to the Operations Hub. All activities in the Meridian Extraction Area and Wahl Conveyors would be considered industrial (EDNA C) under applicable state and local noise regulations.

Noise modeling of the proposed Meridian Extraction Area (Environalysis 2011) incorporated the findings of previous studies done at the Shine Pit, factoring in the contributing noise that would be generated by the Operation Hub, Central Conveyor and Pier activities, to calculate the cumulative noise level generated by all activities in the proposed Meridian Extraction Area. Previous studies conducted at the then-operating Shine Pit registered sound levels generated at a working face of an extraction area being mined by a Caterpillar™ brand CAT 980F front-end loader as 83 dBA at 50 feet (considered a line source). The sound levels from an uncovered conveyor were measured at 49 dBA at 50 feet. Sound levels from an unenclosed conveyor transfer point were measured at 69 dBA at 50 feet (Environalysis 2011).

These actual measurements were used in the CadnaA™ model to calculate the combined sound level at the proposed Meridian Extraction Area. Operational sound impacts would range from 18 to 37 dBA at the edge of area. This would be far less than the strictest noise level allowed at the closest residential property line (EDNA A). It is anticipated that at the actual closest residential property line, some two miles away from Meridian Extraction Area (EDNA C), the operational sound impacts would be even lower.

Therefore, noise levels created from the industrial activities (**EDNA C**) at the proposed Meridian Extraction Area and received at the closest residential property line (**EDNA A**) are expected to be in compliance with day or nighttime maximum permissible environmental noise levels required. Given the attenuating effects of the topography and vegetation between the Extraction Area and the closest resident, a listener at that property line would likely consider the increase in noise to be “not noticeable to barely noticeable”, even during very quiet moments during the day.

3.9 3.2.2.2 OPERATIONS HUB. Under the Ordinance, the strictest maximum permissible environmental noise levels for the proposed Operation Hub are 47 dBA (nighttime) and 57dBA (daytime) measured at the closest residential property line. The closest residential property line is located near State Highway 104, approximately 1/2 mile to the northeast of the proposed Operations Hub.

The proposed Operations Hub would occupy 100-acres where the Shine Pit had previously operated. In 2002, Jefferson County Department of Community Development required the Shine Pit operator to conduct a noise study to determine whether operations exceeded permissible state and local environmental noise levels (Enviroanalysis 2002). The operation (**EDNA C**) was found to be in compliance, even at the operational edge of the pit (47 dBA at night), which was about ½ mile closer than the closest residential property line (**EDNA A**). The noise heard coming from the pit’s operation was considered “noticeable” at some nearby residences, especially when certain weather conditions prevailed (e.g. warm, still summer nights). However, in most timeframes, the increase in noise was considered “not noticeable to barely noticeable”, with the exception of the back-up alarms of heavy machinery and trucks operating during some nighttime operations.

Noise modeling of the proposed Operations Hub (Enviroanalysis 2011) incorporated the findings of the previous Shine Pit 2002 study and determined that the noise generated by the Operations Hub would attenuate, due to the extreme distance (over 20,000 feet) and intervening topography, to such low levels that it would be not add to the cumulative noise levels at residential properties close to Thorndyke Lake or the Pier. Although the amount of sand and gravel to be processed and sent out (via the Central Conveyor) from the proposed Operation Hub would be substantially higher than had occurred when the old pit was running, the Proposed Project will use the same type (although of newer design) of processing equipment (e.g. screening plants, wash plants, rock crushers). Though larger in size, this new equipment is expected to generate noise levels comparable to what historically occurred from similar equipment used in the operations of the Shine Pit. Moreover, the new Operations Hub will no longer extract sand and gravel immediately adjacent to the processing area, operate an asphalt or concrete recycling plant, use equipment powered by diesel generators, or load and operate trucks and trailers to transport the aggregate.

See Chapter 1 Figure 1-7 The proposed Operation Hub would have a twenty-foot high earthen berm, situated between the operations and the neighboring residential properties to the east. The earthen berm will provide a visual barrier but will not materially reduce operational noise levels at residential properties located more than 3,000 feet distant. It is anticipated that the decrease in the number of noise generating activities would likely lower the noise level leaving the site below that which had historically occurred when the Shine Pit operated.

Factoring in those considerations, noise levels created from the industrial activities (**EDNA C**) at the proposed Operation Hub and received at the closest residential property line (**EDNA A**) are expected to be in compliance with day and nighttime maximum permissible environmental noise levels. The loudness is likely to be considered by a listener at a nearby residence to be “not noticeable to barely noticeable”, except when certain weather conditions prevail, such as during a warm, still summer night. Only then would the loudness likely be considered “noticeable.”

3.9 3.2.2.3 CENTRAL CONVEYOR. The Conveyor will operate during the loading of vessels. For the upland portion of Central Conveyor, the strictest permissible environmental noise levels applicable (**EDNA C**) are 50 dBA (nighttime) and 60 dBA (daytime) measured at the closest residential property line (**EDNA A**) (WAC 173-600, JCC 18.30.190). The closest residential property line is located approximately 430 feet west, on the upland portion of the abutting summer cabin’s property line.

The noise study (Enviroanalysis 2011) used the most stringent maximum permissible environmental noise levels (47 dBA night and 57 dBA day) (Ordinance, Section 2, condition 1). Although these restrictions are technically applicable only to the Operations Hub and Meridian Extraction Area, noise still did not exceed permissible levels at the closest residential property line (a summer cabin) or other residential parcels near the upland portion of the Central Conveyor during any timeframe. Noise levels generated from the industrial activities (**EDNA C**) of the upland portion of the proposed Central Conveyor and received at the closest residential property line, the summer cabin (**EDNA A**), are expected to be in compliance with day and nighttime maximum permissible environmental noise levels.

For the shoreline portion of the Central Conveyor, the strictest maximum permissible environmental noise level applicable (**EDNA C**) is 50 dBA at 100 feet away from the sound source, in this case the Central Conveyor, rather than the closest residential property line (Jefferson County 1989 SMP). The noise modeling determined that, if certain design considerations for the Pier structure proposed by the Applicant were implemented, the noise level generated from the shoreline portion Central Conveyor would be 49 dBA at 100 feet. Those design considerations, shown on the Applicant’s preliminary designs, included covering or enclosing the Central Conveyor along its entire route, particularly the covers and enclosures, as shown on the designs for the Pier structure.

Noise levels created from the industrial activities (**EDNA C**) of the shoreline portion of the Central Conveyor are expected to be in compliance with the day and night maximum environmental noise level (50 dBA at 100 feet) set by Jefferson County’s **SMP** for aquatic lands under its jurisdiction.

Table 3.9-4 Modeled Sound Pressure Levels dBA Hourly LEQ

Receiver	Address of Receiver	Range of Background Noise Levels	Sound Levels Generated by Project	Cumulative Sound Levels Background + Project	Increase Due to Project
SLM – 1	62 Soaring Eagle Road	26 – 52	28	30 – 52	0 – 4
SLM – 2	184 Groves Way	25 – 49	37	37 – 49	0 – 12
SLM – 3	Near Summer Cabin	30 – 53	40	40 – 53	0 – 10
SLM – 4*	24559 Johnson St.	25 – 47	0	25 – 47	0
R – 1	Beach front at 62 Soaring Eagle Road	Assume 30 – 55	27	32 – 55	0 – 2
R – 2	Beach front at 184 Groves Way	Assume 30 – 55	41	40 – 55	0 – 10
R – 3	Portion of Aquatic Lands 100 feet from Conveyor	Assume 30 – 55	49	49 – 56	1 – 19

*In regard to SLM-4, per Table 3.9-5, even though there is no attenuation provided from intervening buffers over water, noise generated by the Proposed Project would not reach the receptor represented by SLM-4 as the receptor is too far from gravel loading nose at the Pier (Enviroanalysis 2011). The A-weighted decibel level of noise generated by the project is so low that it would not be audible or add to the cumulative noise levels of this area. However, the sound levels of individual octave bands generated by the project could be louder than those same octave bands occurring in the non-project ambient background and thus might be audible. Source: Enviroanalysis 2011

3.9 3.2.2.4 PIER. The portion of the Pier before it reaches the gantry for the load-out arm is subject to Jefferson County **SMP**'s noise restrictions, which allow a maximum of 50 dBA at 100 feet away from the sound source. Any work or service vehicle operating on this portion of the Pier is expected to be transitory in nature and not expected to contribute noise that would exceed that level.

The gantry for the load-out arm is also subject to **SMP** standard of 50 dBA at 100 feet away from the sound source. Noise from loading operations may exceed this standard, depending on the final design of the load-out arm and pier. If so, a variance from the noise standard would be required.

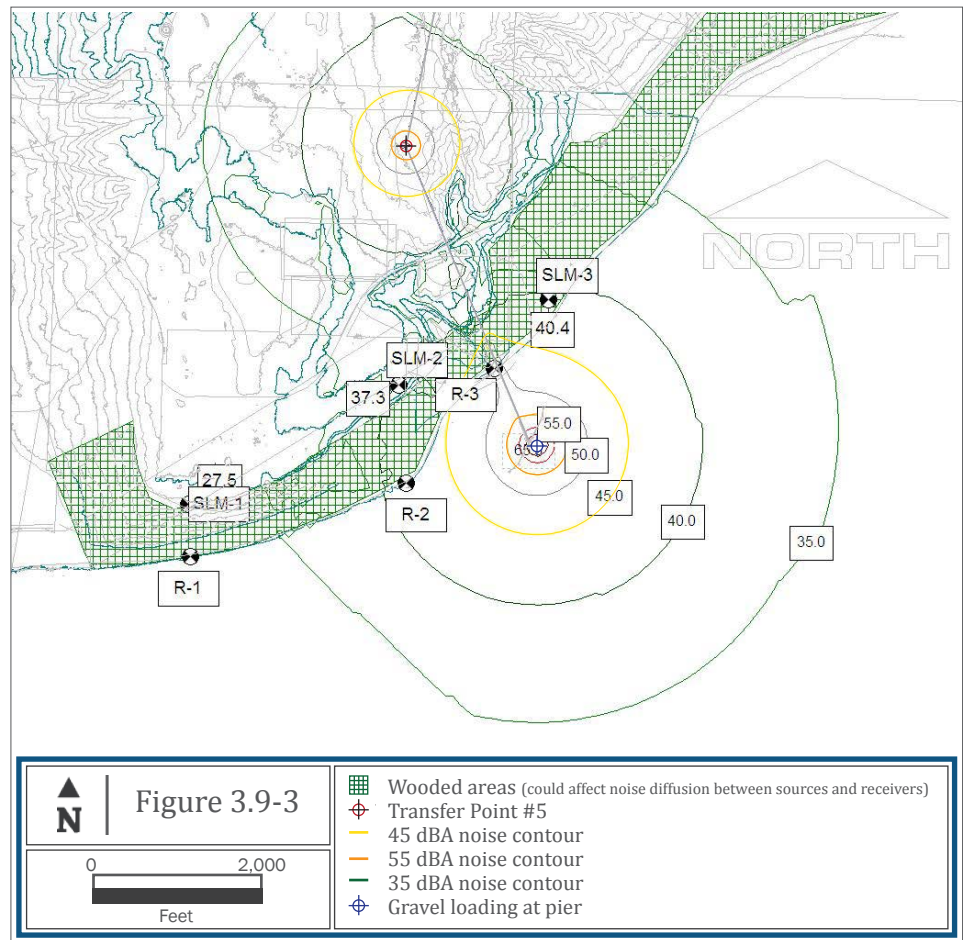
The closest residential property line is a summer cabin, located landward in a northwesterly direction, approximately 700 feet from the start of the deep-water portion (**ELTM**) of the Pier and 1400 feet at the termination point of the Proposed Pier. Even before reaching the **ELTM**, the final 450 feet of the Proposed Pier structure would be fully enclosed, including the control room and supporting gantry of the load-out conveyor arm. The enclosure will attenuate noise heard outside the structure from noise generated from within, to a level of 49 dBA or less (measured at 100 feet from the outside of the structure).

See Figure 3.9-3

The Proposed Pier would be used up to 300 days annually, allowing 65 days annually for holidays, tribal fishing, inclement weather and other periods of non-use. Initially, only barges will call at the Pier. The Applicant has stated that up to two barges can be berthed at the Pier at one time; up to six barges per day would be loaded at the Pier. Depending on the capacity of the barge, the Applicant estimates that it would take barges one to eight hours to berth, load and depart; the most typical barge (5000 dwt) would take approximately 2-3 hours.

Operational Noise

Contours The figure depicts operational noise levels as they extend from transfer point number 5 and the gravel loading at the pier.



Applicant anticipates it may begin using ships when they come available, 8 to 12 years after construction of the Pier. Up to six ships may call at the Pier per month; most ship operations at the Pier (berthing, loading and departure) would take 24 hours to complete. No barges would be loaded or berthed at the Pier during days when ships were being loaded.

As part of establishing the baseline for the noise study conducted in 2011 (Enviroanalysis 2011), noise measurements were taken at an operating sand and gravel load-out Pier in Sechelt, B.C. Data on the noise from the arrival and departure of a bulk carrier was found in a noise study performed for a facility in Port McNeil, B.C. with a similar design to the load-out Pier in Sechelt, B.C. The activities at each facility measured 69 dBA at 100 feet. Unlike the proposed fully enclosed design for the final 450 feet of the proposed Thorndyke Pier, only the control rooms of either of B.C. Piers were enclosed.

The loudest noises will occur during berthing and departure of the barges and ships. The loudest point source of the Proposed Pier would occur at its end, where the sand and gravel would be loaded onto barges and ships. This point is approximately 1400 feet from the summer cabin's closest point of its shoreline property line. The detailed modeling results are shown in Table 3.9-4 and indicate that the noise levels reaching the summer cabin's closest point would be 40 dBA.

The model predicted that the increase in overall noise from operation of the proposed Central Conveyor and Pier would normally be considered by a listener, just outside the summer cabin, as “noticeable” during daytime hours. During the quietest 1-3 hours at night, when the background noise levels fell below 40 dBA, the project’s noise would be considered a “substantial” increase above the background non-project conditions to that same listener.

However, when ambient (background) noise levels exceeded 40 dBA, such as during a windy rainstorm, the increase in noise coming from the Proposed Action would be considered “not noticeable to barely noticeable” and would contribute only slightly to the increased noise levels in the surrounding neighborhood. The modeling showed similar results for the next nearest neighboring residences, located west from where the Proposed Pier would be sited. The model results did not predict an increase in noise levels at a residence located on the east side of Hood Canal (Envronalysis 2011). However, the “hard” surface of a body of water can reflect acoustic energy and increase the sound level at distant receptors. Thus, under certain weather conditions, like on a still water, warm, summer night, noise generated from the Proposed Action may be audible to residences on the east side of Hood Canal (MFG 2004).

Noise levels generated by the Proposed Action reaching the inside of the residence would measure in the range from 15 to 20 dBA—much lower than the anticipated mid-30s dBA from home noise sources such as furnaces, fans, or refrigerators (MFG 2004). Therefore, it is expected that a listener would perceive noise from the Proposed Action to be on the lower side of “not noticeable to barely noticeable” if they were in their home—even during the still of the night. Because of the increased ambient noise levels of the surrounding area during the day, that same listener standing outside would likely consider the noise coming from the Proposed Action to be on the higher side of “not noticeable to barely noticeable”.

3.9 3.2.2.5 MARINE TRANSPORTATION. Environmental noise regulations exempt marine vessels while underway. Sound generated from vessel operation may be audible to nearshore receptors. Noise measurements at the Sechelt facility recorded ship-departure noise levels of 51 dBA at a distance of 500 meters (1640 feet) and 46 dBA at 1000 meters (3280 feet) (Orca 2004).

References

- Envronalysis, LLC. 2002. Report on the Existing Noise Levels in the Vicinity of Fred Hill Materials Operations at Shine, Washington. October 2002.
- Envronalysis, LLC. 2011. Noise Study for the Thorndyke Resources Operations Complex (T-ROC) Central Conveyor and Pier Project. September 1, 2011.
- EPA (U.S. Environmental Protection Agency). 1980. Effects of Noise on Wildlife and Other Animals; Review of Research Since 1971. EPA 550/9-80-100. July 1980.
- MFG, Inc. Atmospheric Science Group. 2004. T-ROC Central Conveyor and Pier Project Noise Analysis Thorndyke, WA Jefferson County. January 13, 2004.

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3.10 AESTHETICS, LIGHT AND GLARE

With the white-capped Olympic Mountains framing the western landscape, Hood Canal shorelines are dotted with residences and homeowners attesting to the area's natural beauty and are a powerful draw for outdoor-based activities and recreation. Hood Canal, a 60-mile-long fjord separating the Kitsap and Olympic peninsulas, runs north-south from the Puget Sound shipping lanes to Belfair in Mason County, the base of the Kitsap Peninsula.

Few changes spark more strident concerns than the specter of altering people's visual surroundings, views or familiar aesthetics. Light and glare, particularly in rural areas, are primary components of impacts that can occur with visual change. Concerns of aesthetically displeasing views and associated light and glare from the Proposed Project center on:

- mining and extraction;
- a reconfigured processing hub with exposed areas, machinery, stockpiles and conveyors;
- a four-mile Central Conveyor along a ridgeline;
- a load-out pier on a relatively undeveloped shoreline; and,
- tugs, barges and ships transporting sand and gravel on Hood Canal.

3.10 1 Regulatory Overview and Permits

3.10 1.1 Federal

The project site and vicinity are not within any area designated as a visual resource area or otherwise regulated for view protection, such as a national scenic area, national scenic byway, wilderness area, or a national park.

3.10 1.2 State

The project site and vicinity are not within any area designated as a state visual resource area or otherwise regulated for view protection.

3.10 1.3 County

The **Comprehensive Plan** recognizes the value of the County's visual character:

"The mountain, water, and valley views found in Jefferson County have significant value for County residents and visitors. County residents depend on these scenic resources for enriching their quality of life and maintaining economic vitality. Tourist activities and real estate property values reflect the high value placed on this aesthetic amenity. There are currently no regulations for the protection of views and viewshed... Given the rural nature of the County, there is very little light or glare "pollution" of concern to residents. Protection of the rural character of the community includes protection from excessive light and glare that may accompany development." (Comprehensive Plan, Page 8-8).

The **Comprehensive Plan** includes additional environmental goals and policies for view conditions, visual character, light and glare:

ENVIRONMENT ELEMENT GOAL

- ENG 8.0 Protect the habitability, environmental quality, and natural beauty of Jefferson County from the adverse impacts of development.

ENVIRONMENT ELEMENT POLICY

- ENP 8.3 Establish standards to limit the glare from outdoor lighting.

To implement this goal and policy, Jefferson County adopted the **Ordinance** to establish the Wahl-Meridian Extraction Area, with conditions:

- Outdoor lighting shall meet the specification of the U.S. National Park Service Interim Design Guidelines for Outdoor Lighting (NPS 2007) (described below). Building lighting shall be located high on the structures and include forward throw optics to direct lighting away from the sides of the buildings and onto the ground. Lighting required for mineral extraction, processing and transportation activities shall be independently mounted (not directly attached to equipment) to allow for a more downward throw of light to further limit the potential for direct light to reach offsite areas.
- A visual impact mitigation plan shall be a mandatory element of the project action environmental review, including but not limited to the establishment of berms, vegetative plantings and other measures to mitigate offsite visual impacts. (Ordinance, Section 2(b) and (d).

Applicable objectives of U.S. National Park Service Interim Design Guidelines for Outdoor Lighting (NPS 2007) are to:

- Curtail and reverse the degradation of the nighttime visual environmental and the night sky, including casual observation and astronomy;
- Minimize glare, light trespass, obtrusive light and artificial sky glow by limiting outdoor lighting that is misdirected, excessive or unnecessary; and,
- Insure “good neighbor lighting” by minimizing light trespass.

The Proposed Project will require a zoning Conditional Use Permit (**CUP**) and a Shoreline Conditional Use Permit (**SCUP**). In its recommendation on the zoning **CUP**, the Jefferson County Hearing Examiner must consider, in part, whether:

- the conditional use is harmonious and appropriate in design, character and appearance with the existing or intended character and quality of the development in the vicinity of the subject property and with the physical characteristics of the subject property;
- the conditional use will not be materially detrimental to uses or property in the vicinity of the subject parcel;
- the conditional use will not introduce noise, smoke, dust, fumes, vibrations, odors, or other conditions or which unreasonably impact existing uses in the vicinity of the subject site; and,
- the conditional use will not cause significant adverse impacts on the human or natural environments that cannot be mitigated through conditions of approval. (JCC 18.40.530).

In its recommendation on the **SCUP**, the Hearing Examiner must consider whether the Proposed Project is consistent with certain Shoreline environmental designation policies and performance standards in the **SMP**, including:

- All structures placed on the water's surface should have as low a profile as possible to minimize visual intrusion (SMP 4.101 Aquatic Environment Management Policy 3).
- Structures placed in the Aquatic designation shall blend into the surroundings to the greatest extent feasible utilizing appropriate color(s), textures, non-reflective materials, and other design characteristics (SMP 4.101 Aquatic Environment Performance Standard 7).
- Industrial facilities shall be located, designed, constructed, and operated to minimize unnecessary interference with the right of adjacent property owners, as well as adjacent shoreline or water uses (SMP 5.90 Industrial and Port Facilities Performance Standard 4).
- Industrial facilities shall assure that no direct or reflected glare is visible from adjacent properties, streets, or water areas (SMP 5.90 Industrial and Port Facilities Performance Standard 9).

3.10 2 Affected Environment

The shorelines and waters of Hood Canal and the overall Puget Sound/Georgia Basin region could be described as a fjord landscape and waterscape, with elongated channels, undulating shorelines (with points and bays), and relatively rapid elevation gain on the shorelines. Because the proposed mining would take place upland amidst an expansive commercial tree farm out of sight from most viewers, the affected visual environment is primarily from points and areas along the Hood Canal shoreline, including both lowbank and highbank views.

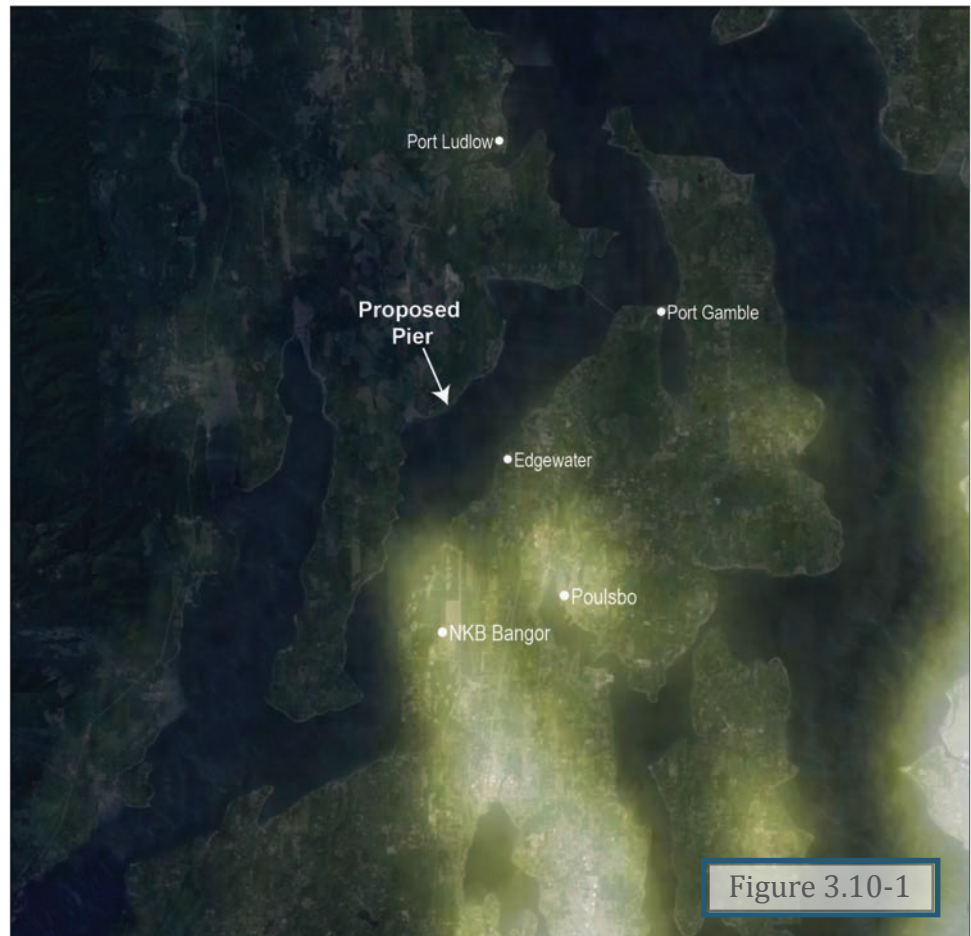
The visual character from the north Hood Canal shoreline area is typical of rural, lowland marine areas of Washington's West Sound and Northern Olympic Peninsula regions (Kitsap and eastern Clallam and Jefferson counties), with the major visual elements being open waters, sky, shorelines, exposed bluffs, rolling forested lowlands and, in certain places, the Cascades and/or Olympic mountain ranges. Shorelines are primarily forested with evergreen trees. Some seasonal variance with the deciduous alder and big-leaf maples are common in some areas. Wide stretches of open water often provide sight distances ranging up to several miles, though the relatively narrow fjord channels assure that the land view is always prominent. Along the shoreline, views may be expansive but can also be blocked by the undulating shoreline of bluffs, points and bays (ESA Adolfson 2008).

Structures and development in the northern Hood Canal viewshed include the Hood Canal Bridge, Naval Base Kitsap-Bangor (NBK Bangor), clear cuts and roads on commercial forest lands, mineral extraction areas at Shine, state and county roads, scattered houses, and single-family housing developments, most of which are along or near shorelines. Marine transportation on Hood Canal includes recreational, Navy and other vessel traffic.

See Figure 3.10-1 for an illustration of the Upper Hood Canal glare from light at night

Residential properties in the project vicinity are concentrated in the Trails End, Eagle Crest, Bridgehaven and Shine residential areas, beginning approximately one mile north of the proposed pier and extending further north to Squamish Harbor. Dispersed residential properties are located off Thorndyke Road along the bluff and on the south shore of Thorndyke Bay. Most residences are oriented toward the shoreline and open water of Hood Canal. Along the Kitsap shoreline, residential development is denser; and includes areas such as Sunset Beach, Lofall, Breidablik, Vinland, and Bangor. At night, scattered homes and the higher density residential areas at Shine, Bridgehaven, Lofall and other portions of the more developed Kitsap side of Hood Canal produce visible isolated as well as clusters of light, including residential and street lighting. The 1.5-mile-long Hood Canal Bridge has highway lighting, headlights and tail lights. NBK Bangor and nearby housing and commercial areas generate some of the highest levels of nighttime lighting along the shores of Hood Canal, sufficient to illuminate low level clouds. Forestry and residential burning can create visual haze during temperature inversions, primarily in the winter months. Vessel traffic can also create visible haze over Hood Canal during temperature inversions in both winter and summer months.

**Upper Hood Canal
Glare from Light at
Night** Source: Google Earth
2013, NASA City Lights



3.10 3 Project Action: Direct and Indirect Impact

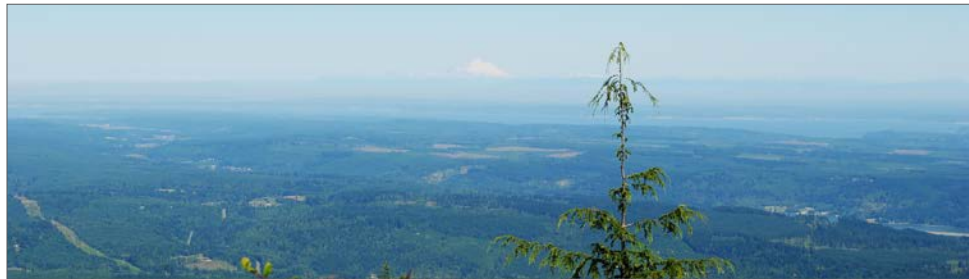
3.10 3.1 Meridian Extraction Area

Mining would be conducted in the interior of the privately owned, 20,901-acre Hood Canal Tree Farm. Ridgelines located west and east of the Meridian Extraction Area would completely screen the operation from surrounding rural residences. Views from the south (Thorndyke Bay) and north (Highway 104) would be blocked by intervening topography and forest cover.

While the Meridian Extraction area is outside of local public viewsheds, areas of active mining and recently reclaimed areas would be visible in the distance from both the north and south

viewpoints on Mt. Walker. These areas are not likely to be particularly noticeable, since they are amid a distant background where contrasting clearcuts and forestry roads create patterns similar to those created by extraction and reclamation. The vividness of views—including those of Quilcene Bay, the Olympic Mountains, Mt. Baker, Seattle, and Mount Rainier—would be retained.

Lighting from the Proposed Project during nighttime extraction work would be limited to lights on the heavy equipment (Loaders) used to extract sand and gravel. Also there would be a downward-directed portable light at the hopper that feeds the Wahl Conveyor. Though the cone of visible light from the vehicle lighting would be somewhat random, it is directed horizontally and would mainly be focused at the working face of the mine, and is not anticipated to affect neighboring residences (some two miles away) or penetrate deep into the surrounding forest. Wahl Conveyor(s) would have limited lighting, directed downward and turned on only for emergency repair. Thus the light and glare from Meridian Extraction Area would be minimal.



Looking northeast from Mt. Walker, in the distant background is Mount Baker. The middle distance is upper Coyle Peninsula where mining would occur. The immediate water is Quilcene Bay. **Source:** tressays.wordpress.com

3.10 3.2 Operations Hub

The proposed Operation Hub would be located on 100-acres where the old Shine Pit has operated since 1959. This area is at roughly 300-feet elevation (mean sea level) overlooking Squamish Harbor, nestled approximately 100-feet below the north-south ridgeline that forms the eastern side of Thorndyke Creek valley. The hub would have a twenty-foot high vegetated earthen berm, situated along the southern property lines, between the operations and the neighboring residential properties to the southeast. Stockpiles of sand and gravel, similar in height (90+ feet) of the old asphalt plant that ran at the old Shine Pit, are expected to be the most visible component to surrounding residences and travelers on State Route 104 (Reid Middleton Memo 2003).



Gravel stockpiles at the Operations Hub. **Source:** Applicant

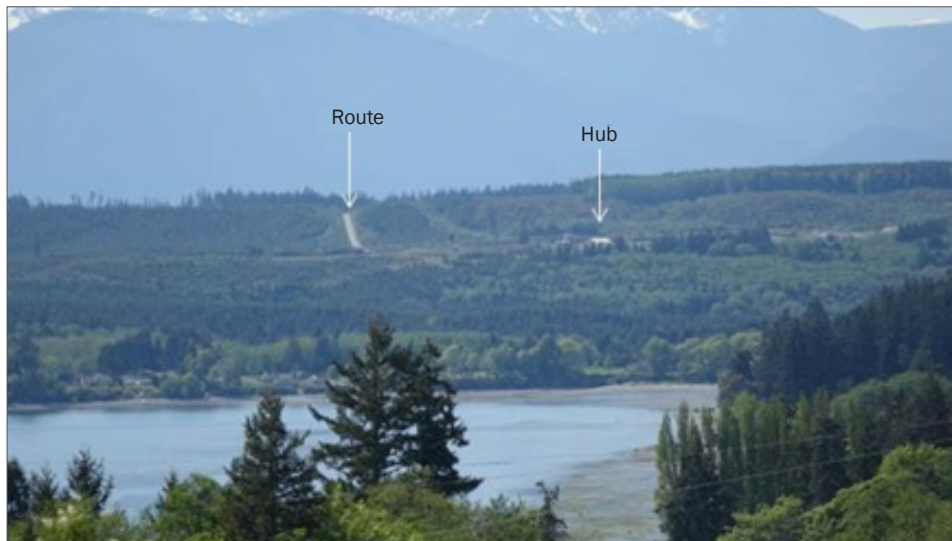


Photo taken from Jefferson County WHR Hicks Park in Shine, WA on the shores of Squamish Harbor. **Source:** Point 2014

elevation of the Hub, the processing area would not directly obstruct views and would make up only a small portion of existing views, with relatively low overall prominence.

More specifically, residences along Squamish Harbor, looking west would be able to see portions of the proposed Operations Hub, as could travelers on SR 104, Southpoint and Shine Road. Residences from Squamish Harbor area are primarily oriented away from the Shine Pit and toward the water, so primary waterfront views would be unaltered. Views of the Olympic Mountains from State Route 104 may be somewhat obstructed, but not blocked, by fleeting glimpses of the Operation Hub activities. Being a longtime approved mineral processing area and commercial forest lands, these types of visual features, including stockpiles, are consistent with working natural resource lands.

As when the former Shine Pit was operating, the Operations Hub would be visible (at a distance) from several areas, including: portions of Shine and its overlooking hillside: shoreline and bluff homes located across Hood Canal in Kitsap County; the Hood Canal Bridge; and, from Salisbury Point Park. Given the mile-plus distances to neighboring residences and the generally higher

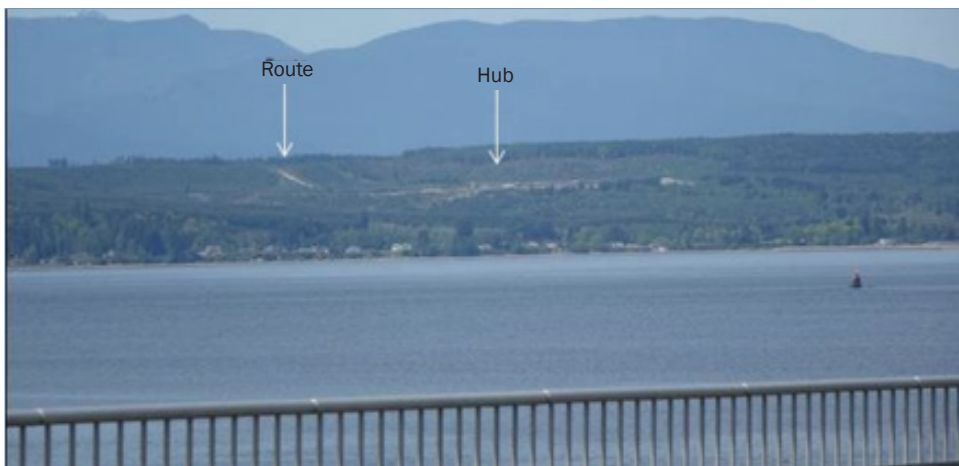


Photo taken from the eastern side of the Hood Canal Bridge looking toward the old Shine Pit area. **Source:** Point 2014

oriented views would remain visually intact, but travelers would have a fleeting glimpse of the Operation Hub when looking west toward the Olympic Mountains. Project components (such as stockpiles) would not block the mountain views, being located well below the vertical angles of the mountain views and not blocking or silhouetted against them (Point 2014). While it may detract from the overall unity and intactness of the view, the visual features would be consistent within the context of lands designated for commercial tree farming and mineral processing.

Residences located higher up on the hillside across SR104 and bluff above Squamish Harbor would be on able to peer from a distance (a mile or so) into the proposed Operations Hub, as would westbound travelers on the hill portion of Shine Road. However, as with the shoreline properties, the primary water-

In compliance with U.S. National Park Service Interim Design Guidelines for Outdoor Lighting (NPS 2007) as mandated by the Ordinance, all outdoor lighting at the proposed Operations Hub would be of the type (e.g. color and intensity) and design (e.g. directed downward and away from surrounding residences), thus minimizing glare leaving the site. The 20-foot high vegetated earthen berm and the location of the sand and gravel stockpiles will also block a portion of the light from the site. Therefore, it is anticipated that lighting from nighttime operations at the Proposed Operations Hub would not adversely impact surrounding residences or travelers.

3.10 3.3 Central Conveyor

Visual components of the Single Conveyor, located at the southern 0.7-mile end of the alignment, include a 12-foot-high by 13-foot-wide metal enclosure spanning 40-50 feet over Thorndyke Road. Materials and colors have not yet been specified.

Approximately 90 percent of the 4-mile long Central Conveyor would be located on upland private forest lands and not be visible to adjacent properties. The conveyor would only be visible as it:

- Leaves the Operations Hub and ramps up to the forested ridge; and,
- Approximately three miles to the south, as it approaches the Pier and crosses Thorndyke Road.

As with the proposed Operation Hub, the impact of the Central Conveyor as it ramps up the forested ridge would be low. The existing forestry service road, where it is located, is visible to some surrounding residences and travelers on State Route 104. However, it is a low proportion of the field of view and tends to blend into the background of surrounding tree farm (Point 2014).

As the Central Conveyor approaches Thorndyke Road and the shoreline area of the Proposed Pier, its approximately 30-foot wide swath would be visible from higher point vantages on the Kitsap side to the east. The conveyor and its maintenance road would appear similar to a two-lane road to those elevated Kitsap properties due east. Specific views from various Kitsap viewpoints would widely vary. Many views of the conveyor route would diminish behind tree lines, but the linear shape of the conveyor may detract from the natural setting in the middle ground and associated background views of the Olympics. While a detraction for the overall unity and intactness of some of the Kitsap views, the visual features would be consistent within the context of lands designated for commercial tree farming and mineral processing.



Photo taken from Thorndyke Road looking southwest toward bridge crossing. **Source:** Point 2014

On Thorndyke Road, the conveyor would cross in an enclosure approximately 60-feet overhead near the peak of a hill, spanning two cuts that were made to construct Thorndyke Road. The Conveyor over Thorndyke Road would be clearly visible to both south and northbound drivers. A similar conveyor crossing is in

operation near Shelton, Washington and is shown in the photograph below. This impact is considered low overall because it would not block any scenic views and the road is primarily a local access road, rather than a major roadway. Views of Hood Canal that are visible to northbound travelers would not be blocked.

The Central Conveyor is not proposed to include outdoor lights. Work on the conveyors at night would be limited to infrequent emergency repair, with lighting emitted by generators on work trucks. Security would be provided remotely, via nighttime-capable cameras, placed along the entire route. No outdoor lighting would be placed on the enclosure over Thorndyke Road. Therefore, it is expected that light and glare from the Central Conveyor would be minimal.

Photo taken in Shelton, Washington of a similar conveyor crossing. **Source:** Applicant



3.10 3.4 Pier

See Figure 1-11 and 1-12 in Chapter 1

At Thorndyke Road, the Central Conveyor descends onto a spur that is approximately 360 feet above sea level. As the conveyor slopes down to the pier, it would pass through a cut in the bluff approximately 250 feet long and 75 feet wide at its widest spot. The overall dimensions of the Proposed Pier are approximately 990 feet long from the shoreline by the 13 to 18-foot width of the enclosed conveyor. The Pier would be visible from many areas throughout the northern Hood Canal.

The highest point of the pier would be approximately 91 feet above mean sea level. The pier includes eight 20 x 20-foot breasting and mooring dolphins and two storage/maintenance enclosures, all connected by a grated five-foot-wide catwalk. The six breasting dolphins would include black breasting plates similar to Puget Sound ferry docks. Support piles are expected to be grayish to brownish gray. The Applicant states that the Pier would be painted a color that best blends into the visual environment. There are no other onshore buildings, storage areas, warehouses or other related shoreline developments or industrial infrastructure other than a 10-stall gravel parking lot for employees' access to the pier between the top of the bluff and Thorndyke Road.

All outdoor lighting on the Proposed Pier structure is proposed to be of the type (e.g. color and intensity) and design (e.g. directed downward and away from surrounding residences) to minimize glare leaving the site. The specific number and intensity of lights cannot be identified at this time; specific lighting requirements would be developed in consultation with the U.S. Coast Guard to provide navigational safety lighting. Nighttime lighting would be minimal when not in use and limited to that required for navigation, safety and security.

Barges and ships would berth at the deep-water portion of the pier. Tugs would be used to dock the barges and ships. During loading, the tugs would not be berthed at the pier. Lighting for the loading would be on the overhead load-out gantry and directed downward.

Subject to market demand, up to six barges may be loaded per day at various times during the day or night (24 hours), seven days a week, up to 300 days annually. The Applicant estimates that it would take one to eight hours to load a barge; with the most typical barge (5,000 dwt) taking approximately 2-3 hours to berth, load and depart the pier.

Loading of ships would take approximately 24 continuous hours. Ships would be loaded 42-72 days out of the overall 300 days a year the pier would be utilized, at the peak of demand. Up to six ships per month are anticipated by Year 25. At night, loading ships would generate light and glare. Bulk carrier ship lighting is dominated by a series of floodlights on the rear house that shine and illuminate the 700-foot deck. Deck light color can be either a yellowish (sodium) or bluish green. Other lighting includes navigational (red, green), deck edge (variable, but typically a string of lights along the rail line), mast lighting at the bow of the ship and stern lighting. The visibility of this lighting, particularly floodlights on the deck, can be increased by both the reflective nature of water as well as the unobstructed views water provides.

*See Section 3.11
Transportation for more
details of loading magnitude.*

Tug lighting is variable. Spotlights are typically used only at arrival and departure. Running lights include navigational and rail lights, with deck lighting typically limited to active deck work. Cabin lighting is not very bright and a minor visual component.



Photo taken from Hood Canal Bridge mid-span, looking toward the Proposed Pier.
Source: Point 2014

(5+ miles) and likely obscured by the dark background of the southern shore of Thorndyke Bay. Overall, the impact on this background portion of the view would be low and, likely, not even noticeable to many viewers, as other views in the foreground of open water and the bridge itself, middle ground views of Thorndyke Bay, and background views of the Olympic Mountains, are the primary visual components of this view. Therefore, the Proposed Pier would have little to no impact on viewer experiences from the Hood Canal Bridge.

On the Jefferson County shoreline, South Point would block the view of the Proposed Pier from residences in Bridgehaven and north including all but the eastern most edge of Suquamish Harbor (some 5 miles away).



Photo taken from Manhattan Beach, looking toward the Proposed Pier. **Source:** Point 2014

The pier structure would be on the peripheral southern view of 15 shoreline residences on Manhattan Beach north of the Proposed Pier, due to the eastern view orientation of those homes. Five of those residences (three located near the shoreline and two located on the bluff) would have relatively high exposure looking down toward the pier site and structure. To those located on the shoreline bluff near Manhattan Beach Creek (some 1.2 miles north), the pier would take up approximately 6.5 degrees of the field of view (or five percent of the approximate 145-degree maximum field of view from this area (bearing 235 to 95)). The pier would be on the right edge of their field of view (Point 2014).

The pier would be five miles south of the Hood Canal Bridge and approximately five miles north of the Delta Pier at Bangor. Views of the pier from travelers on the Hood Canal Bridge would be far in the distance

The pier would begin to be visible from Manhattan Beach (the beach south of South Point). To a viewer walking south of South Point and turning the corner into line of sight with the pier, at a 1.3-mile distance the pier would take up approximately 8.2 degrees of the field of view (or roughly five percent of the approximate 165-degree field of view from this area (Point 2014).

With an approximate 120-foot drop to the shoreline from the shoreline bluff residences, the background of the pier would be water during high tide and predominately sand during low tide (with the water's edge near the dolphin structures). The two residences on the bluff line of site going south would be approximately 4.5 miles (bearing 207 degrees, or roughly south by southwest). The pier's dolphins would be oriented close to parallel to line of sight from this viewpoint, but the oblique angle would allow a semi-compressed perspective of the dolphin structures and catwalk. The conveyor portion of the pier would be oriented at approximately 105 degrees to the line of site, or slightly greater than perpendicular (90 degrees), which would also compress the visual exposure somewhat (Point 2014).

The pier structure would not be visible from the closest residences to the southwest. Residences on these parcels are located on the high bank, physically skewed to the south and southeast and do not have views of the shoreline areas where the pier would be located. Further south, residences would have a very limited view of the deep-water portion of the pier.

On the Kitsap County shoreline, the pier would be within lines of sight for many shoreline and bluff residences. For example, from the shoreline bluff at Kitsap Memorial Park (approximately 1.7 miles across Hood Canal), the pier would be viewed at approximately 261.5 to 264.5 degrees, with a three-degree sweep. Overall visual change would be reduced by the oblique angle and distance of viewer orientation. In

addition, the pier would be visible below the horizon created by the Jefferson County shoreline bluffs, rather than silhouetted against the skyline (Point 2014).

The pier could detract somewhat from views of the Olympic Mountains, but the distance across the Canal reduces the overall visual footprint to approximately three degrees, or six percent of the field of view. The pier would be visible but would not dominate views from either the Olympic National Park or National Forest Service's Mt. Walker viewpoint. Mount Constance and Warrior Peak, at approximately 22 miles distance, bearing 262 degrees, are roughly within the sightline to the pier and would take dominance of view (Point 2014).



Photo taken from Kitsap Memorial Park, looking toward the Proposed Pier. **Source:** Telephoto 2014

The pier would convert the existing natural setting within Manhattan Beach to a built maritime setting. The pier structure would add a noticeable overwater structure approximately midway between existing large overwater structures at Bangor (five miles south to Delta Pier) and the Hood Canal Bridge (five miles to the north). These existing structures are considered as either detractive from the natural setting, or as neutral or attractive features as built landmarks. Although not as dominant as Bangor or the Hood Canal Bridge, the pier would become a visual landmark in the area. Absent vessels, the pier would be less prominent at night.

Since the shoreline parcels in the vicinity of the Proposed Pier are undeveloped, and the overall Manhattan Beach shoreline contains very little lighting, the Proposed Project would introduce lighting to a currently dark area. Residents and vacation home visitors on Manhattan Beach would have the closest and most direct view of loading and, at night, associated lighting from tugs, ships and the pier. As described earlier, most dwellings on this shoreline are oriented toward the water and away from the pier, though a few high bank residences just around (south of) the bend of South Point are oriented more toward the pier and lights. Ships would be viewed from above and at an acute angle (i.e. more head on than broadside). Loading would create point and wash lighting in an area with currently little lighting other than the navigational marker at the Proposed Pier location and scattered homes lined along the southern lip of Thorndyke Bay to the south. Views of residences on the Kitsap County shoreline, immediately east of the Proposed Pier, would be changed at night as well.

Daytime views from Jefferson and Kitsap County shoreline residences would retain vividness, with remaining predominant open water views, Hood Canal shorelines and, from particular elevations, the Cascade and Olympic mountains. It is anticipated that some of those in the Pier's immediate vicinity or across Hood Canal would react negatively to the Pier's visual impact.

3.10 3.5 Marine Transportation

The Applicant has stated that tugs, barges and ships would call on the pier. This maritime traffic would be a notable visual change on Hood Canal. Initially, only barges will call at the pier. Subject to market demand, up to six barges may be loaded per day at various times during the day or night (24 hours), seven days a week, up to 300 days annually, allowing 65 days annually for holidays, tribal fishing, inclement weather and other periods of non-use.

The Applicant has stated up to two barges can be berthed at the Pier at one time. Depending on the capacity of the barge, the Applicant estimates that it would take one to eight hours to load; with the most typical barge (5,000 dwt) taking approximately 2 to 3 hours to berth, load and depart the pier. Various sized barges would be used, the largest of which would be 100 feet wide by 400 feet long, drafting 25 feet, and capable of hauling 20,000 tons (dwt). Due to the constraints of the existing Puget Sound receiving facilities, it is anticipated that most of the barges would be 60 feet wide by 240 feet long, drafting 25 feet and capable of hauling 5,000 tons (dwt). Applicant anticipates it may begin using ships when they come available, 8 to 12 years after construction of the pier.

It is anticipated that barges will pass under the eastern span of the Hood Canal Bridge, crossing Hood Canal on a diagonal course between the eastern span and the pier, thus traveling close to the eastern shoreline for a short distance.

The Applicant has stated that, in any given month, up to six ships could call at the pier and most ship operations at the pier (berthing, loading and departing) would take 24 hours to complete. No barges would be loaded or berthed at the pier during days when ships were being loaded. Most striking of the vessels calling on the Proposed Pier would be the Panamax class, bulk carriers.

Currently, almost all Panamax bulk carriers are painted similarly, with white rear house (also called tower and bridge superstructure), deck and deck hatches; black stacks and hull above the loaded waterline; and red hull below the summer load line (the deepest draft allowed). Masts, located at the front of the vessel, are typically tan or black.

The visual character of inbound versus outbound ships would be substantially different. Empty inbound ships, would ride noticeably higher in the water and would show approximately 20 feet of red portion of the hull. Loaded outbound ships would be up to 30 percent lower in the water, with the red portion of the hull mostly underwater. In either case, the 745-foot long by 110-foot wide, white-topped ships would be very noticeable as they travel in Hood Canal. The high profile and contrast, particularly for inbound vessels, would be more noticeable and have greater visual distraction than the 560-foot long by 42-foot black Ohio-Class submarines, which are currently the largest vessels that regularly transit Hood Canal. Ships would transit the Hood Canal Bridge through the mid-span opening.

While in Hood Canal, neither the tug and barges or ships would “hold off” or anchor but would travel directly to the pier. Arriving and departing vessels would transit relatively close to shoreline in the vicinity of the Proposed Pier. It is anticipated that a vessel traveling close to shore would be a new sight that would dominate views from the Jefferson County shoreline over several minutes, replacing open water, sky and the Kitsap County shoreline as the major visual component.

In addition to the physical presence of vessels, marine traffic can create visible plumes from stack emissions. During temperature inversions, emissions can be trapped at view level, resulting in lingering lines of plumes and eventually brownish haze. Such haze forms throughout Puget Sound in the presence of high pressure systems, which typically occur during late summer and mid-winter. Emissions are most visible during rapid acceleration and deceleration of engines. However, most of the time, prevailing winds and upward rise would disperse emissions to the point of not being visible. Overall impacts are expected to be temporary (See Section 3.1 Air).

References

National Park Service (NPS). 2007. Interim Outdoor Lighting Guidelines (Draft). Version 1.0. January 30, 2007.

Point Environmental Consulting. 2014. Thorndyke Resource Project: Light, Glare and Aesthetics Assessment. April 2014.

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3.11 TRANSPORTATION

For transportation-based industries, the flow of goods from producers to consumers in a safe, feasible and ecologically sound manner is vital. Spending in the U.S. logistics and transportation industry totaled nearly \$1.3 trillion in 2011, and averaged 8.5 percent of the country's annual gross domestic product (GDP). Maritime carries approximately 78 percent of U.S. exports by tonnage via bulk carriers. Over-the-road transportation of cargo (trucks) moves two-thirds of all domestic freight, mostly over short and medium distances. Rail moves more than 58 percent of U.S. raw metal ores, and more than 30 percent of grain. Air delivery offers time-sensitive services and the export infrastructure for many small and medium-sized businesses that cannot afford to operate their own supply chain (SelectUSA 2012).

Different transportation modes vary in their impacts on the environmental and human health. The Proposed Action's primary transportation mode is by waterway, utilizing barges, tugs and ships to deliver sand and gravel from a pier load-out facility on Hood Canal to local, regional and West Coast markets. However, project components would also impact vehicular (ground) transportation, specifically at sections of Thorndyke Road and State Route 104, including potential mid-span openings on the Hood Canal Bridge.

Primary analysis of the Proposed Action's marine and ground transportation centers on:

- tug, barge and ship loading impacts on marine environment at the pier and shoreline vicinity;
- traffic back-ups on Hood Canal Bridge due to openings allowing marine transport calling at the Proposed Pier;
- impacts to other vessels operating on Hood Canal, including tribal and commercial fishing boats, U.S. Navy and U.S. Coast Guard operations;
- and, effect of access to the Operations Hub from State Route 104, and to the pier from Thorndyke Road.

3.11 1 Regulatory Overview and Permits

Vehicular traffic from the construction and operation of the Proposed Project is regulated by the state and county. The vessels (tugboats, barges, and ships) used to construct the Proposed Pier and haul sand and gravel to local, intrastate and interstate markets are subject to federal maritime rules and regulations.

3.11 1.1 Federal

Pursuant to the Ports and Waterways Safety Act of 1972 (**PWSA**) and the Port and Tanker Safety Act of 1978 (**PTSA**), the Coast Guard oversees navigation and vessel safety; protection of the marine environment; and protection of life, property, and structures in, on, or immediately adjacent to the navigable waters of the United

States. Under the **PWSA**, the Coast Guard has established the Vessel Traffic Service–Puget Sound (**VTS**), which controls vessel movement, establishes requirements for vessel operation, and imposes other related port safety controls within Puget Sound, including Hood Canal. All transit to and from the Proposed Pier and any temporary mooring or anchorage must comply with U.S. Coast Guard rules and regulations.

Federal law preserves the public's right of navigation and prevents interference with interstate and foreign commerce (Rivers and Harbors Act of 1899 (33 U.S.C. 407 et seq.) and General Bridge Act of 1946 (33 U.S.C. 525 et seq.)). The authority granted to the Secretary of Transportation pertaining to bridges and causeways over U.S. navigable waters was delegated in 1967 to the Commandant, U.S. Coast Guard (46 CFR 1.46(c)).

Federal regulations provide protective measures for naval vessels and bases (33 CFR 165.2010). These regulations establish protection zones surrounding large naval vessels (>100 feet) in U.S. navigable waters and prohibit vessels and persons from coming within 500 yards of a naval vessel unless authorized by the Coast Guard or senior Naval officer in command. The Coast Guard has also established a security zone encompassing all waters of Hood Canal for Navy Submarines operating in Hood Canal (33 CFR 165.1328). Any person or vessel within these prescribed areas must follow all lawful orders and directions from Coast Guard security escort personnel.

The Coast Guard uses Hood Canal between Foul Weather Bluff and the entrance to Dabob Bay for live training exercises. Federal regulations establish a safety zone of 500 yards around any vessel involved in a Coast Guard training exercise (33 CFR 165.1339). No one may enter or remain in a Coast Guard exercise safety zone without authorization from Coast Guard personnel.

The Jones Act (P.L. 66-261) requires that all goods transported by water between U.S. ports be carried on U.S.-flagged ships, constructed in the United States, owned by U.S. citizens, and crewed by U.S. citizens and U.S. permanent residents. Pursuant to a license granted by the Coast Guard, the Washington State Department of Transportation (**WSDOT**) operates the Hood Canal Bridge (Bridge License No. 105c-80-13). Federal law requires **WSDOT** to open the bridge for all requests by ship captains, unless an exception is granted by the Coast Guard. Bridge safety and navigation is the exclusive domain of the Coast Guard (Coast Guard P16591.3c).

3.11 1.2 State

The State of Washington regulates vehicle and traffic safety (RCW Ch. 46.61 and WAC Ch. 308-330). These laws and regulations are enforced in the project area by the Washington State Patrol and the Jefferson County Sheriff.

WSDOT operates the Hood Canal Bridge draw-span pursuant to the Bridge License and Coast Guard regulations (33 CFR 117.1045), which provide that:

“(a) The draw shall open on signal if at least one hour’s notice is given. The draw shall be opened horizontally for 300 feet unless the maximum opening of 600 feet is requested.”

(b) The draw of the Hood Canal Bridge, mile 5.0, need not open for vessel traffic from 3 p.m. to 6:15 p.m. [starting] daily from 3 p.m. May 22 to 6:16 p.m. September 30 [ending], except for commercial tug and tow vessels and vessels of the U.S. Navy or vessels attending the missions of the U.S. Navy and other public vessels of the United States. At all other times the bridge will operate in accordance with paragraph (a) of this section.

(c) Telephone requests for bridge openings may be directed as collect calls to the Toll Office at the bridge site. The call may also be made by direct telephone communication through the Seattle Marine Operator, Station KOH, or through other marine wire or radio telephone service.

(d) During unusual or emergency periods, the authorized representative of the owner or agency controlling the bridge shall open the draw on a demand basis for specified periods of time, normally not exceeding 48 hours, when requested by the Department of the Navy. While on a demand basis, a drawtender shall be in attendance on the bridge with radio communication equipment in operation.”

3.11 1.3 Jefferson County

Vehicle and traffic safety are regulated by Jefferson County (JCC Ch. 10.05), and are enforced in the project area by the Jefferson County Sheriff.

The standard of measure meeting roadway demands is called a Level of Service (LOS) rating. The LOS serves as a gauge to judge performance of the system. The Growth Management Act requires Jefferson County to use LOS to evaluate existing roadway performances, establish LOS standards, and predict traffic impacts from proposed developments (RCW 36.70a.070).

Table 3.11-1 Level of Service Definitions

Level of Service Category	Definition
Level of Service A	Describes a condition of free flow with low volumes and high speeds. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. Stopped delay at intersections is minimal.
Level of Service B	Represents reasonably unimpeded traffic flow operations at average travel speeds. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tensions.
Level of Service C	In the range of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. The selection of speed is now significantly affected by interactions with others in the traffic stream, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.
Level of Service D	Represents high-density, but stable flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.
Level of Service E	Represents operating conditions at or near the maximum capacity level. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to “give way” to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor disturbances within the traffic stream will cause breakdowns.
Level of Service F	Describes forced or breakdown flow, where volumes are above theoretical capacity. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations, and operations within the queue are characterized by stop-and-go waves which are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion.
Source: Transportation Research Board, Highway Capacity Manual: Special Report 209, Washington, D.C. 1985. Table 10-4 in the 1989 Jefferson County Comprehensive Plan.	

Jefferson County requires that roads in the area of the Proposed Project perform at no less than the following adopted minimum **LOS** standards:

- Rural Roads: **LOS C** (e.g. Thorndyke Road)
- Urban Roads: **LOS D** (e.g. Tri-Area)
- Master Planned Resort Roads: **LOS D** (e.g. Port Ludlow)
- HSS/Tourist Corridors: **LOS D** (e.g. SR-104 on Hood Canal Bridge)

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Section 3.8 Land Use. The Land Use Element contains the following goals and policies applicable to the transportation impacts of the Proposed Project:

LAND USE ELEMENT GOAL

- LNG 17.0 Ensure that transportation is safe, efficient, multi-modal, and based on levels of service that correspond to the land use densities in the Comprehensive Plan.

LAND USE ELEMENT POLICIES

- LNP 17.1 Encourage development and land use proposals that utilize existing transportation systems and provide non-motorized transportation opportunities.
- LNP 17.3 Include provisions to consolidate access points to main arterials.
- LNP 17.4 Site transportation facilities in locations which minimize the disruption of natural habitat, floodplains, wetlands, geologically sensitive areas, resource lands, and other priority systems.

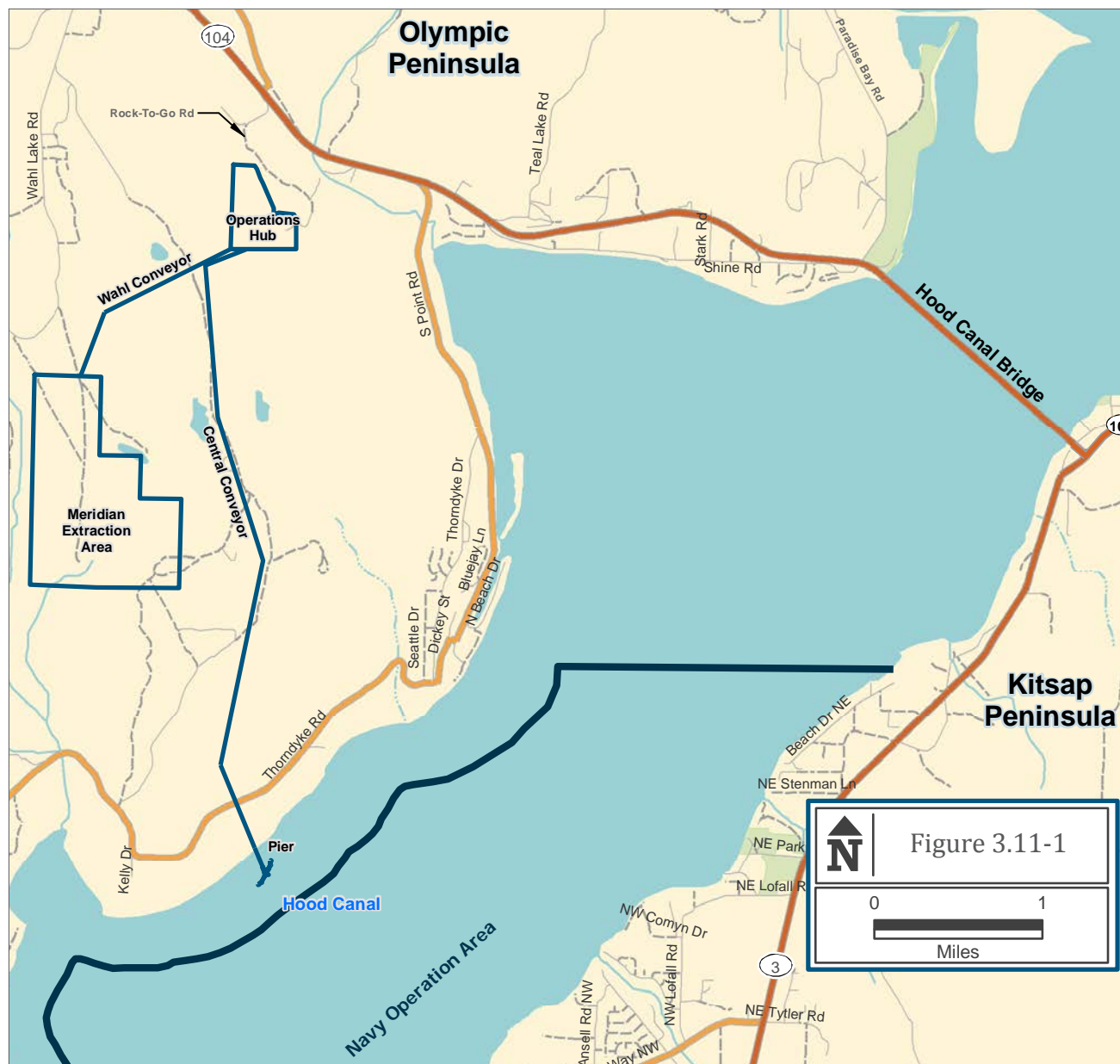
The Jefferson County **SMP** requires that a project proposal within the County's shoreline jurisdiction be evaluated for consistency with the Shoreline environmental designation policies and performance standards for the environmental designation in which the project is located ("Aquatic") (SMP 4.101). The following are those that are relevant to the analysis of transportation impacts:

- Potential conflicts with adjacent uses such as commercial fishing, recreation, and navigation should be considered in the review of the proposed aquatic developments. Development should not be permitted where they would materially interfere with existing uses. Aquatic Environment Management Policy 4.
- Aquatic developments shall not be approved in narrow channels, shipping lanes, or in other areas, where there are a significant hazard to navigation; Aquatic Environment Management Performance Standard 4.
- All structures that could interfere with navigation shall be marked in accordance with the U.S. Coast Guard Private Aids to Navigation. Aquatic Environment Management Performance Standard 5.

3.11 2 Affected Environment

The upland surface transportation network in the project vicinity includes State Route (SR) 104, Hood Canal Bridge and Thorndyke Road. The main access for traffic generated by the construction and operations of the mining, processing and conveying of sand and gravel to the Proposed Pier would be at the intersection of SR-104 and Rock-To-Go road, a private forestry service road. Access for traffic generated by the upland portion of construction and operations of the Proposed Pier would be Thorndyke Road.

See Figure 3.11-1



Street Map Roads and the Navy Operation Area in the vicinity of the project. **Source:**

The Hood Canal Bridge connects SR-104 between the Kitsap and Olympic peninsulas and is approximately 5 miles south of the entrance to Hood Canal. The Hood Canal Bridge is a floating bridge. Overall it is 7,869 feet long, with a floating portion of 6,521 feet, and is thus the longest floating bridge in the world located in a saltwater tidal basin, and the third longest floating bridge overall. The bridge is located in a marine environment subjected to waves, strong winds, and tidal fluctuations of as much as 16.5 feet. The floating portion has pontoon sections with the highway built on top.

The draw-span of the bridge is made up of the two 300-foot long pontoon center sections. During an opening (draw) each section slides under the pontoon section which is landward of it. When both center-span sections are open vessels crossing are afforded a 600-foot opening. A typical draw cycle (open, vessel pass and close) is 25 to 30 minutes for a ship under its own steam and 30 to 40 minutes for a tugboat and tow crossing.

The bridge has two fixed-span openings which allow vessels to pass under the bridge, thus not requiring the opening of the draw-span. The eastern (Kitsap County) fixed-span has the largest opening for vessels. Its mariner opening is approximately 240 feet wide, 50 feet high above the waterline (mean high tide) and 45 feet channel depth (mean low tide), with a current flowing through of 1 to 3 knots during flood and ebb tides.

Since before Washington became a state, there have been pits with barging operations supplying sand and gravel that were used to build the cities and roads of the Puget Sound. Historically, the now-defunct pit in Steilacoom (the current location of the Chambers Bay Golf Course) was the largest U.S. maritime sand and gravel supplier to Puget Sound ports. Other smaller operations also supplied sand and gravel, such as the now-defunct Pioneer Pit on Murray Island. Other current operations supplying Puget Sound ports include a pit in DuPont, now considered the largest U.S. maritime pit, and a smaller pit in Shelton. The now-defunct Producer pit, north of Victoria, B.C., also historically barged sand and gravel to Puget Sound ports. Currently, sand and gravel is barged to Puget Sound ports by a pit in Sechelt, B.C., considered the largest Canadian maritime pit. A few shoreline quarries, such as the Mat Mats Quarry, north of Port Ludlow, have barged basalt rock into Puget Sound ports.

The Applicant proposes to ship sand and gravel via barge or ship to various local, intrastate and interstate ports located outside of Hood Canal. The Proposed Pier would be approximately 10 miles south of the entrance to Hood Canal. Thus, all tugboats, barges and ships (vessels) that would call on the Pier would have to either sail through the bridge's draw-span or under its eastern fixed-span.

Naval Base Kitsap-Bangor (NBK Bangor) lies approximately 2.5 miles south and across the Hood Canal, of where the Proposed Pier would situate. The base is homeport to several Trident ballistic and conventional naval submarines. NBK Bangor's main mission is to support the Trident launched ballistic missile system; maintain and operate facilities for administration and personnel support which includes base security, berthing, messing, and recreational services; and provide logistics support to other facilities in the area.

3.11 2.1 Vehicle Traffic

SR-104 is categorized as a principal arterial in the Jefferson County **Comprehensive Plan**. West of Puget Sound, SR-104 runs between Kingston and US-101. It is classified by **WSDOT** as a Highway of Statewide Significance and Rural Principal Arterial, providing and supporting transportation functions that promote and maintain significant statewide travel and economic linkages. As evaluated in the transportation element of the Jefferson County **Comprehensive Plan**, the **LOS** on the segment of SR-104 between the intersection of SR-19 and the Hood Canal Bridge is near capacity.

Traffic across the Hood Canal Bridge includes commuters travelling to work, trucks hauling freight, tourists visiting the Olympic Peninsula, and residents travelling for shopping, services, and other purposes (Reid Middleton 2003).

Analysis of hourly traffic volumes for the bridge showed Peak traffic hours (when traffic volumes are the highest) were:

- Monday through Thursday - between 6 a.m. to 11 a.m. and 3 p.m. to 6 p.m.;
- Friday - between 6 a.m. to 6 p.m.;
- Saturday - between 10 a.m. to 2 p.m. and 4 a.m. to 7 p.m.; and,
- Sunday - between from 10 a.m. to 7 p.m.

The hours which occur outside the periods listed above are considered Off-Peak traffic hours (Heath 2011).

There are approximately 20,000 average daily trips across the bridge, with Friday, Saturday and Sunday traffic counts being higher than Monday through Thursday. This is likely attributable to tourism traffic on weekends (Heath 2011).

Draw-span openings for marine traffic will stop and back traffic up onto SR-104 and SR-3. When an opening occurs during the highest traffic use periods (peak hours) highway traffic backups can stretch back as long as 2-3 miles (Heath 2011).

Rock-To-Go Road (T-3100), a paved private forestry service road, would be the primary access to the proposed Operations Hub. The road is used to provide access to the commercial tree farm, and in the recent past, was the retail and worker access to the old Shine Pit. It intersects SR-104 at milepost 9.85 where there is a westbound center-turn lane.

The main local collector street for the eastern Coyle Peninsula, South Point Road is a two-lane county road and local access route for residences at Bridgehaven and South Point. Admirals Row branches off from South Point Road to reach a residential area located on the bluffs above Bridgehaven, after which the road turns into Thorndyke Road.

Employee access to the Proposed Pier would be via Thorndyke Road, a two-lane, county road that is the primary north-south roadway on the eastern Coyle Peninsula south of South Point. Coyle Road is the primary western access road near the mid-point of the Coyle Peninsula. Thorndyke Road eventually meets Coyle Road and continues to the southern tip of the peninsula. Existing traffic volumes are light

residential. Thorndyke Road is classified as a minor collector with an average number of daily trips of approximately 800 vehicles (Jefferson County Ordinance 2004).

Sighting distances can be limited along the road due to curves, hills and heavy roadside vegetation. Shoulders are often narrow and made of gravel. Residential access roads and driveway densities are low. There is a hill at the access point where the employees access for the Proposed Pier. The nearest residential intersections to the access point are Kelly Road, approximately 0.7 miles north, and Groves Way approximately 0.3 miles south, both intersecting with the northbound lane of Thorndyke Road. There are adequate sightlines, both directions, for access to Thorndyke Road off the proposed employee access point.

3.11 2.2 Marine Vessel Traffic

The Applicant has stated that there would not be shipping sand and gravel to any port (inbound terminus) on Hood Canal. Thus all vessels involved with the Proposed Action would only transect Hood Canal north of the Proposed Pier site.

Naval operations, including transit of the Hood Canal Bridge, are common in Hood Canal. This is because NBK Bangor, homeport for the Navy's Pacific nuclear submarine fleet, is located about approximately 12.5 miles south of the entrance of Hood Canal. The Proposed Pier terminus would be approximately 2.5 miles north of and across the Canal from the base.

Within Hood Canal, vessel traffic is primarily Navy-related marine traffic, including submarines, escort vessels, tugs, and other vessels transiting to and from NBK Bangor. Most naval ship movements require opening the draw-span of the Hood Canal Bridge. Overall, the bridge opens for other marine traffic an average of 400 to 450 times per year—excluding openings caused by Navy vessels, which are not reported for national security reasons. The majority of those non-navy openings occur between June and October (Navy Vol. 1 2012). Federal regulations provide protective measures for naval vessels and bases. These regulations establish protection zones surrounding large naval vessels (>100 feet) in U.S. navigable waters and prohibit vessels and persons from coming within 500 yards of a naval vessel unless authorized by the Coast Guard or senior Naval officer in command. The Coast Guard has also established a security zone encompassing all waters of Hood Canal for Navy Submarines operating in Hood Canal. Any person or vessel within these prescribed areas must follow all lawful orders and directions from Coast Guard security escort personnel.

See Figure 3.11-1 Southeast of the Hood Canal Bridge, approximately 2.5 miles waterward of the terminus of the Proposed Pier, the Navy has a charted testing and training exercise area. Federal regulations allow the Navy to limit or prohibit other vessels from within the charted area when in use. Vessels calling on the Pier would sail through approximately 5 miles of this charted area when not in use by the Navy.

The Navy has other charted areas in Hood Canal, on waters in front of NBK Bangor and Dabob Bay, used to provide security, fleet training and weapon testing. However, they are not located on waters where vessels calling on the Proposed Pier would transit.

The Coast Guard uses Hood Canal between Foul Weather Bluff and the entrance to Dabob Bay for live training exercises. Federal regulations establish a safety zone of 500 yards around any vessel involved in a Coast Guard training exercise. No one may enter or remain in a Coast Guard exercise safety zone without authorization from Coast Guard personnel.

3.11 3 Proposed Action: Direct and Indirect Impact

3.11 3.1 Construction

Delivery of equipment, supplies and worksite access for construction of the Operations Hub, Wahl Conveyor and Central Conveyor would primarily be from SR-104, via Rock-To-Go Road (T-3100). Additional access to the Central Conveyor would be off forestry service roads that connect to Thorndyke Road. It is anticipated that it will take one year to complete all of the various tasks necessary to build the Proposed Project, with many of those tasks being done concurrently. On the busiest days, the construction would generate vehicle trips of approximately 80 more trips per day onto SR-104, and 40 more trips per day on Thorndyke Road. This increase in traffic attributable to construction of the Proposed Project is not expected to reduce the current **LOS** rating of SR-104 or Thorndyke Road.

Applicant anticipates that the construction of the in-water portion of the Pier would take approximately 2 to 3 months to complete, subject to stoppage due to environmental, tribal and commercial fishing considerations. Barges would be used as platforms for large equipment such as pile drivers and cranes needed to construct the Proposed Pier.

Due to the height of the equipment onboard, it is anticipated that these construction barges would require the Hood Canal Bridge draw-span to be opened. During construction these barges would be brought in and stay in the vicinity of the pier. During periods of non-use, these barges would be anchored out, within close proximity to the Proposed Pier site, not in the open water of the main channel. A tugboat is anticipated to stay on station during much of the initial construction of the in-water portion of the Pier to provide movement for the construction barges.

Materials such as steel trusses and pilings used to construct the Proposed Pier would be shipped to the construction site via barge. It is anticipated that, due to the size of the material, many of these supply barges would necessitate opening of the Hood Canal Bridge draw-span.

The barges and tugboats used to construct the pier may result in physical impediments to tribal and commercial fishing that may occur within the vicinity of the construction site. The impacts are anticipated to be temporary and minimal. It is expected that in-water work would stop to make way for fishing, which would primarily occur during the fall and winter fish harvesting seasons.

To minimize the number of drivers affected by traffic backup delays when the Hood Canal Bridge's draw-span is open, the Applicant has agreed to open the draw-span for all construction and materials barges only during Off-Peak traffic hours. The increase in traffic attributable to opening of the bridge for construction and materials barges during Off-Peak traffic hours is not expected to reduce the current **LOS** rating along SR-104 or SR-3 (Heath 2011).

3.11 3.2 Operations

3.11 3.2.1 Mining, Processing and Conveying

Employee access to the proposed Meridian Extraction Area, Operations Hub and Central Conveyor would be from SR-104 via Rock-To-Go Road (T-3100). Employees working at the Meridian Extraction Area would also have access to their worksite via Wahl Lake Road (T-1000), which intersects SR-104 at Mile Post 8.52.

Applicant has stated that, at peak production, work would occur up to 7 days a week, 24-hours a day. The largest expected shift would be 25 miners employed to maintain equipment and mine, process, and send sand and gravel to the pier via conveyor. A worst case scenario would be if shift changes were scheduled to occur during heavy traffic flow on Sunday at 4 pm. This could result in 50 worker vehicles coming and going at the intersection of SR-104/Rock-To-Go Road with traffic volumes of 1600 vehicles per hour. This is well within the intersection capacity, and is historically comparable in number of transactions that occurred at that intersection when the old Shine Pit was operating. However, unlike the instant case, the majority of the vehicles utilizing the intersection during Shine Pit operations were commercial truck and trailers, hauling sand and gravel (Heath 2006). Moreover, worker start times are anticipated to be staggered rather than concurrent, and workers can access the Meridian Extraction Area through Wahl Lake Road. Therefore, the traffic attributable to the operations of Meridian Extraction Area, Operations Hub and Central Conveyor is not expected to reduce the current **LOS** rating of SR-104.

3.11 3.2.2 Maritime Activities at the Pier

Workers supporting pier operations would access the site via Thorndyke Road. A ten stall parking area would be established off Thorndyke Road. Applicant expects work to occur up to 7 days a week, 24-hours a day at the Proposed Pier, with the expected largest shift to be 10 workers onshore.

A worst case scenario would be during shifts changes, assuming workers driving alone; 20 additional trips would be generated on Thorndyke Road at one event. However, it is anticipated that worker start times will be staggered at times of low traffic volumes on the road. Therefore, the increase in traffic attributable to the operations of the Proposed Pier is not anticipated to result lowering the **LOS** on Thorndyke Road.

3.11 3.2.3 Marine Transportation

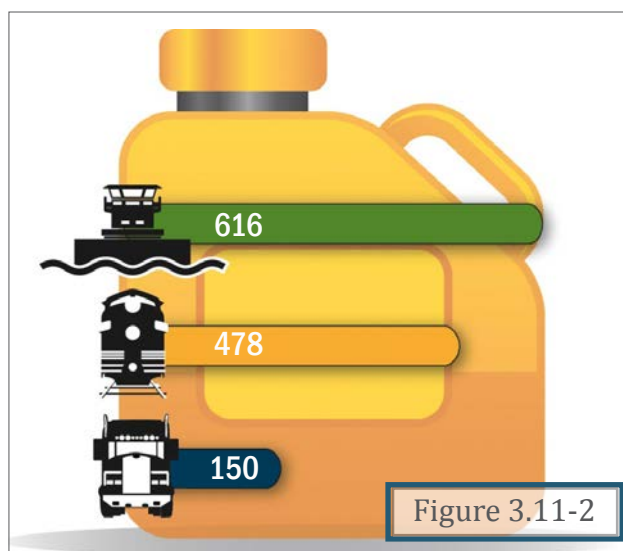
Applicant proposes to use tugs, barges and ships of varying sizes to transport sand and gravel from the Proposed Pier. Outgoing barges and ships would navigate approximately 12 miles to Admiralty Inlet and Puget Sound shipping lanes, transporting aggregate to markets locally (e.g., Port Angeles), regionally (e.g., Puget Sound urban centers), intrastate (e.g., Vancouver, WA) and interstate (ex. Oregon, California and Hawaii).

During mooring operations, barges and ships will be tug assisted and will not maneuver under their own power. Two tugs may be used for ships or larger barges. The assist tugboats will be stationed offshore during loading operations. A spill containment boom, a small tender (boat) capable of operating the boom and other safety and maintenance equipment will remain on site. All tug and barge operations would be conducted by locally licensed firms with crews familiar with navigation on Hood Canal. Ships would be operated by licensed, professional harbor pilots familiar with the inland waters of Puget Sound and the Strait of Juan de Fuca, including Hood Canal. The pilot would maintain overall command and supervise the work of all officers and crew, setting the course, speed and navigational maneuvering to avoid hazards.

Initially, only barges will call at the pier. Subject to market demand, up to six barges may be loaded per day, up to 300 days annually, allowing 65 days annually for holidays, tribal fishing, inclement weather and other periods of non-use. Two barges could be berthed at the Pier at one time. Applicant expects up to two barges to be loaded at the Proposed Pier per day, at various times during the day or night (24 hours), seven days a week, up to 300 days a year. Various sized barges would be used, the largest of which would be 100-feet wide by 400-feet long, drafting 25-feet, and capable of hauling 20,000-tons (dwt). Due to the constraints of the existing Puget Sound receiving facilities, it is anticipated that most of the barges would be 60-feet wide by 240-feet long, drafting 25-feet and capable of hauling 5000-tons (dwt). Applicant expects to barge the sand and gravel to existing off-loading facilities on Puget Sound, such as shoreline concrete and asphalt plants in Seattle. No construction of new off-loading facilities in Puget Sound are being considered or analyzed under this Proposed Action.

In time, Applicant proposes to use U.S.-flagged, bulk carrier ships to haul sand and gravel to intrastate markets, such as Vancouver, Washington, and interstate markets in Oregon, California and Hawaii. These ships will vary in size from ships capable of hauling 20,000-tons (dwt) to 65,000 (dwt). There are currently no ships on the West Coast available for transport of sand and gravel at the Proposed Pier. Canadian markets use foreign-flagged, Panamax class, bulk carrier ships to supply U.S. West

Figure 3.11-2 illustrates the fuel efficiency of barges compared to trains and trucks



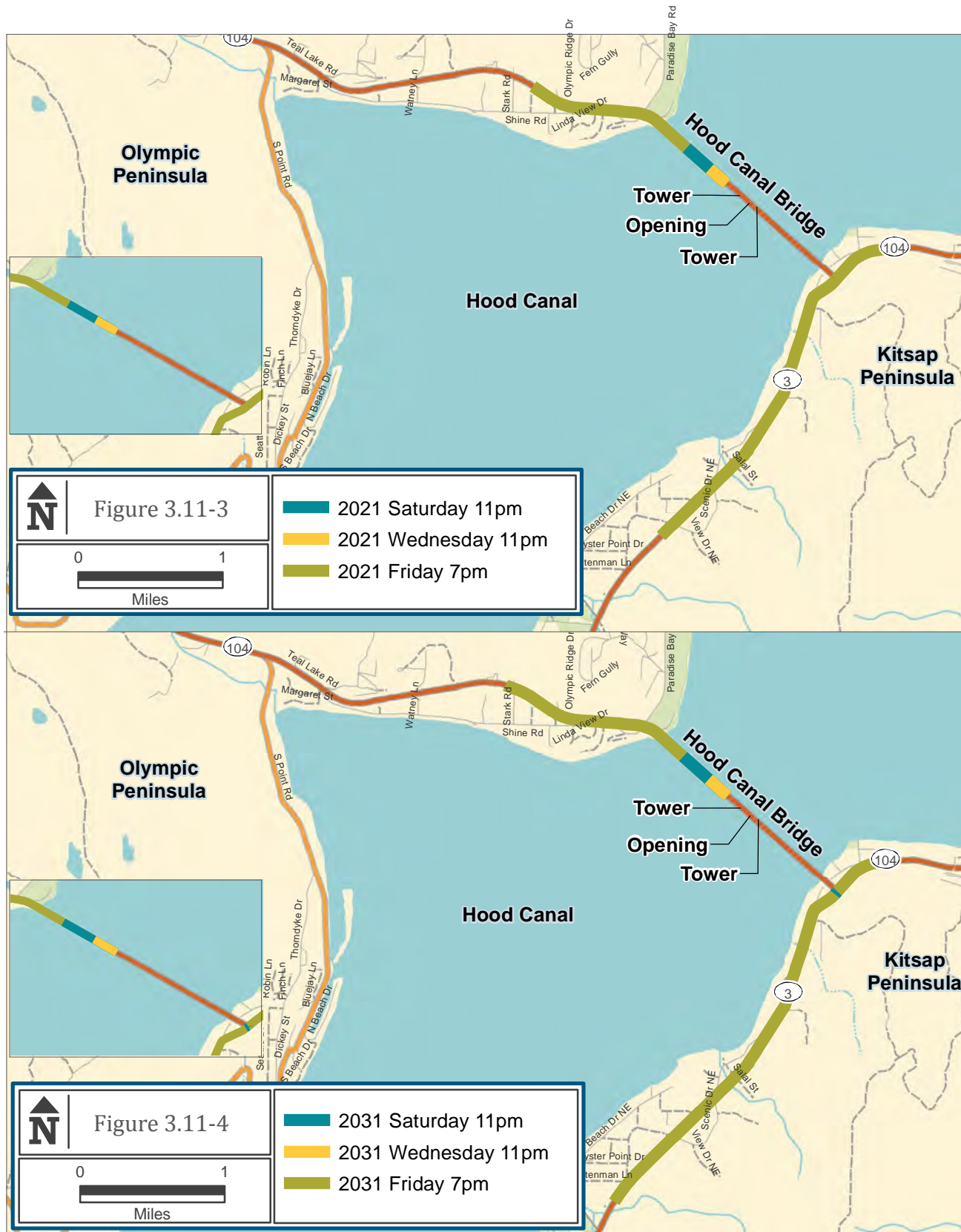
Fuel Efficiency Barges are the most fuel efficient when compared to trains and trucks. Barges can move one ton of cargo 616 miles on one gallon of fuel. A rail car would move the same ton of cargo 478 miles and a truck only 150 miles. **Source:** National Waterways Foundation (Modal Comparison of Domestic Freight Transportation Effects 2012)

Coast and Hawaii markets. However, federal maritime regulations (U.S. Jones Act) prohibit foreign vessels from hauling cargo between U.S. ports; thus, these ships are not available to be used by the Proposed Action. Applicant anticipates U.S.-flagged, Panamax class, bulk carrier ships (65,000 dwt), will come available 8 to 12 years after construction of the pier. No construction of new off-loading facilities at any U.S. West Coast or Hawaii ports are being considered or analyzed under this Proposed Action.

Applicant anticipates that up to six ships would call on the pier per month. No barges would be loaded on days when ships are loaded. Subject to market demand, Applicant projects the peak annual volume of sand and gravel loaded at the Pier would be 6.75 million tons (dwt), with barges hauling 4 million tons at Year 10 (after pier construction) and ships hauling 2.75 million tons at Year 25. It is anticipated that at least one barge would be loaded 228-258 days out of the overall 300 days the Pier would be utilized. When U.S.-flagged bulk carrier ships become available, it is estimated that ships would be loaded at the Pier 42-72 days out of the overall 300 days the Pier would be utilized.

Pursuant to international maritime treaties and federal law, vessels are given priority over any structure (e.g. the Hood Canal Bridge, the Proposed Pier) that would impede commerce on U.S. waterways (including Hood Canal). Two federal agencies have exclusive jurisdiction over the U.S. waterways to ensure compliance: the **USACE**, which ensures that there are no impediments to commerce; and the Coast Guard, which enforces navigational rules and regulations (including any licenses or exclusive use granted to any structure, action or chartered area). Applicant will be required to obtain approvals from the respective agencies for the Proposed Pier and the barges, tugs, and ships calling on the Pier.

The captains, pilots and crews who would operate the ships and tugboats expected to call upon the Proposed Pier would be under the authority of the Coast Guard, which requires compliance with all orders (verbal or written) issued by the agency. The Coast Guard's Captain of the Port, located in Seattle, oversees all ship movements of any commercial and naval vessels sailing on the waters of the Strait of Juan de Fuca, Puget Sound and Hood Canal through a **VTS**. These functions, duties and control are similar to what air traffic controllers have over aircrafts. Commercial vessels are required to continually monitor and maintain radio communication with the Captain of the Port. Should weather become too inclement to safely sail, the Captain of Port can order vessels to port or anchor. Commercial vessel operators, via **VTS**, are notified of any naval ship movement, Navy or Coast Guard training, or testing within chartered areas, as may occur in Hood Canal, and are compelled to follow any restrictions associated with those actions.



2021 and 2031 Traffic Map Predicted traffic backups during the years 2021 and 2031 when ships cause the Hood Canal Bridge to open.

The Navy considered the potential impacts of the Proposed Project on its activities in the area as part of the U.S. Navy Final EIS TRIDENT Support Facilities Explosives Handling Wharf, March 2012 (NAVY Vol. 1 2012). Based on information available at that time, the Navy determined that construction of the Proposed Project would only have short-term, temporary direct and indirect cumulative impacts, even if construction of both this project and the Navy project were to take place simultaneously. See Chapter 4 of U.S. Navy Final EIS TRIDENT Support Facilities Explosives Handling Wharf, March 2012 (NAVY Vol. 1 2012); and Chapter 4 of NAVSEA NUWC Keyport Range Complex Extension EIS/OEIS Final, May 2010 (Keyport 2010) for further detail. Regarding operational impacts, the Final Navy EIS listed potential cumulative impacts as aesthetics, erosion, water quality, and marine vessel traffic.



When available on the West Coast, a limited number of Panamax class ships (110 feet maximum width) would utilize the bridge's 600-foot center opening.



All barges would pass through the 230-foot eastern (Kitsap side) span of the Hood Canal Bridge.

Ships will require the draw span of the Hood Canal to be opened. A 2011 traffic study showed that in any given hour there were few vehicles crossing the bridge during overnight hours. This is an expected traffic pattern of most all bridges, however because of the low population and rural nature of the Olympic Peninsula, overnight use was significantly less than expected. Overall, traffic from tourism, tended to increase both the length of time and vehicle count during the Friday - Sunday Evening Peak traffic hour period. However, the overnight Non-Peak traffic count remained low. Projections calculate that the pattern of low overnight traffic would continue through the next couple of decades (Heath 2011). Figures 3.11-3 and 3.11-4 illustrate predicted traffic backups during bridge openings in 2021 and 2031. The Applicant has agreed to require the ship's pilot to limit draw-span openings to overnight Non-Peak traffic hours. This agreement would minimize the number of vehicles on SR-104 and SR-3 backed up by any ship calling on the Proposed Pier.

Applicant has proposed to use the bridge's eastern fixed-span for tugboat and barge crossings, to eliminate any traffic backups for those more frequent crossings. However, **WSDOT**, which operates the Hood Canal Bridge under the Bridge License, has expressed its preference that barges utilize an opening the bridge's draw-span, rather than passing under the eastern fixed-span. **WSDOT's** concern is that barges or tugboats navigating past the Hood Canal Bridge have the potential to result in a bridge/vessel crash or "allision".

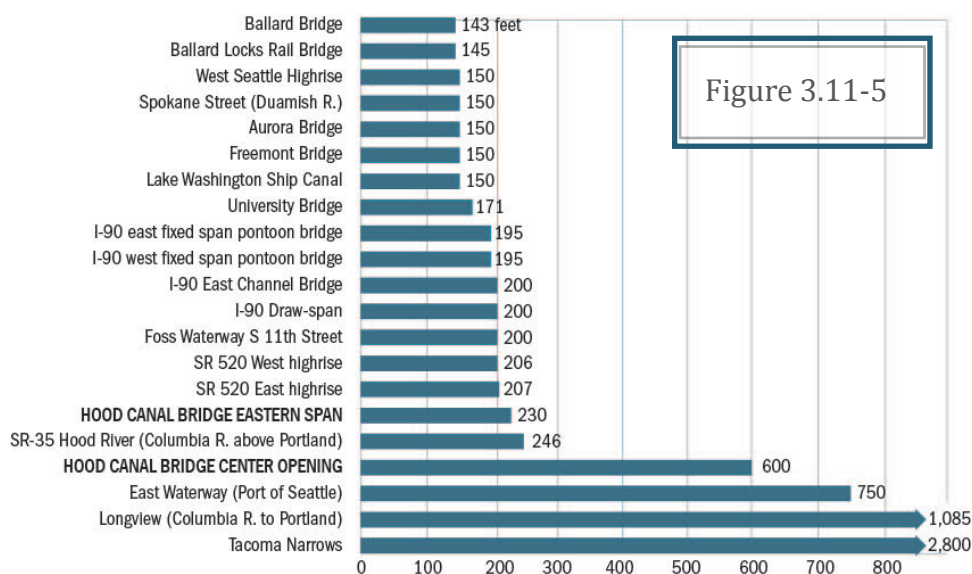
An allision could damage the bridge, resulting in a temporary delay or prohibition of traffic use across the Bridge. Although the risk of a tugboat- or barge-bridge allision is very low, the damage to the Hood Canal Bridge if such an accident did occur could be potentially substantial. **WSDOT** noted:

“... It is impossible to design a floating bridge to take a large vessel impact with no damage. Therefore, the Hood Canal Bridge was designed to lower the probability of a vessel impact by widening the navigational channel clearance; and to increase life safety by preventing a bridge collapse in the case of a vessel impact. Large vessels use the large 600 foot draw span in the middle of the Bridge where the clearance is large enough to minimize the probability of a direct vessel strike, and where a strike would more than likely be a glancing blow that can be handled by the fender protection system. For life safety, the Bridge was designed with compartmentalization that would allow for a complete hull breach and an anchor cable loss without the bridge sinking. While the bridge may not sink from a large vessel strike, it may be out of service for some time until the pontoons are either repaired or replaced” (Clarke WSDOT 2013).

The risk of a bridge allision is extremely remote. Barge traffic operates on waterways, including tidal waters, throughout the United States on a daily basis and the frequency of bridge-tugboat/barge allisions are very unusual. However, they do occasionally occur due to extreme weather conditions, mechanical failure, or operator error. According to the Coast Guard and American Waterways Operators Bridge Allision Work Group Study bridge allisions are rare (Coast Guard 2003).

Bridge allisions are uniquely within the expertise and jurisdiction of the Coast Guard and USACE. Since those federal agencies have exclusive jurisdiction over the issue of analyzing and imposing permit conditions regarding the potential of bridge allisions, this EIS recognizes that the issue exists and will be analyzed during the environmental review done during the National Environmental Policy Act (NEPA) process which would be required of Applicant when they seek federal permits.

See Figure 3.11-5



Horizontal Clearances of Key Navigational Channels

The Hood Canal Bridge center opening has a horizontal clearance of 600 feet, while the eastern span of the Hood Canal Bridge has a horizontal clearance of 230 feet. Source: U.S Coast Guard (2004) and City of Seattle (2005)

Ultimately, the Coast Guard has exclusive jurisdiction over the operating conditions under which bridge crossings are conducted and will determine whether, and under what conditions, barges and ships will be allowed to travel under the eastern span. The Coast Guard will determine the scope of study required to evaluate the risk and possible consequences of bridge allisions and the mitigation measures that the Coast Guard will impose.

As a part of its review, the County must determine that the Coast Guard's regulatory system is adequate to address the potential impacts (WAC 197-11-158). Jefferson County will likely require, as a condition of any permit issued for the project, that the Applicant comply with the terms and conditions imposed by the Coast Guard regarding crossings of the Hood Canal Bridge and operations within the area regulated by the VTS–Puget Sound system operated by the Coast Guard.

See further discussion of impacts to salmon-bearing watersheds in Section 3.7 Threatened and Endangered Species.

Federal permits may also place restrictions on tribal and commercial fishing operations in the immediate vicinity of the Proposed Pier. However, the Proposed Pier location is not near stream mouths or deltas with significant salmon populations or locations where adult salmon may stage or aggregate during spawning runs. Nor is the Pier located in the vicinity of the major salmon-bearing watersheds within Hood Canal (such as the Skokomish, Big and Little Quilcene, Duckabush, or Dosewallips Rivers). Therefore, tribal and commercial fishing are not expected to occur within the immediate vicinity of the Proposed Pier.

However, tribal and commercial fishing operations do occur along the expected route of ships, tugboats, and barges while in the main portion of Hood Canal. As noted in Chapter 2, the federal permitting process requires that protocols (standards of care) be developed and complied with to minimize or avoid conflicts with tribal and commercial fishing operations and the Proposed Action. The Captain of Port has authority to enforce compliance. Therefore, it is expected that any impacts to tribal and commercial fishing operations would not be significant.

References

Heath & Associates. 2006. Fred Hill Materials Shine Pit Traffic Analysis. September 2006.

Heath & Associates. 2011. Fred Hill Materials Central Conveyor & Pier Traffic Impact Analysis. September 2011.

Reid Middleton, Inc. 2003. Transportation Report, Wahl Extraction Area, Jefferson County Shine, Washington. June 25, 2003.



3.12 PUBLIC SERVICES AND UTILITIES

Developments, public or private, can incrementally increase the demand for law enforcement, fire, rescue, medical emergency and administrative services (public services), as well as roads, schools or hospitals. Developments also typically trigger public utilities such as power, water, sewer, stormwater, solid waste management and telecommunications.

These increases can lead to increased costs for additional personnel and equipment, as well as temporary disruptions of services. The various industrial activities of the Proposed Action may impact county, state and federal firefighting, rescue and emergency medical services, local law enforcement first responders, and county staffs from the departments of health and community development.

Analysis of the impact on public services and utilities throughout construction and operation of the Proposed Project include:

- fire, rescue and emergency medical provided by county, state and the Coast Guard;
- law enforcement from county and state police;
- administration services from Jefferson County; and,
- power, stormwater, telecommunication and solid waste utilities.

3.12 1 Regulatory Overview and Permits

Public services are provided under the jurisdiction of Federal, state, and local regulatory bodies and service providers.

3.12 1.1 Federal

Federal regulations pertain primarily to occupational health and safety requirements. Both Mine Safety and Health Administration (**MSHA**) and Occupational Safety and Health Administration (**OSHA**) rules and regulations set training standards for worker safety, fire, rescue and medical emergency response. Both **OSHA** and **MSHA** regulations also determine what necessary equipment needs to be available and operable at the various worksites of the Proposed Action.

MSHA is the primary enforcement agency governing the project's surface mining operations and regulates all mining activity worksites for this Proposed Action (30 CFR 62.100 et seq.). The **Mine Act** mandates periodic mine inspections; development of and compliance with health and safety standards; oversight of mine accident investigations, violations and complaints; and review of mine operating plans, and education and training programs. In particular, Section 115 of the **Mine Act** requires mine operators to have an approved health and safety training program with new miner and ongoing training requirements, including instruction in the use of the self-rescue and respiratory devices; hazard recognition; emergency procedures; electrical hazards; first aid; walk around training; and the health and safety aspects of particular jobs.

Both **OSHA** and **MSHA** rules and regulations set training standards for worker safety, fire, rescue and medical emergency response, and equipment availability and operation requirements for the various worksites of the Proposed Action.

OSHA also regulates worksites for this Proposed Action. **OSHA**'s marine terminals regulations govern employment within a marine terminal, including the loading, unloading, movement and handling of cargo, gear and any other activity associated with the overall operation of the terminal, such as the use and routine maintenance of facilities and equipment (29 CFR 1917.1). **OSHA** regulations require employers to develop and implement an Emergency Action Plan to ensure employee safety from fire and other emergencies. The Emergency Action Plan must include emergency escape and evacuation protocols; rescue and medical duties for those employees who are to perform them; fire and emergency reporting protocols; employee alarm systems; and employee training requirements (29 CFR 1917.30).

Captains, pilots and crews on US-flagged vessels are subject to **OSHA** requirements while in navigable waters of the United States. **OSHA** gives the Secretary of Labor jurisdiction over occupational health and safety standards "with respect to employment performed in a workplace in a state," except where other Federal agencies "exercise statutory authority to prescribe or enforce standards or regulations affecting occupational safety or health." (29 U.S.C. § 653). The boundaries of the state extend to its territorial waters contained within a line three geographical miles from the state's coastline. (Submerged Lands Act 43 U.S.C. § 1312).

With regard to the Pier and overwater operations, the U.S. Coast Guard is responsible for navigation and vessel safety; protecting the marine environment; and protecting life, property, and structures in, on, or immediately adjacent to the navigable waters of the United States Ports and Waterways Safety Act of 1972 (**PWSA**); Port and Tanker Safety Act of 1978 (**PTSA**). The Coast Guard also has jurisdiction over Piers involved with the loading of any vessel in U.S. waters. The Coast Guard controls vessel movement, establishes requirements for vessel operation, and imposes other related port safety controls within Puget Sound, including Hood Canal. The Coast Guard rules and regulations prevail over **OSHA** regulations aboard all US-flagged vessels to the extent the Coast Guard chooses to exercise jurisdiction.

The Coast Guard's jurisdiction includes waterways management, marine safety, search and rescue, law enforcement, border security, port security and environmental issues in Puget Sound and northwest Washington State. The Coast Guard regularly inspects U.S.-flagged vessels (such as the tugboats, barges and ships that would call on the Proposed Pier) for durability and safety, as well as conducting fuel, sewage and greywater monitoring inspections. In addition, the Coast Guard responds to and investigates all marine incidents and accidents involving commercial vessels.

3.12 1.2 State

State regulations pertain to administration of federal **OSHA** standards, firefighting within the Thorndyke Tree Farm, and managing vessel and facility incidents that may impact marine resources.

Washington Department of Natural Resources (**WDNR**) Forestry Division, provides emergency firefighting response to fires on commercial forestlands in the state. However, both the cost and first response duties are the responsibility of the property owner (RCW Ch. 76.04, WAC Ch. 332-24). The Washington State Fire Services Resource Mobilization Plan (RCW 38.54) authorizes a request for state fire resource mobilization if all local and mutual aid resources have been expended in attempting to control an emergency incident presenting a clear and present danger to life and property.

Washington Department of Licensing (**DOL**) adopted and administers federal **OSHA** worker safety standards. (RCW Ch. 49.17, WAC Ch. 296-800).

Stormwater would be regulated by the **WDNR** Geology Division, through the requisite reclamation plan for the mining portion of the Proposed Project, and Washington Department of Ecology (**Ecology**) through the National Pollutant Discharge Elimination System (**NPDES**) permit program.

For further discussion of compliance with the Ecology Stormwater Manual see Section 3.4 Water.

Through its Spills Prevention, Preparedness, and Response (**SPILLS**) Program, **Ecology** is the primary state authority responsible for dealing with vessel and facility incidents as they might impact State marine resources. (RCW Ch. 88.46, WAC Ch. 317-31). The State's jurisdiction extends to activities occurring in the coastal waters within the U.S. territorial seas, and State interests may even extend beyond those limits to the extent the event would likely impact state waters and resources. Similar to the U.S. Coast Guard, the **SPILLS** program conducts vessel examinations utilizing accepted industry standards for non-tank vessels, as well as conducting fuel and cargo oil transfer monitoring inspections on all vessels. In addition, **Ecology** responds to and investigates all marine incidents and accidents involving covered vessels (i.e., tank vessels, and other commercial vessels of 300 gross tons or more).

Ecology also regulates release of sewage and greywater into Washington waters (RCW 90.48.080, WAC Ch. 173-201A). See Section 3.3 Marine Shorelines for more detail.

3.12 1.3 County

Construction of proposed structures must comply with the Uniform Development Code (**UDC's**) development standards (Title 18 of the Jefferson County Code). The **Comprehensive Plan** contains Level of Service (**LOS**) standards typically adopted for impacts to various public services, facilities and personnel. Local public services potentially affected by the proposed project primarily involve law enforcement, fire and emergency medical services, and administration. The **Comprehensive Plan**, the **LOS** standards for public Capital Facilities and equipment are based on population (i.e., square feet of facilities or equipment units per 1,000 population). Thus, the **LOS** standards cannot be directly translated to impacts related to the proposed project. However, mitigation measures may be imposed under State Environmental Policy Act (**SEPA**) guidelines if the Proposed Action were to create a significant burden (adverse impact) to law enforcement, fire, or rescue or emergency medical services, or administration of the County.

The **Comprehensive Plan** also contains a policy applicable to the Proposed Project's impact on public services:

LAND USE ELEMENT POLICY

- LNP 21.2 Encourage project proponents to mitigate potential adverse impacts to public health, safety, and welfare as a result of a proposed project, action, or use concurrent with project development.

The Proposed Project will require a Conditional Use Permit and a Shoreline Conditional Use Permit. In its recommendation on the Shoreline Conditional Use Permits, the Hearing Examiner must consider whether the proposed is consistent with certain performance standards, including:

The Jefferson County Shoreline Master Plan (**SMP**) requires that a proposed development be consistent with the adopted performances standards for the applicable use designation—in this case, “Industrial and Port Facilities”:

“Industrial and port facilities shall not duplicate but share over-water structures such as docks and Piers whenever practicable. Any activity involving the use or storage of flammable or explosive materials shall be protected by adequate fire-fighting and fire prevention equipment and by such safety devices that are normally used in the handling of any such material. Such hazards shall be kept removed from adjacent activities to a distance that is compatible with the potential danger involved. (SMP Performance Standard 5).”

Construction requirements for electrical power lines must comply with the development standards of Jefferson County Public Utility District #1.

On-site septic systems must be designed, installed and maintained according to the requirements of Jefferson County Health Department (JCC 8.15.090).

3.12 2 Affected Environment

See Figure 3.8-1

The Meridian Extraction Area, the Operations Hub and the majority of the Central Conveyor are located within the southern portion of the Hood Canal Tree Farm's Thorndyke Block, and designated as commercial forestland under the Jefferson County **Comprehensive Plan** and Map. The final Pier approach and Pier are located on rural waterfront property, tidelands and in deep water of Hood Canal.

Local public services (i.e., sheriff, fire, rescue and emergency medical services) are expected to be called upon to respond to emergencies that may occur from activities of the proposed mining, material processing and conveyance, and Pier loading. Marine vessels that are underway cross multiple jurisdictional boundaries. Local public services, to the extent of their on-water emergency response capacities, would still have primary responsibility to respond to emergencies that may occur on vessels that would be used in this proposal.

Both public and private utility systems would serve the Proposed Project. Public power would be required for all project components. Ships, berthed at the Pier, would be provided electrical “shore-power”. Private wells would provide potable water. Private on-site septic systems would provide sewage treatment. No sewage or greywater pump-out facilities would be provided at the proposed Pier. All tugs and ships will hold and dispose of their sewage and greywater in accordance with applicable federal and state rules and regulations.

The individual structures used in the proposed action would be constructed with metal, including any buildings to house equipment at Operations Hub, Conveyors and their covers, transfer point enclosures, the Thorndyke Road crossing and the Pier. A few wood structures may be built to use for office and restroom facilities.

Processing, conveyance, and Pier loading equipment would be powered by electricity. Diesel-powered generators located on-site would provide backup power, and may also be used during the construction phase. Above ground fuel tanks would be situated at the Operation Hub. Fuel trucks would be used to fuel the heavy machinery at the Meridian Extraction Area.

3.12 2.1 Fire, Rescue and Emergency Medical Services

Fire, rescue and emergency medical services that could be required within the area of the proposed project are provided by a mix of federal, state and local agencies.

Forest fire fighting within the Thorndyke Tree Farm is provided by the **WDNR**. However, **WDNR** is not considered a first responder. **WDNR** firefighting capacity resources are limited and spread across the State, so it is unlikely that **WDNR** firefighters and firefighting equipment would be available to respond quickly should a fire start within the Thorndyke Block. **MSHA** safety regulations require that the miners, expected to be running the extraction, processing and conveying of the sand and gravel, be trained and have the equipment available nearby and operable to respond to fire, rescue and emergency medical situations. If a forest fire were to occur, it is likely that the heavy machinery (i.e. bulldozers and front-end loaders) used for the mining and processing activities would be commandeered to help contain the fire. Miners, depending on their firefighting training and ability, could be pressed into service to help fight the fire.

Jefferson County provides fire, rescue and emergency medical services to the project area through Port Ludlow Fire and Rescue (Fire District No. 3). The District operates out of three stations that serve about 5,000 residents over an area of 55 square miles. The District provides fire, rescue and emergency management services including fire protection and suppression; emergency medical aid and transport; basic hazardous materials response; specialized technical rescue services; fire and life safety inspections; public fire safety and prevention education; community relations and events; and, disaster preparedness and education (Fire District 2013).

During 2012, about 66 percent of the district's 820 total calls involved rescue and emergency medical services, 5 percent involved fire responses, and 23 percent non-emergency assistance and support services. None of these incidents involved the then operating Shine Pit or other mining operations within the commercial tree farm where the proposed Action would occur. Combined, 583 incidents (71 percent) responded to by Fire District No. 3 involved fire, rescue and emergency medical services. As of May 2013, the district employed 12 career firefighters (four paramedics) and six resident volunteer firefighters (Fire District Stats 2013).

Two of the district's stations (No. 31 and No. 33) include fulltime firefighters and emergency medical technicians. Station 31 (7600 Oak Bay Road in Port Ludlow) is the district's headquarters. Station No. 33, located at 101 South Point Road near the intersection of SR 104 and South Point Road, is the closest to the proposed project area. Station No. 32 (121 West Alder Street in Port Ludlow) is a volunteer station.

The Jefferson County Sheriff has a Marine Division that is tasked with enforcing boating and wildlife ordinances and state laws as they apply to water ways in Jefferson County. The Sheriff's Marine Division is staffed by a fulltime Captain and four part-time patrol deputies with federal and state funded manpower, training, equipment and other expenses. The Marine Patrol unit and Dive Rescue Team are on call 24 hours a day and serve as the primary responders for all water related search and rescue activities, particularly private recreational vessels. One 24-foot patrol boat is equipped with necessary electronics to respond to a range of emergencies. The Marine Division does not provide fire or emergency medical response on-water, but will assist other responders (Sheriff Marine 2013).

Fire District #3 also has a boat used to respond to rescue and emergency situations on-water, but no firefighting boat. Staffing and location where the District's boat is stationed varies, depending on the season (Fire District 2013).

The Coast Guard's Captain of the Port (Sector Puget Sound) oversees all Coast Guard operations in the Puget Sound area, and is responsible for administering and directing all Coast Guard activities relating to applicable navigation, shipping, transportation, firefighting, rescue and environmental laws and regulations within Puget Sound.

The Coast Guard has no specific statutory responsibility to fight marine fires. Federal policy established in the Federal Fire Prevention and Control Act of 1974 (PL 93-498), states that fire prevention and control is and should remain a state and local responsibility, although the federal government must help to reduce fire losses. Traditionally, the Captain of the Port will render assistance with fires on board vessels and at waterfront facilities. However, the availability and level of assistance is based on the Coast Guard's current resources and training level. Currently, Sector Puget Sound's policy is that it shall not actively engage in firefighting, unless a life is threatened, or as requested by the local fire department (Coast Guard 2014).

The Captain of the Port may also coordinate response efforts whenever a marine disaster creates a substantial threat of pollution due to discharge or an imminent discharge of large quantities of oil or a hazardous substance from a vessel.

3.12 2.2 Law Enforcement

The Jefferson County Sheriff's Office (located at 79 Elkins Road, Port Hadlock) provides law enforcement services to the 18,000 residents within the County's unincorporated areas. The Sheriff's Office is comprised of criminal, civil and corrections divisions. Staffing includes 45 sworn officers, seven civilian officers and 50 volunteers (Sheriff 2013). Among its main services are traffic control, civil process, county jail, crime investigation, marine patrol, and search and rescue. Jefferson County Sheriff Hernandez has stated the Sheriff is also responsible for any criminal investigation triggered by accidents that may be covered by **DOL**. Further, traffic control services include responding to incidents stemming from back-ups on SR 104 during openings of the Hood Canal Bridge. Traffic on the Bridge's western end (in Jefferson County) is exacerbated by the lack of a traffic signal at the intersection of SR 104 and Paradise and Shine Roads (Keenan 2013).

Certain high security U.S. Navy openings of the Hood Canal Bridge require the presence of the Washington State Patrol; in these instances, the State Patrol also provides traffic control. However, due to national security interests, services provided by the State Patrol is not considered a factor in evaluating the potential effects of this Proposed Action.

Potential traffic impacts of opening the draw-span of the Hood Canal Bridge are evaluated in Section 3.11 Transportation.

3.12 2.3 Administration

Jefferson County Department of Community Development provides design review, inspections and enforcement relative to county building codes for new construction and other development proposals. Staffing for these services is mostly funded through building permit fees, development review and inspection fees. Applicants are required to pay for all inspections, monitoring and additional reports as defined in permit conditions.

Jefferson County Department of Health provides design review, construction and maintenance inspections of on-site septic systems. Staffing for these services is partially funded through on-site septic system permits and inspections fees. Applicants are required to pay for all inspections, monitoring and additional reports as defined in permit conditions.

3.12 2.4 Hospitals and Medical Care Facilities

The closest major medical facilities to the proposed project are Jefferson Healthcare Hospital in Port Townsend; Harrison Medical Centers in Silverdale and Bremerton; and St. John's Hospital in Port Angeles. 24-hour healthcare clinics also are located in Port Townsend and Poulsbo. Medical evacuation services by Air Lift Northwest are available to transport major emergency medical and trauma patients to Harborview Medical Center in Seattle.

3.12 2.5 Telecommunications

Telecommunications include conventional telephone service as well as personal wireless and broadband cable for telephone, internet and video delivery systems (Jefferson County 2004). Qwest Communications International (dba CenturyLink QC) is the primary carrier for conventional phone service with long distance service provided by AT&T Wireless, US Sprint and MCI. Wireless carriers in Jefferson County include AT&T Wireless and Verizon Wireless. Cable television service is provided by Summit Cablevision, Hood Canal Telephone, Western Cable Service and Interstate Cable, Inc. Summit provides service to the Port Townsend, Shine and Kala Point areas.

3.12 2.6 Water

Potable water on the Toandos Peninsula is provided exclusively via wells. The closest existing wells to the Proposed Action are private wells located approximately one-third of a mile from the proposed Single Conveyor route near Thorndyke Road and an existing well within the proposed Operation Hub.

3.12 2.7 Sewer

The proposed project is not located within or near any public sewer systems within Jefferson County. The various worksite locations of the Proposed Action are expected to be served by private onsite septic systems approved by the Jefferson County Health Department.

3.12 2.8 Stormwater

See Section 3.4 Water for discussion on stormwater.

Private stormwater controls for the proposed Action would be installed and maintained in accordance of applicable State (ex. **WDNR** reclamation plans and **Ecology NDPES** permits at the proposed Meridian Extraction Area, Operation Hub and Central Conveyor) and County rules and regulations. The only public storm drainage systems anticipated to be utilized are open ditch drainage courses at the road access at Rock-To-Go Road and SR-104 and the Pier access at Thorndyke Road.

3.12 2.9 Solid Waste

Solid waste collection and management facilities are located in several locations in eastern Jefferson County. Without a County landfill, solid waste is transported to landfills outside the County by private carriers.

3.12 2.10 Electrical Power

Electrical power for the Proposed Action would be provided by Jefferson County PUD #1 with offices located at 310 Four Corners Road, Port Townsend, WA. (PUD 2014). The PUD is regulated by the Washington Utilities and Transportation Commission and has an obligation to supply electrical service and facilities that are safe, adequate, efficient, just and reasonable (Jefferson County 2004). The Project would also use diesel-powered generators as emergency backup and auxiliary power.

3.12 3 Proposed Project: Direct and Indirect Impact

3.12 3.1 Construction

A minor increase in demand for fire and emergency medical services may occur during construction, including potential fire protection and suppression, emergency medical aid, basic hazardous materials response, and specialized technical rescue services. Station 33 of Fire District No. 3 would likely provide the first agency response to any upland fires, accidents or medical emergencies. If further medical help for the patient(s) is needed the District would transport the patient to local hospitals in either Port Townsend or Silverdale. In the event of an extreme emergency, Air Lift Northwest helicopters would be called in to fly patients to Harborview Medical Center in Seattle.

It is expected that emergency incidents that may occur during the construction of the proposed Pier would involve individual or joint responses by the Jefferson County Sheriff Department's Marine Patrol, Fire District No. 3, commercial vessels in the vicinity, and the U.S. Coast Guard.

Coast Guard regulations require all contractors involved with Pier and nearshore construction activities to have trained workers and the equipment necessary to respond to any fire, rescue or emergency medical incidents. Therefore, it is expected that the workers involved would be the actual first responders should any emergency occur.

Potable water, fire suppression equipment, portable sanitation facilities and temporary construction stormwater controls would be required to be provided at every construction site.

Construction would follow all applicable design and industry construction standards, and occupational safety rules. Work performed would be done in a workmanlike manner in compliance with applicable federal, state or county regulations. Therefore, the construction of the Proposed Action would not adversely affect the functions of any public service provider or public or private utility or government regulatory agency.

3.12 3.2 Operations

3.12 3.2.1 Mining and Operations Hub

The need for fire, rescue and emergency medical services within the mining area and the Operations Hub would be similar to the need generated by previous and current surface mining operations in Jefferson County. Sand and gravel mining, including the use of Conveyor systems similar in nature to the proposed project, occurred in the immediate project area when the prior Shine Pit was in operation. Currently, other sand and gravel mining and basalt quarries are operating within the Thorndyke Block, the area where the proposed Meridian Extraction Area and Operations Hub would be located. The prior Shine Pit and the current mine and quarry mining operations have had very few emergencies requiring response by local public service providers.

In recent history, there has been only one accident: in 2003, when a worker lost a finger as a result of not following heavy equipment protocols. After this incident the operator at the Shine Pit and the Fire District No. 3 created a medevac helicopter landing area within Shine Pit, available for use 24 hours, 7 days a week.

Implementation of the occupational safety rules and regulations required by the various federal and state agencies, including worker training and required availability of on-site fire, rescue and emergency medical response equipment, have been instrumental in minimizing incidents that might have required an emergency response. The activities associated with the Proposed Action are expected to be run with same standard of care. Therefore, it is considered a low probability that additional emergency incidents that could occur would contribute significantly to the annual call volume for fire, rescue or emergency medical responses by Fire District No. 3 or other public service providers.

Concerning public or private utilities:

- Telecommunications for the proposed Operation Hub would be provided by the local landline service provider and a regional cellular phone provider. Miners at the proposed Meridian Extraction Area communicate via cell phones and commercial radio handsets to provide both work and emergency communications.
- Water for the proposed Operations Hub would be provided by the utilization of an existing well that had supplied the prior Shine Pit operations and is currently being utilized to provide water for reclamation. Potable and sanitation water for the proposed Meridian Extraction Area would be provided by an onsite well.
- An on-site septic system, approved by Jefferson County Public Health Department, would provide the sewage treatment for a restroom facility.
- Stormwater controls at the Meridian Extraction Area and Operations Hub would be provided by continual and temporary conveyance and ground release within the confines of the mine, as required by **WDNR** reclamation plans and **Ecology** **NDPES** permits.

Therefore it is anticipated that new demands on those utilities would be minimal.

Gasoline and diesel-powered vehicles and heavy machinery would be used throughout the proposed operation. Heavy machinery used to mine at Meridian Extraction Area would be fueled by tankers, supplied by above-ground fuel tanks located at the proposed Operations Hub.

Electrical power for the proposed Operation Hub would be provided by Jefferson County PUD #1. Electrical power lines, extending from the proposed Operations Hub, would supply the mining operation equipment and various Conveyors used in-mine, and for the Little Wahl and Wahl Conveyors. The capacity of PUD's Beaver Valley substation and existing power lines that would supply the operations electrical needs are considered adequate today. However, when the actual construction of the Operations Hub occurs, if an upgrade of any component of the PUD's power grid became necessary, the cost to do so would be the responsibility of the Applicant, subject to the PUD tariff requirements. Therefore, it is anticipated that new demands for electricity caused by the

proposed project's operation would not adversely impact the public electrical utility. All public and private utilities would be installed, used and maintained in compliance with applicable state, county, or utility regulations. Therefore, the operations of the Meridian Extraction Area and Operations Hub would not adversely affect the functions of any public or utility or government regulatory agency.

3.12 3.3.4 Marine Transportation and Pier Operations

Federal Coast Guard and **OSHA**, along with state occupational safety rules and regulations, require that adequate spill response, fire, rescue and emergency medical equipment be available and maintained for emergencies at the Proposed Pier, along with trained personnel available capable of using the required equipment. Coast Guard and **OSHA** rules and regulations also require all tugs and ships calling at the Pier to have captains and crews trained to use the spill response, firefighting, rescue and emergency medical equipment onboard their vessels, and avail their services to any "at Pier" or "in-water" emergency that could arise.

The Applicant has agreed to install automatic fire suppression systems at the control, power and equipment rooms located at the end of the Pier. There would also be firefighting, rescue and emergency medical equipment stationed within reach of the Pier operators. Two storage sheds, located on the innermost mooring dolphins, would house in-water fire, rescue and emergency medical equipment. A tender (small boat) available for both rescue and placement of spill containment, would also be stationed on one of the mooring dolphins at the Pier.

Prior to initiation of barging and shipping, a Marine Operations Plan defining specific standard procedures and protocols (Standards of Care or **SOC**) will be developed in coordination with the Army Corps, Navy, Coast Guard, **WSDOT**, **Ecology**, Washington Department of Fish and Wildlife (**WDFW**) and Puget Sound Harbor Safety Committee (**PSHSC**). Safety elements of the plan will include:

- Under-keel Clearance **SOC**
- Towing **SOC**
- Hood Canal Bridge Passage **SOC** (prepared separately for ships and for tugs)
- U.S. Navy Coordination **SOC** (including Navy exercises, Navy vessel ingress/egress to Hood Canal/Admiralty Inlet, and security of Naval Base Kitsap-Bangor)
- Mooring and Departure **SOC**
- Tug/Escort **SOC**
- Pilotage requirements
- Emergency Response and Communications
- Tribal and Commercial Fishing Conflict Resolution
- Heavy Weather **SOC**
- **SOC** for Movement in Restricted Visibility
- Anchorage **SOC**
- Equipment Failures and Ensuring Equivalent Levels of Safety

Marine Operations Plan will also include protocols for:

- spill prevention, control and countermeasures to ensure incidents and related risks related to potential fuel spills and vessel operations are effectively controlled and minimized;
- ongoing training of Pier and vessel operators and crews for spill control and cleanup, firefighting, rescue and emergency responses;
- ongoing maintenance protocols for all equipment and vessels which would be used for spill control and cleanup, firefighting, rescue and emergency medical responses; and,
- tugboat and ship operations and procedures for the safe handling of barges and ships as well as for emergency response.

Implementation of the Marine Operations Plan's, spill response, safety and emergency action protocols will be especially important in light of the unknown availability of Fire District #3 and Coast Guard personnel at any given time.

Coast Guard requirements compel all captains of the tugs and pilots of ships and their crews to report arrivals and departures under the Vessel Traffic Service (VTS), operated by the Coast Guard Captain of the Port (Sector Puget Sound), along with compliance with Marine Operations Plans. Compliance is also required of Pier operators and their workers. Through the VTS, commercial vessels are directed away from other on-water events, such as local fishing derbies and tribal canoe journeys.

As discussed in Section 3.11 Transportation, in order to minimize vehicle backups on the Hood Canal Bridge, the Applicant has agreed to limit draw-span openings to overnight, Off-Peak vehicle traffic hours for all ships that would call on the Pier and compel all barges and tugs to go under the bridge's eastern fixed-span. Thus, the potential for increased traffic control services caused by the proposed project's additional openings of the Hood Canal Bridge is not anticipated to be significant. The Applicant states that the Marine Operations Plan, specifically under the Hood Canal Bridge Standard of Care, will require all tugboat captains and ship pilots to comply with these limitations.

As a result of these considerations, significant adverse impacts to public services are not anticipated because of the Proposed Pier operations or vessels expected to call; nor would additional emergency incidents that could happen contribute significantly to the annual call volume for fire, rescue or emergency medical responses by Fire District No. 3 or other public service providers.

References

Fire District #3, Jefferson County, Washington. 2013. Operations webpage. Available at <http://plfr.org/operations/index.php>. [Accessed November 2013.]

Public Utility District #1, Jefferson County, Washington. 2014. Main webpage. Available at <http://www.jeffpud.org/>. [Accessed November 2013.]

Sheriff's Office, Jefferson County, Washington. 2014. Main webpage. Available at <http://www.jeffersonsheriff.org>. [Accessed November 2013.]

Sheriff's Office, Jefferson County, Washington. 2014. Marine Patrol webpage. Available at <http://www.jeffersonsheriff.org/pages/Marine-Patrol.html>. [Accessed November 2013.]



3.13 ARCHAEOLOGICAL AND CULTURAL RESOURCES

“Historic properties” typically include buildings, sites, structures and objects, including shipwrecks. Each has potential historical, architectural, archaeological, cultural or scientific importance. Artifacts, records and materials, including those having traditional religious and cultural importance, may be associated with archaeological and religious sites and landscapes. Current shoreline development must acknowledge and respect the potential presence of archaeological sites of historic native cultures as they built a rich culture and livelihood on the marine waters, rivers and lakes of the Puget Sound and Straits of Juan de Fuca.

Construction and operation of the Proposed Project’s upland extraction activities, processing hub, Conveyors and Pier could impact historic, archaeological and cultural resources. Studies were conducted to identify, evaluate and record pre-contact and historic cultural resources in accordance with Section 106 of the National Historic Preservation Act (NHPA). Objectives included identifying archaeological resources and historic properties that might be eligible for the National Register of Historic Places (NRHP) located within the Area of Potential Effects (APE) for the Proposed Project. Methodologies included archival review of relevant documentation, written communications with tribal representatives regarding technical issues, and field investigations (NPS 2001).

3.13 1 Regulatory Overview and Permits

Historic resources are protected at all levels under federal, state and county regulations.

3.13 1.1 Federal

The National Historic Preservation Act (NHPA) (16 U.S.C. 470) requires federal agencies to consider the effects of a project on historic properties falling within the National Register of Historic Places (NRHP), the nation’s official list of historic properties worthy of preservation. The national register includes districts, sites, buildings, structures and objects that are significant in American history, architecture, archaeology, engineering and culture at local, state and national levels. Additional federal regulations relevant to the protection of historic properties include the American Indian Religious Freedom Act (42 U.S.C. § 1996), Archaeological and Historic Preservation Act (16 U.S.C. 469-469c-2), and the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 et seq). Formal tribal consultation typically occurs at the federal level.

Prior to approving the Proposed Project, the National Environmental Policy Act (NEPA) lead agency (in this case, the U.S. Army Corps of Engineers (USACE) must complete planning and actions necessary to minimize harm to any National Historic Landmark. (NHPA’s Section 106 process is codified in 36 CFR § 800, “Protection of

Historic Properties”). During the early stages of planning, the involved federal agency official must formally consult with the state or tribal historic preservation officer (**SHPO/THPO**) and other interested persons. Historic properties must be adequately identified and project effects considered.

In determining eligibility for listing in the National Register (36 CFR § 60.4), evaluations of historic properties that are more than 50 years old, or that have achieved significance in the last 50 years, utilize the following criteria:

- properties associated with events making a significant contribution to the broad patterns of our history;
- properties associated with the lives of people significant in our past;
- properties that embody the distinctive characteristics of a type, period or method of construction, that
- represent the work of a master, that possess high artistic values, that represent a significant and
- distinguishable entity whose components may lack individual distinction; or
- properties that have yielded, or may be likely to yield, information important to prehistory or history.

As mandated by Section 106 of the **NHPA**, agencies are required to identify historic properties potentially affected by their actions, assess and take into account the related effects of the actions, and seek ways to avoid, minimize or mitigate any adverse effects (36 CFR § 800.1a). Properties determined eligible for inclusion in the National Register are identified so that a determination on the effects on each historic property within the Proposed Project’s **APE** can be made (either as a “no effect” or “effect” determination). An “effect” is defined as an alteration to the characteristics of a historic property, qualifying it for inclusion in or eligibility for the National Register (36 CFR §800.16). If this analysis results in an “effect” determination, measures to mitigate or reduce the effect are developed by the consulting parties, agreed upon, and implemented. The consulting parties include the Washington **SHPO**, Indian tribes, representatives of local government, and applicants for federal permits and approvals (NEH 2013).

3.13 1.2 State

Washington’s Department of Archaeology and Historic Preservation (**DAHP**), under the direction of the **SHPO**, administers the National Register program and identifies any historic properties. The Department of Commerce is granted authority to issue civil penalties while protecting Indian graves, archaeological sites and cultural and historic resources (RCW chapters 27.34, 27.44 and 27.53).

Initially, consultations with the **DAHP** establish the Areas of Potential Effect (**APE**) and include the geographic area(s) where the proposed activity may alter the character or use of historic properties. Existing information on historic properties within the **APE** is then reviewed and site investigations conducted to assess the potential presence of previously undocumented properties. Additional information is then sought from the consulting parties and other individuals or organizations likely to have knowledge of, or concerns with, historic properties in the Proposed Project area, or who could identify issues relating to potential effects of the Proposed Project on historic properties.

The **APE** typically includes project locations where activities would result in ground, visible or audible disturbances; changes in public access; traffic patterns, or land use. Adverse effects to historic properties can be either direct or indirect and can include:

- Physical destruction or damage
- Alteration inconsistent with the Secretary of Interior's Standards of Treatment of Historic Properties (NPS 2001)
- Relocation of the property
- Change in the character of the property's use or setting
- Introduction of incompatible visual, atmospheric or audible elements
- Neglect or deterioration (NEH 2013)

3.13 1.3 County

Jefferson County's Uniform Development Code (**UDC**) protects historic and archaeological resources through environmental review and regulations (JCC 18.30.160, Development Standards, Archeological and Historic Resources).

Jefferson County's **Comprehensive Plan** contains a variety of goals and policies applicable to the Proposed Project, which are discussed in greater detail in Section 3.8 Land Use. The following goals and policies are applicable to this discussion of the Proposed Project's impacts on historic, archeological and cultural resources:

HISTORIC PRESERVATION ELEMENT GOAL

- OSG 6.0 Identify and preserve historic and prehistoric sites, structures, Native American settlements, and artifacts that have value as significant cultural resources.

HISTORIC PRESERVATION ELEMENT POLICIES

- OSP 6.1 Support the efforts of the Jefferson County Historical Society and other interested groups to:
 - a. Identify, evaluate and designate historic and prehistoric sites, structures, and artifacts of cultural significance for inclusion on appropriate national state, and/or local registers;
 - b. Develop and implement a preservation program for the on-going protection and preservation of designated cultural resources;
 - c. Develop and implement an educational program to increase awareness, appreciation, and voluntary preservation of cultural resources; and
 - d. Develop methods to link cultural resource preservation with tourism and local tribal economic development strategies.
- OSP 6.2 Ensure that new development located adjacent to structures and sites of archeological and/or historical significance is compatible with the character of the site.

In addition, the **SMP** requires that a project proposal be evaluated for consistency with the Conservancy Shoreline designation applicable to an area with valuable cultural or historical resources:

CONSERVANCY ENVIRONMENT MANAGEMENT POLICY

- To protect, conserve, and manage existing resources and valuable historical and cultural areas in order to ensure sustained resource stabilization and that sensitive natural conditions are not subject to inappropriate uses.

Informal consultation with the tribes may occur at the local level.

3.13 2 Affected Environment

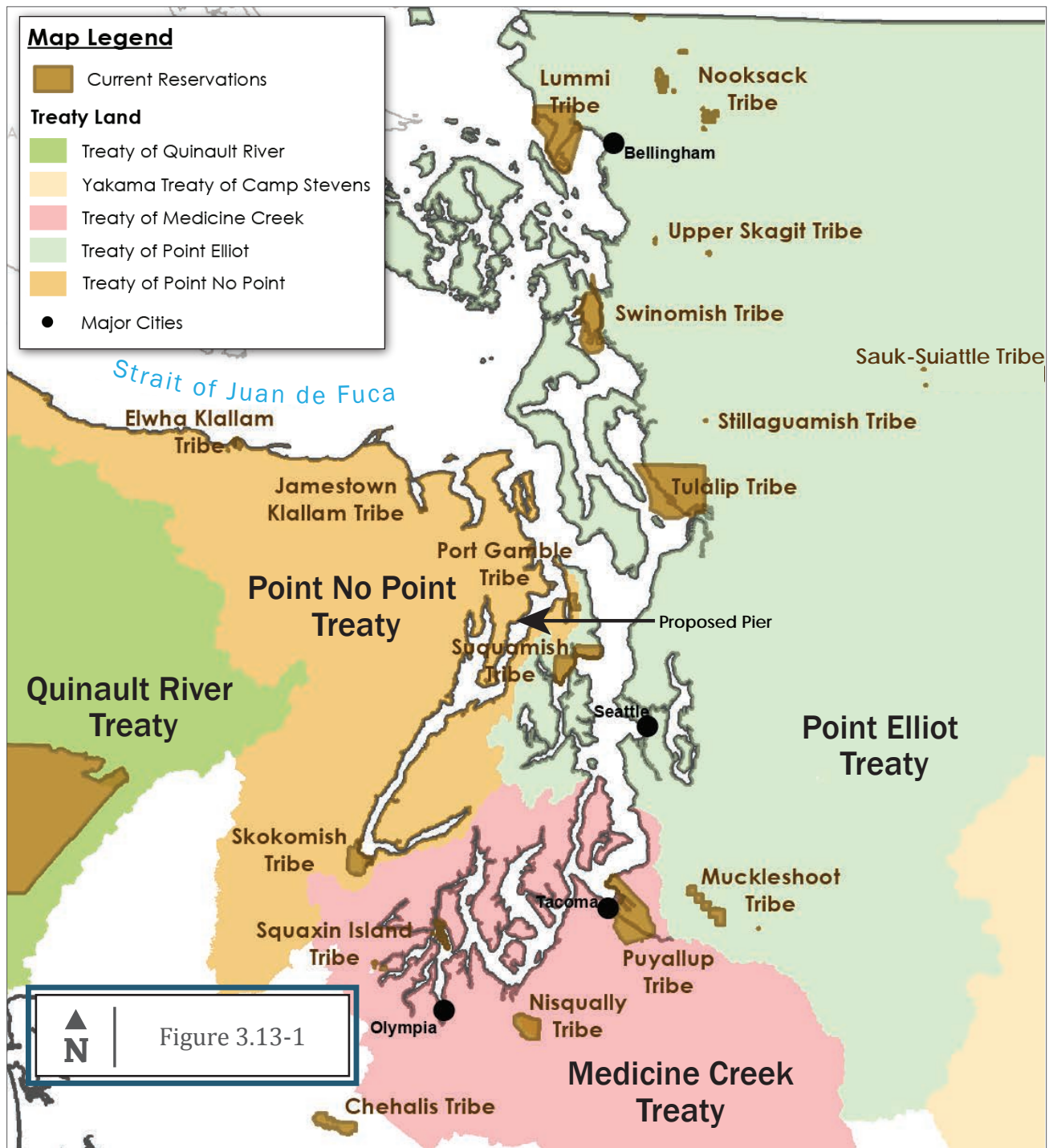
The Proposed Project is located on the west side of Hood Canal on the northeastern portion of the Toandos Peninsula. Project components include a proposed Conveyor linking mining and processing activities (Upland Area) with a proposed Pier for transporting sand and gravel by barge and ship (Shoreline Area). The upland mining operations are approximately three miles inland from the western shore of Hood Canal. The Proposed Project area, situated on glacial deposits formed during the last glaciation of Western Washington, was available for hunter-fishermen-gathering activities after deglaciation, beginning approximately 14,000 years ago (LAAS 2002).

See Figure 3.13-1

The aboriginal territory of the Twana people (now known as the Skokomish Tribe) resided just south of the Proposed Project area. The Twana mostly lived in villages at the mouths of rivers and streams draining into Hood Canal and Puget Sound from the Olympic Mountains. Lying near the mouth of Hood Canal, the proposed Pier site was among fishing and clam digging areas for the neighboring Klallam, Chemacum and Suquamish people (LAAS 2002).

The Twana and their neighbors' winter villages consisted of clusters of two to four gable-roof houses with associated smaller, shed-roof houses usually situated at the mouth of a stream or river. The Twana used cedar planks for the exterior wall and roof of their winter houses. The Twana and their neighbors also built summer houses at hunting, fishing, berry gathering and clam digging camp sites. Three types of summer houses were used: the plank shed made from cedar planks temporarily taken from winter houses, the mat house consisting of a pole frame covered with cattail mats, and an open-air lean-to made from cedar planks on a pole frame (LAAS 2002).

During their stay at the summer camps, the Twana and their neighbors harvested salmon, bottom fish, clams and oysters; hunted sea mammals, land game and waterfowl; and picked berries. These foods were consumed immediately, preserved for winter use, traded and used for travel provisions (LAAS 2002).



Treaty Ceded Lands The proposed project area is within usual and accustomed tribal hunting, fishing and shellfish gathering areas on ceded lands defined under the Point No Point Treaty. Source: Ecology, WA Office of Financial Management.

After initial contact with European-American explorers and settlers, the Twana, Chemakum, Suquamish and Klallum peoples were exposed to disease and acculturation efforts that reduced their populations. The Point Elliott and Point No Point Treaties, signed in 1855, established the Skokomish Indian Reservation for the Twana, Klallum and Chemakum; and the Port Madison Reservation for the Suquamish. Twana and Chemakum mostly settled on the Skokomish Reservation and are now known as the Skokomish Tribe. The Klallam bands, with some Chemakum, refused to move to the Skokomish Reservation and instead settled at Port Gamble, Sequim and Port Angeles, where reservations were eventually established (LAAS 2002).

The Proposed Project area is located on lands ceded to the United States under the Point No Point Treaty of 1855. The Point No Point Treaty established the Usual and Accustomed Fishing Area, the area for which rights to fish, hunt and gather were retained for the signatory tribes of the Lower Elwha Klallum, Port Gamble S'Klallum, Jamestown S'Klallum and Skokomish Tribes (CRC 2008).

The first non-native settlers arrived on the Toandos Peninsula around 1860. These early Euroamerican settlers were primarily loggers. After the land was cleared for timber, a small number of farmers, ranchers and fishermen settled in the area. Since then, the Proposed Project extraction area and surrounding forest lands have been logged several times, increasing the likelihood of disturbing any prehistoric or pre-contact archaeological or cultural resources. The primary landowners in the project alignment have been timber companies (LAAS 2002).

No recorded shipwrecks are located in the Proposed Project area. Based on the distance of known shipwrecks from the proposed Pier location, and the water depths (bathymetry) of the Proposed Project area, it is unlikely that known shipwrecks would have drifted into the Proposed Project area. Hood Canal's steep submarine shelf south of the proposed Pier site (LAAS 2002) further lowers the probability of unrecorded shipwrecks in the Proposed Project area.

3.13 2.1 Archaeological Resources

Hunter-fisher-gatherers and pre-contact aboriginal peoples may have infrequently accessed the Proposed Project area to collect shellfish, hunt land game, procure plant resources, or occupy during vision quests. Other landforms north and south of the Proposed Project area with natural harbors, sand spits and low gradient streams draining into Hood Canal would have been used more frequently and have a higher probability for containing significant archaeological resources. However, literature review and field investigations conducted on and in the immediate vicinity of the area directly affected by the Proposed Project revealed no evidence of archaeological resources (LAAS 2002).

The closest listed NRHP site to the Proposed Project is on the south bank of Shine Creek located approximately three-quarters of a mile east of the Operations Hub. In May 2005, a buried cultural deposit with two pit features was discovered while the Natural Resources Conservation Service was conducting a cultural resources survey for a wetland restoration project close to the mouth of the Shine Creek Estuary (CRC

2008) and beach at Squamish Harbor (Williams 2005). The two pit features include a charcoal-stained layer with a charcoal-filled pit and a fire pit with charcoal lenses and oxidized soil. An additional 10 acres were surveyed along the slough banks and adjacent wetland. There were no diagnostic artifacts associated with the site, no radiocarbon dating of the charcoal performed, and the site was not affected by the nearby wetlands project. Based on its location and stratigraphic position, the site was interpreted as a pre-contact camp site and recorded on June 15, 2005 (45JE287).

The APE for direct effects to historic properties is considered to be the footprint for ground-disturbing activities anticipated to occur during construction and long-term maintenance of the project. The Proposed Project's ground disturbance would take place within the Meridian Extraction Area and Wahl Conveyor (534 acres) and along the Central Conveyor and Pier (approximately 20 acres including Conveyor corridor, adjacent maintenance road, Pier approach and Pier.)

In some cases, indirect effects may extend beyond the geographic boundary of ground-disturbing activities. For example, indirect effects caused by visual impacts or noise, could result in an effect on historic properties of traditional religious and cultural importance beyond the Proposed Project's footprint. For the purpose of this DEIS analysis, the APE extends from the ridge line that lies west of the Meridian mining area, along the proposed Conveyor corridor east and south to the Pier and west shoreline of Hood Canal, and north to SR 104 and the Hood Canal Bridge.

A persistent mapping error on various government archaeology maps erroneously shows the Earl Oatman House (Wiki 2013) at the mouth of Thorndyke Creek and as the closest listed NRHP site. In fact, the Earl Oatman House is located seven miles away from the Proposed Project vicinity, across Dabob Bay in the town of Quilcene, and outside the anticipated APE for the Proposed Project.

Disturbance from logging activities in the Proposed Project area over the historic period diminishes the likelihood that archaeological resources would be found.

3.13 3 Proposed Action: Direct and Indirect Impacts

The potential for probable significant adverse impacts include direct impacts (physical alteration or damage) and indirect impacts (i.e., visual or noise) to the setting in which the resource is located. The APE for direct effects to historic properties is considered to be the footprint for ground-disturbing activities anticipated to occur during construction and long-term maintenance of the Proposed Project. The Proposed Project's ground disturbance would take place within the Meridian Extraction Area and Wahl Conveyor (534 acres) and along the Central Conveyor route and Pier (approximately 20 acres including Conveyor route, adjacent maintenance road, Pier approach and Pier.)

In some cases, indirect effects may extend beyond the geographic boundary of ground-disturbing activities. For example, indirect effects caused by visual impacts or noise, may impact historic properties of traditional religious and cultural importance beyond the Proposed Project's footprint. For the purpose of this **DEIS** analysis, the APE extends from the ridge line that lies west of the Meridian mining area, along the proposed Conveyor route east and south to the Pier and west shoreline of Hood Canal, and north to SR 104 and the Hood Canal Bridge.

3.13 3.1 Construction

Ground disturbing activities will occur along the proposed Conveyor corridor, adjacent maintenance road, proposed employee parking lot, and at all logging road abandonment locations during construction. Based on the results of the archaeological and cultural resources assessments conducted for the Proposed Project, the likelihood is low that historic properties within the Proposed Project's construction footprint would be encountered or disturbed. The predominantly inland route of the Conveyor is in areas with no known historic resources. Nor is it likely a significant archeological site would be discovered or revealed where the Conveyor route approaches the shoreline, given the bluff's general instability and history of landslides.

As far as indirect impacts, distance and nearby forest vegetation would screen recorded historic properties from construction activities. Operation of machinery, clearing vegetation and installing the Pier approach and Pier pilings would generate temporary increases in noise over background levels. With the exception of the Conveyor's approach to the Hood Canal shoreline and the Pier itself, construction activities along the Conveyor route and extraction areas would not be visible beyond immediate sight-lines.

3.13 3.2 Operations

There are no direct impacts anticipated to historical properties as a result of operation of the Proposed Project. Given the vegetative screening surrounding all operation areas excepting the Pier approach and Pier, indirect impacts are also unlikely. None of the Proposed Project operations are visible from the nearest identified archaeological site (45JE287) near Shine Creek.

3.13 3.2.1 Mining

As described in Chapter 1, the Proposed Project will mine sand and gravel within the Meridian Extraction Area of an approved Mineral Resource Lands Overlay (**MRLO**). This area was not directly surveyed (i.e., no pedestrian transects or shovel probes) but was investigated by archival review of relevant documents and communication with the tribes.

Mining would involve removal of existing vegetation and topsoil and potentially disturbing historic properties. Given the longtime logging activities in the area, the likelihood of encountering previously undisturbed or intact historic properties in the Meridian Extraction Area is lower than other, more remote areas.

3.13 3.2.2 Operations Hub

Initial excavations associated with prior mining and processing activities at the Shine Operations Hub have resulted in removal of vegetation and soil overburden in the area. It is therefore unlikely Proposed Project mining activities here would disturb any potential historic properties.

3.13 3.2.3 Central Conveyor

Operation of the Central Conveyor, once constructed, is unlikely to disturb historic properties because of historic logging activities in the area. The footprint of the Central Conveyor is limited in dimension and predominantly inland (approximately 3.8 miles of its overall 4-mile route from Operations Hub to end of the Pier). Primary Conveyor maintenance would occur from a realigned, adjacent forestry service road constructed concurrently.

3.13 3.2.4 Pier, Including Central Conveyor Approach

The area occupied by the Pier in the intertidal and nearshore waters of Hood Canal is within the usual and accustomed fishing and shellfish harvesting area of the signatory tribes to the Point No Point Treaty of 1855. As noted earlier, no shipwrecks are likely to be located within the vicinity of the Pier.

Impacts to tribal fishing and shellfish harvesting are described in sections 3.4 Water, 3.5 Marine Plants and Animals and 3.7 Threatened and Endangered Species.

3.13 3.2.5 Marine Transportation

The activity associated with transit, navigation and loading of tugs, barges and ships may affect tribal fishing and shellfish harvesting areas reserved in the Point No Point Treaty of 1855. Although beaches in the Proposed Project vicinity would remain accessible to tribal undertakings, the applicant stated in the Proposed Project application that up to 65 days be allotted annually in consideration of tribal fishing, holidays, inclement weather and periods of non-use.

See 3.11 Transportation for Pier operational impacts to tribal fisheries and the tribal Canoe Journey.

References

CRC (Cultural Resource Consultants, Inc). 2008. Re: Preliminary Results, Phase II Historic and Cultural Preservation Gap Analysis for the Central Conveyor and Pier ("Pit to Pier") Project, Jefferson County, Washington. Letter Report #0802F-1. June 16, 2008.

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CHAPTER 4

Collective Impacts and Mitigation, No Action Alternative, and Cumulative Impacts



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4.0 Introduction

Chapter 3 discusses at great length and in detail, the possible significant adverse impacts of construction and operation of the Proposed Project on elements of both the natural environment and the built environment as required under **SEPA**. Some impacts, in isolation, may not appear to be significant, but their significance becomes apparent when combined with other impacts (termed “collective impacts” in this document). This Chapter 4 provides a comprehensive analysis spanning multiple environmental elements for four key issues identified in Jefferson County’s Final **SEPA** Scoping Letter dated December 16, 2013. This analysis of the Key Issues is intended to summarize collective impacts rather than repeat the detailed information provided in Chapter 3.

Many mitigating actions proposed by the Applicant also span multiple environmental elements. Consequently, Chapter 4 addresses mitigation holistically to provide a better picture of mitigation of the significant matters raised in this **DEIS**. As noted in Chapter 3, the regulatory requirements contained in federal, State of Washington, and Jefferson County laws and regulations will mitigate many potential impacts. Compliance with many of the regulatory requirements, such as completion of additional technical studies, preparation of a detailed mining reclamation plan, identification of specific BMPs, etc., occur during the design phase of the proposed project, however—following any approval of the zoning and shoreline Conditional Use Permits.

Mitigating measures may go beyond regulatory requirements if they are if they are tied to specific adverse impacts, and are reasonable and capable of being accomplished. As part of this **DEIS**, such mitigating measures are proposed by the Applicant to mitigate identified impacts. During the permitting process, some or all of the mitigating measures (beyond regulatory requirements) may become conditions of any permit approval.

Chapter 4 also addresses the No Action Alternative to the Proposed Project. No other alternatives are discussed; several other sites for the Pier were considered but eliminated because they could not achieve project objectives at a lower environmental cost than the proposed site (see Chapter 1).

Finally, this Chapter will address Cumulative impacts—those impacts resulting from the incremental impact of the proposed action combined with other actions in the project vicinity.

4.1 Collective Impacts – Key Issues

As part of the County scoping process, four key issues were identified that require a more detailed analysis of collective impacts; these issues also cross multiple elements of the environment. The following discussion addresses the collective impacts of construction and operation of the Proposed Project with respect to each of these four issues.

4.1 1 Key Issue No. 1: Collective Impacts of the Proposed Pier on Hood Canal, Shorelines and Neighboring Residential Area

Section 4.1.1 summarizes the following collective impacts of construction and operation of the Proposed Pier on:

- Hood Canal;
- Associated shorelines, and;
- Neighboring rural residential areas.

This section addresses impacts associated with light, glare and aesthetics, natural shoreline processes, ambient and underwater noise levels related to humans and wildlife, nearshore habitat, marine mammals, and threatened and endangered species, and existing and future shoreline land use.

4.1 1.1 Collective Impacts of the Proposed Pier on Hood Canal

This section addresses general impacts of the proposed project on the larger area of northern Hood Canal. These impacts relate primarily to temporary underwater construction noise and the long-term increase in marine vessel traffic. The increased marine traffic could potentially impact existing marine traffic and incrementally contribute to the degradation of water quality. Impacts to the Hood Canal shoreline immediately adjacent to the project site are addressed in 4.1 1.2.

See 4.1 1.2 Construction and operation of the proposed project will result in temporary, short-term disturbances to Hood Canal marine species and result in a long-term increase in the level of marine vessel traffic on Hood Canal from the area of the Pier north, to Admiralty Inlet. Construction activities and the increased marine traffic will incrementally increase impacts to water quality and underwater noise levels, thus potentially impacting the health of Hood Canal and its aquatic life. The increased volume of marine traffic is not anticipated to significantly impact recreational boating. Impacts to Navy vessel traffic and Tribal fishing will be evaluated as part of the federal environmental review (NEPA) and permitting process. Impacts from the increased marine traffic relating to the issues of light, glare, aesthetics, in-air noise levels, and land use, are addressed under the impacts to neighboring residential areas.

As described in Section 3.3, Hood Canal waters in the vicinity of the proposed Pier are designated as Extraordinary Primary Contact waters by the State of Washington, meaning the water has an extraordinary quality for aquatic life. Measured levels of dissolved oxygen, temperature, and turbidity in upper Hood Canal meet State standards for Fair to Good. Four sites in the vicinity of the proposed project site have been listed on **Ecology's** 303(d) List of Impaired Waters for dissolved oxygen, and one site at the south end of Squamish Harbor has been listed for contaminated tissue concentrations. While operation of the proposed project would contribute incrementally to water quality impacts, the proposed project is unlikely to result in exceedance of toxicity thresholds as a result of the leaching of anti-fouling paints (metals and tributyltin) from barge or ship hulls, is unlikely to result in pollution related to nutrients, bacteria or exotic species, and is unlikely to contribute to changes in the level of dissolved oxygen. Based on the preliminary design of the Pier, long-term impacts from increased turbidity are also unlikely. Short-term increases in turbidity are likely to result from construction activities.

Anticipated underwater noise impacts relate primarily to noise generated during in-water construction activities. Potential injury and disturbance zones for marine species have been identified, based on the proposed construction techniques. Some of the potential temporary disturbance zones extend beyond the proposed project site. Construction activities, including allowed underwater noise levels, and timing of construction, are regulated by both the State **WDFW HPA** and federal **USACE** permitting processes.

In-water noise levels associated with pile installation and construction of the proposed Pier facilities will temporarily elevate noise levels above existing background noise levels, and if not conducted per regulatory requirements, could potentially injure or cause behavioral disturbances to fish, marine mammals and diving seabirds. Pile driving and work vessel activity during construction may cause short term disturbance of fish, marbled murrelets and pinnipeds.

Fish may alter their normal behavior, including minor startle response and avoidance of project construction activities. In- and over-water construction of the proposed Pier and gantry are expected to take two months and occur during the agency-approved work window (July 16 to February 15) when the fewest juvenile salmonids are expected to be present in the project area. A small number of federally or state-listed adult and juvenile salmonids may occur in the project area during construction. Data indicate that juvenile salmonids do not appear particularly susceptible to impact pile driving, making it unlikely that injury will occur to these species.

Other marine species, particularly sea perches, are susceptible to injury caused by change in pressure (barotrauma) and mortality during impact driving of large diameter steel piles. A vibratory hammer will minimize most impacts, as will a bubble curtain to be used when proofing with an impact hammer is needed. To further protect fish, a soft-start approach using the vibratory and impact pile driving hammers will be utilized to encourage fish to move away from the area prior to initiation of pile driving. It is expected that forage fish, and spawning areas for herring, surf smelt and Pacific sand lance, will not be impacted by proposed in-water work; none are proximal to the Proposed Conveyor and Pier site.

Operational noise and activities may cause some behavioral avoidance (or attraction) as specimens approach the facility, but given the Conveyor's height above the water, airborne noises will be low after construction activities are completed. Most noise generated during normal operations will be airborne and unlikely to impact salmonid behavior in waters surrounding the project area. Also, due to its modern design (e.g., sealed bearings), combined with regular monitoring and maintenance, the Conveyor itself is expected to generate relatively little airborne noise.

Pinnipeds, such as harbor seals, California sea lions and Steller sea lions, are unlikely to be injured by impact pile driving. No marine mammal haulouts are present in the vicinity of the Proposed Pier and Pier approach. These animals are unlikely to occupy areas of such intense construction activities and vessel traffic, plus the zone of injury is very close to the pile driving. Required monitoring of marine mammals during pile driving may reduce the marine mammals' potential exposure to noise.

4.1 1.1.1 REQUIRED MITIGATION ACTIONS AND APPLICANT-PROPOSED MITIGATIONS FOR IMPACTS ON HOOD CANAL. A significant portion of the design of the shoreline proposed project components will serve to mitigate potential impacts to Hood Canal water quality. Existing federal and state regulations for in-water construction will minimize species disturbance from underwater noise.

WATER QUALITY

- Final design of the proposed Pier will ensure that long shore drift sediment transport will not be obstructed.
- To reduce turbidity and sediment, the applicants proposed design would result in only short term localized scouring impacts from propeller wash.
- Strong currents and tidal exchanges in the proposed project area will also reduce potential for accumulation of metals and organotins within the water column and substrate.
- No antifouling paint will be applied onsite.
- Fueling of vessels will not occur onsite, and any spill or leak would be limited to that contained with the tug or ship.
- A **MOP** would be prepared and would include standard procedures and protocols to covering safety and environmental elements to address fuel spill prevention and response plan.
- All tugboats and ships will hold and dispose of their sewage and greywater in accordance with applicable federal and state rules and regulations.
- Restroom facilities located at the end of the proposed pier will be pumped out, maintained, and contained and disposed at the upland facility.
- Discharge of greywater by vessels associated with this project will be prohibited.
- Federal law also requires vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore before they are allowed to discharge ballast into waters of the state, minimizing the risk of introducing exotic species or potential deleterious effects to listed species.

UNDERWATER NOISE

- Impacts will be temporary and limited to in water work construction period.
- Agency approved work windows will be adhered to during in water work to minimize impacts to juvenile salmon.
- To minimize the underwater noise during pile driving, a vibratory hammer would be used for the majority of pile installation.
- A bubble curtain will be used when proofing with an impact hammer.
- A soft start approach using the vibratory and impact pile driving hammer to encourage fish to move away from the area.
- Required monitoring of marine mammals and marbled murrelets during pile driving may reduce the potential for exposure to noise.
- If pinnipeds are spotted within the injury zones, pile driving would cease until the animals have left the respective zones.

4.1 1.2 Collective Impacts of the Proposed Pier on the Associated Shorelines

This section addresses general impacts from construction and operation of the proposed Pier to natural processes, nearshore habitat, and existing and future shoreline land use of the existing Hood Canal shoreline in the immediate vicinity of the proposed Pier. Impacts related noise associated with the Pier are addressed in 4.1 1.2.2 (wildlife) and 4.1 1.2.3 (humans). Impacts related to aesthetics, light and glare are addressed in 4.1 1.2.4.1.

4.1 1.2.1 COLLECTIVE IMPACTS OF PIER ON NATURAL SHORELINE PROCESSES.

Construction of the 990-foot long Pier with its steel piles and the presence of moored barges and ships could potentially impact the physical characteristics of the existing Hood Canal shoreline. Potential concerns include impacts to the functioning of existing drift cells, the backshore wetland (Wetland B), and bluff erosion.

As described in detail Section 3.3, the shoreline consists of a bluff, beach, and tidelands. In this general area, much of the bluff is prone to landslides. At the toe of the bluff, groundwater seepage and movement of beach material has created a backshore wetland. The existing surface expression of the steep upland bluff and sand flat are the result of erosion and retreat of the steep slope. The primary mechanisms of erosion are surface winds, rain water, and landslide and wave erosion at the toe of the bluff.

See Section 3.3

The Applicant has submitted a preliminary design of the proposed Pier. The Applicant must still complete design-level hydraulic, geotechnical, structural and civil engineering studies, including studies of the stability of the submarine slope, for the proposed pier and over-water conveyor delivery system. The final type, size and location of piles to support the structures would be dependent on the result of those studies. It is expected that the proposed Pier's final design would be sufficient to resist the effects of seismic forces including liquefaction and submarine slope landslides.

Studies based on the preliminary pier design indicate that neither the proposed location nor diameter of the piles nor vessels moored at the proposed Pier would impact the longshore transport of sediment along the drift cell or the immediate beach profile. It is anticipated that the final pile spacing for the conveyor supports, pier and breasting dolphins will be evaluated/established during the design studies for the proposed project. The federal review of the proposed project will make a final determination regarding such potential impacts.

Construction will not alter groundwater flow patterns beneath the upland portion of the site, which govern in large part the potential for landslides and erosion from the bluff. Some localized mobilization of sediment may occur during pile driving and installation. However, these effects are expected to be temporary in nature.

No shoreline armoring is proposed as part of this project.

4.1 1.2.1.1 Required Mitigation Actions and Applicant-Proposed Mitigations for Impacts on Natural Shoreline Processes

A significant portion of the design of the shoreline project components will reduce potential impacts to natural processes.

PHYSICAL PROCESSES

- The orientation of the proposed pier is designed so as not to obstruct long shore sediment transport or deflect waves in a manner that causes the sediments near the surface of the seabed on either side to accumulate or be scoured away by tidal action.
- To prevent alterations in drift cell dynamics, the design proposes spacing the pilings sufficiently apart, and the overwater conveyor above the OHW mark. By substantially allowing current and natural sediment transport to occur unimpeded, no impacts are expected to occur.
- Proposed pier design including boat orientation will result in scouring impacts which are only short term and localized.

BLUFF EROSION

- Soils exposed in the cut area as the conveyor crosses the shoreline bluff will be revegetated and stabilized.
- Seep water and stormwater would be collected at various sources in the vicinity of the conveyor and tight lined down slope.
- Prior to construction and issuance of any building permits, a geotechnical and hydrogeologic design level study will be required including subsurface explorations and stability analyses, especially in areas identified as landslide hazard.

4.1 1.2.2 COLLECTIVE IMPACTS OF PIER ON NEARSHORE HABITATS AND WILDLIFE.

See Section 3.7

The marine nearshore provides ecologically valuable habitat including both designated critical habitat for species listed as threatened and endangered and designated essential fish habitat, as well as habitat for a variety of other marine species. Marine habitats include corridors for juvenile salmon, spawning habitats for forage fish, sediment and sub-surface levels (benthic and epibenthic) for shellfish and other species, macrovegetation, and forage habitats for a variety of marine fish, marine mammals and seabirds. Marine vegetation includes patches of both non-native and native eelgrass. Threatened and endangered species that could be present within the proposed project area include: Puget Sound Chinook salmon, Hood Canal Summer-run chum salmon, Puget Sound steelhead trout, Coastal Puget Sound bull trout, bocaccio, canary rockfish, yelloweye rockfish, and marbled murrelet.

Proposed pier development and barge operations may increase the potential for adverse impacts on intertidal and nearshore subtidal habitats and species. Proposed construction and operational activities may impact existing habitats and resources through:

- Construction/operational disturbances and noise;
- Increased shading from pier structures and vessels, affecting photosynthesis by macrovegetation;
- Stormwater runoff onto the nearshore;
- Spills from increased marine equipment activity;

- Disruption to existing drift cell and longshore sediment transport;
- Modification of existing bottom habitats through marine operations; and
- Potential marine mammal encounters from increased marine traffic.

The proposed project will impact 475 square feet of Wetland B. Construction disturbances over the intertidal zone could impact marine animals and their habitats near the lower end of the Single Conveyor as it approaches the 990-foot proposed pier that extends to water depths of approximately -50 feet **MLLW**. Temporary disturbance of benthic resources within the intertidal zone are typical when work barges are used as a platform to construct the proposed overwater conveyor. Pilings will displace approximately 734 square feet of benthic habitat between +6 feet and -64 feet **MLLW**. Because of the greater number of piles used for the proposed pier supports for the conveyor, the majority of this area (613 square feet) would be below depths of -30 feet **MLLW**. No piles will be driven within the freshwater or saltmarsh wetland areas, but piles could impact patches of non-native eelgrass.

Fuel spillage during construction activities and operation of the conveyor is possible.

Indirect impacts from construction would involve ecological and food web interactions between species. Injuries or avoidance by fish resulting from pile driving could have an indirect impact to marine mammals and seabirds that rely on those fish resources in their diet. Similarly, changes in benthic or epibenthic production resulting from spills or barge groundings could have indirect impacts on juvenile salmon or other marine resident species that occupy the sand flats and rely on those food resources.

Some direct impacts will affect specific groups of animals or plants while other potential impacts would affect the proposed project nearshore environment. For example, fuel spillage during operation of the conveyor is possible.

Existing eelgrass in the proposed Pier and Pier approach area could be impacted by accidental aggregate spills along the overwater portions of the conveyor. The presence of the proposed conveyor would cast limited shadows on portions of the adjacent beach, subtidal bottom areas and eelgrass beds. During the major growth periods of spring and summer, shadows from the proposed conveyor and pier (including vessels) are not expected to reach the large patch of the native eelgrass north and east of the proposed pier except in the early morning. However, due to the conveyor alignment and its proximity to patches of the non-native eelgrass, some shading of this species is likely to occur.

Several studies have shown that juvenile salmon are reluctant to migrate beneath piers and floats where there are sharp contrasts between open, lighted areas and darker areas beneath piers. Given the initial height of the overwater conveyor (22 feet above **MLLW**) and relatively narrow width (13 to 18 feet), shading will be minor and well below the thresholds that elicit avoidance.

No marine mammal haulouts are present in the vicinity of the proposed pier and pier approach. Operational noise and activities may cause some behavioral avoidance (or attraction) as specimens approach the facility, but given the conveyor's covered and enclosed design, and height above the water, airborne noise levels will be low after construction activities are completed.

The impact of underwater construction noise on habitats is addressed in 4.1 1.1.1

See Section 3.5

4.1 1.2.2.1 Required Mitigation Actions and Applicant-Proposed Mitigations for Impacts on Nearshore Wildlife and Habitats

HABITAT

Critical Habitat and Essential Fish Habitat

- In-water construction will take place during the regulatory agency-approved work windows outside of the juvenile salmon outmigration period.
- The proposed Pier was designed to avoid interference with the natural littoral drift of the sediment and natural processes affecting recruitment and productivity of food sources (benthic, epibenthic and zooplankton communities) along the Toandos Peninsula.
- Permanent loss of benthic habitat will be small and partially replaced by new hard pile substrates.
- Lighting of the proposed conveyor and pier across marine habitats would be restricted to the minimum required to conform to applicable safety requirements.
- Direct lighting of the water surface would be minimized with shielding.
- Pier lighting would be turned off except as required for loading operations, maritime safety and navigation.
- Previous macrovegetation studies have been conducted to locate vegetation within the project area and another survey will be conducted prior to construction to more accurately define potential to impacts of eelgrass.
- Eelgrass is seasonal and likely shifts in the area due to currents and wave action.
- Alignment and depth of the pier were chosen to directly avoid impacts to native eelgrass (*Z. marina*).
- Grounding of barges during construction activities can be avoided.
- Required BMPs will minimize the risk of fuel spills and an agency-approved spill prevention and response plan will be developed.
- The enclosed design of the proposed conveyor in all overwater marine areas minimizes the potential aggregate spill impacts.
- The alignment of the proposed conveyor was designed to avoid the native eelgrass.
- Barge aggregate spills, if they occur, will not impact marine macrovegetation since the barges are moored in deep water.
- During the major growth periods of eelgrass, shadows from the proposed conveyor and pier are not expected to reach the large patch of native eelgrass north and east of the proposed pier except in the early morning.
- Given the height and width of the proposed pier and average sun angle, shading from the pier will traverse marine water along the pier alignment throughout each day and remain over any specific eelgrass patch for a maximum of one to two hours each day.
- Because of the low sun angle, light refraction off the water surface will be great and the amount of photo-synthetically active radiation reaching the bottom (and eelgrass) will likely be below the threshold for photosynthesis with or without the project structures.
- The proposed conveyor support structure and service walkway along the pier will have open steel girders and grated decking to minimize shading effects on Japanese eelgrass beds.

- Working with regulatory agencies to determine measures that will ensure no long-term loss of nearshore productivity that cannot be fully eliminated. Types of compensatory mitigation that may be required include: annual monitoring of eelgrass and potential supplementation, monitoring of intertidal recovery in areas of barge grounding and wetland and storm berm monitoring and enhancement if impacts are found.
- Orienting the axis of the proposed pier approximately perpendicular to the shoreline, so it traverses the shortest distance across intertidal and subtidal habitats and minimizes potential impacts to marine biological communities.
- Requiring barges, when possible, to moor in deep subtidal waters to avoid disturbing existing native eelgrass colonies.
- Restrict refueling of equipment in upland areas or to containment areas on work barges in strict conformance to safety guidelines and permit requirements.
- Completing an approved spill response plan, including provisions for on-site spill containment equipment prior to initiating any construction activities.
- Restoring to original conditions areas of the beach temporarily disturbed during installation of pilings and conveyor truss segments near the **MHHW** level. Original conditions will be determined through pre-construction slope surveys. Any disturbance (e.g. ridging) will be re-graded according to the original results of the pre-construction slope survey.
- Establishing work limit boundaries to minimize disturbance of intertidal and subtidal marine habitats, and to prevent and minimize overwater work activities from directly affecting mapped eelgrass beds.
- Moving construction barges as little as possible, and orienting vessel propulsion away from nearshore areas and eelgrass beds, to the extent practicable, to minimize disturbance.

Benthic Habitat

- Impacts will be temporary and limited to in water work construction period.
- After in-water work, daily tidal inundations will quickly restore bottom habitats to their pre-construction grade.
- Providing a substantially greater area of hard surface for attachment of epibenthic plants and animals to offset the direct loss of existing habitat and biota resulting from the destruction of benthos and habitat.
- Enclosing the pier approach over the entire overwater route to minimize the potential for aggregate spills.
- Steep slope of the seafloor at the transfer point will likely prevent any accumulation of sand and gravel resulting from potential spillage.

Wetland Habitat

- To mitigate proposed impacts to Wetland B and associated buffers, approximately 2,600 square feet (1,392 square feet for Wetland B impact and 1,208 square feet for buffer impact) of Wetland B and 10,000 square feet of Wetland R (for Wetland B impact) would be enhanced at a 24:1 mitigation ratio.
- The proposed wetland mitigation plan is intended to compensate for permanent or temporary impacts to Wetland B by increasing plant community diversity and habitat complexity, removing and controlling Himalayan blackberry (and other invasive species) while preserving water quality. The plan proposed planting a range of native plant species, followed by monitoring to ensure establishment of that vegetation.

ANIMALS

Seabirds including Marbled Murrelets

- A marbled murrelet monitoring program will likely be required and all work will stop when a marbled murrelet is spotted within the project area.
- Displaced birds will likely return to the area once construction is complete.

Fish and Marine Mammals

- Given the height of the overwater conveyor and relatively narrow width, shading will be minor and well below the thresholds that elicit fish avoidance.
- Given the proposed pier design and height above the water, airborne noises will be low.
- Ships and tugs will move slowly to reduce the potential for marine mammal collisions.

Eagles

- The nests to the north will be avoided, and are more than 750 feet from the proposed conveyor.
- The three previously identified eagle perch trees to the east will be retained.

4.1 1.2.3 COLLECTIVE IMPACTS OF THE PIER ON FUTURE HOOD CANAL SHORELINE LAND USE. This section addresses the general impacts of the proposed pier on future shoreline land uses in the proposed project area.

Given the local topography and geologic conditions, it appears unlikely that any substantial amount of new residential development would occur in the immediate vicinity of the proposed Pier, whether or not the Pier is constructed. Whether the presence of the proposed Pier would forestall new residential development in the larger shoreline area is unknown. New residents attracted to the area and not directly impacted by changes to views or increased noise levels, may or may not be adverse to seeing gravel barges, tug, and ships transiting the Canal.

Concern has also been expressed that approval of the proposed Pier would set a precedent for allowing other industrial Piers on the Hood Canal shoreline. The recently adopted updates to the Jefferson County Shoreline Master Program would not allow for similar piers; this prohibition has been appealed, however, and the decision on the appeal has not yet been made. Any pier proposed along this shoreline would be tied to a resource use—forestry or mining, and would be difficult to permit. Policies contained in the Jefferson County **Comprehensive Plan** address the compatibility of rural lands and resource-based industry. No other proposals for piers are known at this time or have been proposed in the past.

4.1 1.2.4 COLLECTIVE IMPACTS OF THE PIER ON EXISTING NEIGHBORING RURAL RESIDENTIAL AREAS. This section addresses general impacts of the proposed pier on rural residential areas within the vicinity of the project site.

Construction and operation of the proposed Pier would introduce a resource-based industrial maritime use, with its associated level of activity, noise, and light, and glare into an area of natural shoreline. Neighboring rural residential properties are occupied by scattered residential uses along Groves Way (approximately 1,140-feet to

the southeast of the Pier to the nearest residence) and further southeast along Kelly Drive/Soaring Eagle Road (approximately 3,300-feet), to the east of the proposed Pier), a small summer cabin along the beachfront (840-feet from the proposed Pier), residences along the northern portion of Manhattan Beach (approximately 840-feet from the pier, summer cabin is the nearest residence), and the residential communities of South Point, Bridgehaven and Shine lying further north along the shoreline, between the proposed project site and State Route 104/Hood Canal Bridge. Residences along Kelly Drive/Soaring Eagle Road and Groves Way are located between the commercial Hood Canal Tree Farm and Hood Canal. The nearby portions of the adjacent Tree Farm are currently in a reforestation cycle, and encompass on-going surface mining operations.

The existing rural residential environment currently generates low levels of human activity and associated vehicular traffic, low levels of background noise (especially at night), and little light or glare. The existing setting reflects the natural landscape, native vegetation and terrestrial and water views.

Properties along the eastern shore of Hood Canal, approximately 1.2 miles distant (within Kitsap County), are also residential and are occupied by waterfront and water-view residences.

Construction and operation of the proposed Pier will impact the closest residential land uses through impacts to views and frequent increases in noise levels. For residents further away, within sight of at least some portion of the Pier and/or the associated tugs, barges and ships, the fact that the proposed Pier is located on what was a natural, undeveloped Hood Canal shoreline may be perceived as detracting from their local quality of life.

Activity generated by the operation of the proposed project will be periodic, but frequent. Loading activities at the Proposed Pier are anticipated to occur up to 300 days per year, up to 24 hours per day. Up to six barges per day could be loaded at the proposed Pier; no more than two barges would be loaded at any one time. Barge loading times would vary from 1 to 8 hours, with a typical loading time of 2-3 hours. Once ships are available (8 to 12 years in the future), up to six ships could call at the proposed Pier per month. It is estimated that ships would utilize the Pier 42-72 days out of the overall 300 days of use. Most ship operations at the Pier would take 24 hours to complete. No barges would be loaded or berthed at the proposed Pier during days when ships were being loaded.

Construction of the Pier will result in short-term increases in noise levels. The Applicant proposes to limit construction activities to 7:00 a.m. to 7:00 p.m., weekdays only—no work would occur at night or on weekends. Construction of the proposed pier would be further restricted to starting one hour past sunrise or 7:00 a.m., whichever is later. For the closest residences, if the construction noise were to occur during a very quiet daytime hour (vs. times of higher ambient (background) noise), the increase in noise of 44 dBA would be high enough that it would be beyond “substantial”. Most likely a listener would find it disturbing. It is expected that short-term spikes in noise generated from certain activities conducted during in-water construction, such as pile-driving impact testing, would be even more pronounced.

Noise modeling has been conducted to identify impacts to these closest residents from long-term operation of the proposed Pier activities. This modeling indicates that, although regulatory noise standards would not be exceeded, the proposed project's noise could be audible (i.e. at least 3 dBA above hourly background levels) for much of the time—38 hours out of the 48-hour measurement period. For 1-3 hours in the middle of the night the project would generate noise up to 10-12 decibels louder than the ambient sound environment (considered a “substantial” increase). Only rarely, however, would the proposed project's noise exceed the existing highest background sound levels (2-3 hours per day). When ambient (background) noise levels are greater, such as during a windy rainstorm, the increase in noise coming from the Proposed Project would be considered “not noticeable to barely noticeable” and would contribute only slightly to the increased noise levels in the surrounding neighborhood.

The nearest Groves Way residence would experience the greatest noise impacts, largely due to its proximity to Transfer Point #6. The increase would range from 0-12 dBA depending on the ambient noise level, the latter increase is considered “substantial”. Just outside the summer cabin, a listener would perceive the increased noise levels as “noticeable” during daytime hours. During the quietest 1-3 hours at night, when the background noise levels fell below 40 dBA, the proposed project's noise would be considered a “substantial” increase above the background non-project conditions. Noise levels inside the cabin would be reduced when windows are closed.

Regarding loading activities at the proposed Pier, the gravel-loading noise is the predominant source of the proposed project's noise impacts. On the beach, within 100-feet of the proposed conveyor, the conveyor would be the predominant source of noise.

Residential areas further southeast at Groves Way and further north along Manhattan Beach would likely only experience a 0-4 dBA increase in long-term noise levels. The residences further northeast at Southpoint, Bridgehaven and Shine area would likely experience no noticeable increase in noise levels. An increase of 0-3 dBA is considered “not noticeable to barely noticeable” and an increase of 3-5 dBA is considered “noticeable” to most people. Certain sounds such as alarms will also be clearly audible.

Visual impacts will vary. The proposed Pier structure and loading activities would be the most apparent to residences located on the northern portion of Manhattan Beach. Residences in Bridgehaven and north, including all but the eastern most edge of Squamish Harbor (approximately 5 miles distance) would not see the proposed Pier, because it would be blocked by South Point. The Pier structure would be visible, but on the peripheral southern view, of the 15 shoreline residences on Manhattan Beach, north of the proposed Pier. Residents of communities further north along the shoreline, will be able to see the proposed Pier in the distance as a portion of their view, and may hear some activity during quiet evening hours.

Impacts of the proposed Pier on residents along the Kitsap shoreline, across from the proposed Pier, will include changes to views and at times, noise levels. The proposed Pier would be within the lines of sight for many residents along the Kitsap shoreline and bluff; these residences would, however, retain views of open water, Hood Canal

shorelines and, from particular elevations, the Cascade and Olympic mountains. The greatest visual change would be during night hours; the proposed pier would convert a currently dark shoreline to higher density lighting, though the amount would be minimized as part of the Standards of Care (SOC). During periods of higher ambient noise on Kitsap shoreline, the overall decibel level of the proposed project is low enough that it would not be heard at the Kitsap residences; the proposed project would, however, be audible during moments of very low background noise (i.e., a still, warm night). These residences would also see the new barge and ship traffic as it transits to and from the Hood Canal Bridge.

For all residents with views of Hood Canal, the ships and barges may be more noticeable and have greater visual distraction than the black Ohio-Class submarines, which are currently the largest vessels that regularly transit Hood Canal. In addition to the physical presence of vessels, and night lighting of vessels, marine traffic can create temporary, visible plumes from stack emissions. During temperature inversions, emissions can be trapped at view level, resulting in lingering, but temporary, lines of plumes and eventually brownish haze.

4.1 1.2.4.1 Required Mitigation Actions and Applicant-Proposed Mitigations Impacts to Neighboring Rural Residential Areas

Impacts to neighboring rural residential area include noise and aesthetics, glare and light. The following mitigation measures address potential impacts to noise, aesthetics, glare and light:

NOISE

- Use only construction equipment that is in good working order especially property maintaining noise muffling systems.
- Stage work efficiently to minimize the days needed to construct.
- Restrict all construction activities to the hours of 7 a.m. to 7 p.m., weekdays only. Further restrict construction of the Pier to starting 1 hour past sunrise or 7:00 a.m., whichever is later.
- In-water portion of Pier construction period estimated to last 2-3 months.
- Proposed pier structure would be fully enclosed including the control room and supporting gantry of the load out conveyor arm and the enclosure will attenuate noise heard outside the structure from noise generated from within.
- Establishing continuous noise monitoring, if necessary, at the nearest residential receptor to the proposed pier to identify noise generated from the proposed project.
- Possibly restricting the use of backup alarms and whistles prior to startup of the conveyor during nighttime operations.

LIGHT, GLARE AND AESTHETICS

- Painting the proposed pier a color that best blends into the visual environment.
- Type, orientation and design of the proposed pier structure to minimize glare leaving the site.
- Specific lighting requirements would be developed in consultation with US Coast Guard to provide navigational safety lighting.

- Nighttime lighting would be minimal when not in use and limited to that required for navigation, safety and security.
- Lighting for the loading would be positioned on the overhead load out gantry and directed downward.
- On the Jefferson County shoreline, South point would block the view of the proposed pier from residences in Bridgehaven and north including all but the eastern most edge of Squamish Harbor.
- Establish protocols to minimize the lighting necessary on the pier to load the barges and ships and onboard lighting on ships berthed at the pier.

4.1 2 Key Issue No. 2: Collective Impacts of Marine Transportation on Hood Canal

This section addresses the collective impacts of marine transportation on Hood Canal including:

- Air quality from navigation, berthing and loading activity emissions
- Fuel leaks, oil spills or exotic/invasive species
- Noise related to Pier operations and loading activities

4.1 2.1 *Collective Impacts to Air Quality from Navigation, Berthing and Loading Activity Emissions*

This section addresses general impacts to marine air quality from marine vessels navigation, berthing and loading activity emissions.

Gravel loading and barge and ship transport may result in minor local air quality impacts. The closest residential receiver is a summer cabin at the shoreline, approximately 840-feet from the closest point of the proposed Pier. The load-out chute would be located approximately 1,400-feet waterward of this residence.

Dust emissions from the load-out process are a function of the fineness and moisture content of the sand and gravel, ambient wind speed, and drop height. While these dust emissions are not fine enough to be considered a health risk under Federal OSHA standards (Section 3.1.3 Air), they may be considered nuisances that unreasonably interfere with the use and enjoyment of property, settling on plants, cars, and houses, and getting carried into interior spaces. The Conveyor along the Proposed Pier will be enclosed, shielding the sand and gravel from wind erosion. This will considerably limit the generation of fugitive dust. Dust emissions from material being dropped from the Conveyor during load-out operations will be controlled by design features discussed below in 4.3 3.1.

Tugs and ships will generate diesel exhaust during arrivals, departures, berthing, and operations in the vicinity of the proposed Pier, and during transport of aggregates to local, regional, intrastate, and interstate markets. While the main engines of tugs or ships will not run while berthed at the proposed Pier, ships may operate their diesel generators. Depending on atmospheric conditions, such emissions will have a temporary limited effect on local air quality due to the number of tugs and ships involved and the distances between these sources and nearby residential receptors.

Vessels involved in marine transportation associated with the Proposed Project will be compliant with **EPA** standards, thereby reducing the likelihood of impacts to air quality from marine based diesel engines. Additionally, low sulfur Diesel and Ultra Low Sulfur Diesel fuel requirements now imposed by the **EPA** and Environment Canada for the 200 nautical miles around the US and Canadian coasts will reduce air quality impacts from marine vessels operating in these waters. Within Hood Canal and the immediate vicinity of the Proposed Pier, prevailing winds will typically dissipate the tugboat and ship emissions. Occasionally, during calm winds and temperature inversions, tugboats and ships underway may leave visible plumes that may linger for several minutes and contribute to a brownish haze resulting from the cumulative effect of all emission sources including marine vessel traffic, residential sources, and vehicular traffic.

Globally, operation of marine vessels for delivery of aggregate from the Proposed Project will contribute to the atmospheric load of carbon dioxide. Increases in atmospheric concentrations of greenhouse gases, primarily carbon dioxide, have been implicated in global warming. Marine transport of aggregate by tugs with barges and ships would, however, replace a multitude of deliveries by truck and trailer combinations. For example, a typical barge load will replace 150 truck-with-trailer loads and a typical ship load will replace over 2,000 truck-with-trailer loads. It is expected that marine vessel transport of aggregate from the Proposed Project site will represent a significant reduction in carbon dioxide and diesel particulate matter ($PM_{2.5}$) generation compared to roadway transport of a similar volume of material.

4.1 2.1.1 REQUIRED MITIGATION ACTIONS AND APPLICANT-PROPOSED MITIGATIONS FOR COLLECTIVE IMPACTS TO AIR QUALITY FROM NAVIGATION, BERTHING AND LOADING ACTIVITY EMISSIONS. Proposed marine air quality mitigation measures are listed below.

AIR QUALITY

- Vessels will be compliant with **EPA** standards, thereby reducing the likelihood of impacts to air quality from marine based diesel engines.
- Onshore power will be provided to vessels during loading activities to minimize generation of diesel emissions.
- Marine transport will replace a multitude of deliveries by truck and trailer combinations. Marine vessel transport will represent significant reduction in carbon dioxide and diesel $PM_{2.5}$ generation compared to truck transport of similar volume of aggregate.

4.1 2.2 *Collective Impacts from Fuel Leaks, Oil Spills or Invasive Species from Marine Traffic*

This section addresses general impacts of the proposed marine transportation on Hood Canal and the project area from fuel leaks, oil spills and invasive species. Impacts to air quality from marine traffic are addressed above.

Fuel spillage during construction and operation activities is possible. The probability of a catastrophic spill as a result of boat or barge collisions and/or accident is low. Fueling of vessels will not occur on site and any spill or leak would be limited to that

contained within the tug or ship (barges do not contain fuel). Incidental oil/grease and gasoline/diesel originating from precipitation runoff from boat or barge surfaces has a high probability occurring, but appropriate operating procedures will reduce potential impacts. **BMPs** will be implemented in marine areas to minimize the risk of fuel spills and other potential sources of contamination. An agency-approved spill prevention and response plan that includes provisions for on site containment equipment (including a boom) will be developed prior to any construction activities. Spill prevention and spill response procedures will be maintained throughout operation of the Conveyor. Such spills or leaks are possible but unlikely to have any long-term impact on aquatic species.

Discharge of sewage or greywater by the tugs and ships is possible. All tugboats and ships will hold and dispose of their sewage and greywater in accordance with applicable federal and state rules and regulations. According to federal guidelines, vessels calling at the proposed Pier may release greywater within the confines of Hood Canal. However, the Applicant, as part of their **SOP** (Standard Operating Procedures), will prohibit discharge of greywater by vessels associated with this Project. If greywater from dishwater, galley, laundry, bath and washbasin drains were discharged, substantial currents present in this portion of Hood Canal will quickly disperse it. The anticipated low frequency of these discharges make it unlikely for significant impacts to levels of fecal coliform, nutrients, and organic matter in marine waters near the proposed Pier site.

See Section 3.12 *Public Services*

Restroom facilities located at the end of the proposed Pier will be pumped out, maintained, contained and disposed at an upland facility. Therefore, no greywater or sewage would enter the Hood Canal from the proposed Pier operations.

The risk of barges and ships introducing exotic/invasive species into Hood Canal is considered unlikely. Federal law requires vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore (open ocean, not Hood Canal) before they are allowed to discharge ballast into waters of the state, minimizing the risk of introducing exotic/invasive species or potential deleterious effects to listed species. The U.S. Coast Guard also regulates ballast water discharge by vessels in U.S. waterways. Anti-fouling paints are used on the hulls of ships prevent the growth of marine organisms.

Aquatic antifouling paints are commonly used on hulls of barges and ships calling at the Proposed Pier. Such paints are considered pesticides because they combat pests such as barnacles and algae. While marine water quality could be impacted from leaching of metals and Tributyltin found in antifouling paint, no significant adverse impacts are anticipated given the relatively limited berthing of barges, ships and tugboats at the proposed Pier. Furthermore, strong currents and tidal exchanges in the project area will reduce the potential for accumulation of metals and Tributyltin within the water column and substrate. No antifouling paint will be applied on site, further reducing the risk of leaching or introducing metals and Tributyltin into the environment.

4.1 2.2.1 REQUIRED MITIGATION ACTIONS AND APPLICANT-PROPOSED MITIGATIONS FOR COLLECTIVE IMPACTS FROM FUEL LEAKS, OIL SPILLS OR INVASIVE SPECIES FROM MARINE TRAFFIC.

Marine traffic impacts caused from potential fuel leaks, oil spills or invasive species would be mitigated by with the following measures:

WATER QUALITY

- Fueling of vessels will not occur onsite, any spill or leak would be limited to that contained within the tug or ship.
- **BMPs** will be implemented in marine areas to minimize the risk of fuel spills and other potential sources of contamination.
- A spill prevention response plan that includes provisions for onsite containment equipment will be developed prior to any construction activities.
- A **MOP** would be prepared and would include standard procedures and protocols to covering safety and environmental elements to address fuel spill prevention and response plan.
- No antifouling paint will be applied onsite.
- Federal law also requires vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore before they are allowed to discharge ballast into waters of the state, minimizing the risk of introducing exotic species or potential deleterious effects to listed species.

4.1 3 Key Issue No. 3: Collective Impacts of Marine Transportation Traffic on Hood Canal Bridge Traffic

This section summarizes the collective impacts of construction and operation of the proposed ship and barge transport on the Hood Canal Bridge, with respect to:

- Traffic back-ups resulting from 12 additional project-related Bridge openings per month
- Barge/ship collisions with the Hood Canal Bridge

4.1 3.1 *Collective Impacts of Marine Transportation on Traffic Back-Ups Resulting from Bridge Openings*

This section addresses general impacts of marine transportation on traffic backups on the Hood Canal Bridge.

To reach the Pier, marine vessels must pass under or through the opening of the Hood Canal Bridge. The Bridge has two fixed-span openings which allow smaller vessels to pass under the bridge, thus not requiring the opening of the draw-span. The Applicant has proposed to use the Bridge's eastern fixed-span for tugboat and barge crossings, to eliminate any traffic backups for those more frequent crossings. Concerns have been expressed, however, by **WSDOT** regarding this proposal; a decision regarding the barge traffic would be part of the federal permitting process. For purposes of this **SEPA** analysis it is assumed the barges will not require Bridge openings; if this is changed, further **SEPA** analysis would be required.

The Applicant proposes to begin using larger ships to transport aggregate when these ships become available, approximately 8 to 12 years after construction of the proposed Pier. These ships will require an opening of the Hood Canal Bridge. These Bridge

openings will impact vehicle traffic on the Hood Canal Bridge. Draw-span openings for the new marine traffic will stop and potentially back traffic up onto SR-104 and SR-3; the length of the back-up would be dependent upon the time of day the Bridge is opened. A typical draw cycle (open, vessel pass and close) is 25 to 30 minutes for a ship under its own steam and 30 to 40 minutes for a tugboat and tow crossing. When an opening occurs during the highest traffic use periods (peak hours) highway traffic backups can stretch back as long as 2-3 miles.

The Applicant proposes to limit barge and ships openings of the Hood Canal Bridge draw-span to the overnight non-peak traffic hours in order to minimize the vehicle back-ups. Lengths of potential traffic back-ups have been identified by day of the week and hour of the day. Examples of back-ups during evening off-peak hours show that the back-up is reduced substantially in the evening hours.

For the 2 to 3 months associated with construction of the proposed Pier, barges transporting construction equipment may also require opening of the Hood Canal Bridge span. Materials such as steel trusses and pilings would be shipped to the construction site via barge, but due to the height of the equipment onboard, it is anticipated that these construction barges would require the Bridge draw-span to be opened. The Applicant has proposed that these openings also be restricted to the overnight non-peak traffic hours.

4.1 3.1.1 REQUIRED MITIGATION ACTIONS AND APPLICANT-PROPOSED MITIGATIONS FOR COLLECTIVE IMPACTS OF MARINE TRANSPORTATION ON TRAFFIC BACK-UPS RESULTING FROM BRIDGE OPENINGS. Mitigation measures for potential traffic backup impacts include:

TRANSPORTATION

- Delivery of construction equipment that will require bridge openings and needed to build the proposed pier will occur during off peak traffic hours.
- During pier operations, all ships calling on the pier to limit travel through the Hood Canal Bridge draw-span to overnight off peak Hood Canal Bridge vehicle traffic hours.
- All tugboats and barges calling on the pier will cross under the Hood Canal Bridge eastern fix span.

4.1 3.2 *Collective Impacts of Marine Transportation on Barge/Ship Allisions with the Hood Canal Bridge*

This section addresses the potential impact from marine transportation allisions with the Hood Canal Bridge.

WSDOT, which operates the Hood Canal Bridge under the Bridge License, has expressed concerns with Applicant's proposal to use the Bridge's eastern fixed-span for tugboat and barge crossings, preferring that barges utilize an opening the Bridge's draw-span. WSDOT's concern is that barges or tugboats navigating past the Hood Canal Bridge have the potential to result in a Bridge/vessel crash or "allision". An allision could damage the Bridge, resulting in a temporary delay or prohibition of

traffic use across the Bridge. Although the risk of a tugboat or barge-bridge allision is very low, the damage to the Hood Canal Bridge if such an accident did occur could be potentially substantial. **WSDOT** noted:

"...It is impossible to design a floating bridge to take a large vessel impact with no damage. Therefore, the Hood Canal Bridge was designed to lower the probability of a vessel impact by widening the navigational channel clearance; and to increase life safety by preventing a bridge collapse in the case of a vessel impact. Large vessels use the large 600 foot draw span in the middle of the Bridge where the clearance is large enough to minimize the probability of a direct vessel strike, and where a strike would more than likely be a glancing blow that can be handled by the fender protection system. For life safety, the Bridge was designed with compartmentalization that would allow for a complete hull breach and an anchor cable loss without the bridge sinking. While the bridge may not sink from a large vessel strike, it may be out of service for some time until the pontoons are either repaired or replaced."

The risk of a bridge allision is extremely remote. Barge traffic operates on waterways, including tidal waters, throughout the United States on a daily basis and the frequency of bridge-tugboat/barge allisions are very unusual. However, they do occasionally occur due to extreme weather conditions, mechanical failure, or operator error. Increased barge, and eventual ship traffic, in Hood Canal would increase the likelihood of conflicts with Navy vessel movements and safety zones, and tribal and commercial fishing. This increased traffic also poses some risk of allision with the Hood Canal Bridge.

See full discussion in Section
3.11 3.2.5 Transportation

Bridge allisions are uniquely within the expertise of the Coast Guard and **USACE**, who have exclusive jurisdiction to analyze and impose permit conditions regarding the potential of bridge allisions. Allision issues will be analyzed during the **NEPA** environmental review process for Applicant's required federal permits. The Coast Guard will determine the scope of study required to evaluate the risk and possible consequences of bridge allisions; whether, and under what conditions, barges and ships will be allowed to travel under the eastern span of the Hood Canal Bridge; and any mitigation measures that the Coast Guard will impose. As a part of its review, the County must determine that the Coast Guard's regulatory system is adequate to address the potential impacts (WAC 197-11-158). Jefferson County will require, as a condition of any permit issued for the project, that the Applicant comply with the terms and conditions imposed by the Coast Guard regarding crossings of the Hood Canal Bridge and operations and could also require additional conditions to mitigate potential impacts.

4.1 3.2.1 REQUIRED MITIGATION ACTIONS AND APPLICANT-PROPOSED MITIGATIONS FOR COLLECTIVE IMPACTS OF MARINE TRANSPORTATION ON BARGE/SHIP ALLISIONS WITH THE HOOD CANAL BRIDGE

TRANSPORTATION

- Potential impacts and mitigation measures addressing bridge allusions will be addressed through the federal and NEPA process.

4.1 4 Key Issue No. 4: Collective Impacts of Upland Mining on Geohydrology

This section summarizes the following collective impacts of the upland mining on local geohydrology, with respect to:

- Impact of Mining within the Meridian **MRLO** (Meridian Extraction Area) located in Thorndyke Area South of the Hood Canal Tree Farm.
- Quantitative and qualitative impacts to surface and groundwater, including wetland and streams

4.1 4.1 Collective Impacts of Mining within Meridian MRLO (Meridian Extraction Area) located in Thorndyke Area South of the Hood Canal Tree Farm

This section addresses general impacts from mining within the Meridian **MRLO** area located in the uplands. Potential impacts specific to surface and groundwater are addressed in 4.1 4.2.

Mining in the 525-acre Meridian Extraction Area would consist of surface mining in segments not to exceed 40-acres at one time. Mining activities typically involve removal of native vegetation and topsoil, which increases the potential for erosion, and permanently alters existing topography. The Applicant states that the volume of material to be extracted from Meridian would range from 2 million tons in Year 1 to 6.75 million tons annually by or before Year 25, subject to market demand. An approved Reclamation Plan and County Stormwater Permit are required prior to commencement of mining activities within each mining segment.

Within Meridian, an area along the western property line is mapped as a Landslide Hazard Area.

4.1 4.1.1 REQUIRED MITIGATION ACTIONS AND APPLICANT-PROPOSED MITIGATIONS FOR COLLECTIVE IMPACTS OF MINING WITHIN MERIDIAN MRLO LOCATED IN THORNDYKE AREA SOUTH OF THE HOOD CANAL TREE FARM. The following mitigation measures are proposed for mining with the Meridian **MRLO**:

- Applicant is limited to opening up maximum 40-acre segments or in accordance with **WDNR**'s best management practices.
- Seismic slope stability for cut areas will be addressed during required final design and slope construction.
- Mining depth limited to no deeper than 10-feet above the elevation of the seasonal high groundwater table.
- **BMPs** would keep both the stockpiled top soils and exposed soils from eroding.
- Implementation of permanent erosion control measures, including regular inspection and maintenance of slopes and disturbed areas, to ensure the surficial stability of cut slopes and disturbed areas.
- Topsoil to be stored for use in reclamation.
- Required **NPDES** Permit will regulate stormwater control and release.
- Reclamation will be undertaken for each mining segment when mining is complete for that segment.
- Applicant will post a performance bond to assure reclamation.

4.1 4.2 Collective Impacts of Upland Mining – Quantitative and Qualitative Impacts to Surface and Groundwater, including Wetland and Streams

This section addresses general impacts of upland mining on groundwater and surface waters.

Mining activities affecting surface waters and groundwater include extraction and transport of aggregate. The primary strategy for stormwater management would be full dispersion and infiltration. Water from Proposed Project operations and stormwater would be managed under the conditions imposed by Ecology in the **Ecology NPDES Permit**.

Ecology's NPDES Permit mandates effluent limitations; monitoring, reporting and record keeping requirements; and development and implementation of various plans including an Erosion and Sedimentation Control Plan, a stormwater pollution prevention plan, and a Monitoring Plan and a Spill Control Plan. Implementation and maintenance of appropriate site specific and general **BMPs** are also required.

Regarding surface waters, mining activities are unlikely to have adverse impacts on wetlands or connecting surface waters. Direct impacts to wetlands and streams, and their buffers, would be avoided. Additional wetland buffer widths (greater than those prescribed by the Jefferson County Code) may be required to maintain hydrological continuity of the wetland and stream systems. These buffers widths will be determined based upon information tied to each of the 40 acre mining segment submittals.

The Meridian Extraction Area is situated east of Thorndyke Creek and its associated drainage. Baseline flow characteristics for Thorndyke Creek, including estimation of groundwater input and base flow, would be collected and reported prior to commencement of mining. Although stormwater contaminants could theoretically flow overland from extraction activities and reach Thorndyke Creek, it is unlikely due to the proposed stormwater control design elements that will be designed and constructed as part of the reclamation plan. These include interception and infiltration of stormwater within the mining area and maintenance of vegetated buffers between the mining area and surface waters located downhill. Stormwater from mining activities within Meridian are expected to run off to low depressions in the mine floor, where it will then fully infiltrate; an engineered system will likely be required.

Mining operations also are far enough from year-round unnamed creeks in the vicinity of the Proposed Project that no measurable adverse impacts to water quality or quantity to these water courses are anticipated.

Regarding groundwater, mining at the proposed site will be incremental, with segmental reclamation and replantings. Changes in surface water infiltration are expected to be similar to that during ongoing and historic timber harvesting activities throughout the region. Because of the reduced ground cover and soil depth in the area being actively mined, infiltrated surface will reach the Vashon aquifer more quickly. At times of prolonged heavy precipitation, a more rapid travel time between the surface and the groundwater table may temporarily alter the flow in Thorndyke Creek, potentially resulting in flash events. However, the impact is not anticipated

to be significant due to the distance between the extraction area and the stream. In the absence of vegetation during mining, groundwater recharge will increase. Once reclamation is achieved and vegetation is re-established, groundwater recharge is anticipated to return to pre-extraction levels. Because the proposed active mine area will account for only a small portion of the overall recharge area, little to no measurable change in recharge will be observed. Groundwater wells would be monitored via monitoring wells to better evaluate mining depths relative groundwater elevations and set excavation limits. Depth of mining is limited to 10-feet above the seasonal groundwater table.

4.1 4.2.1 REQUIRED MITIGATION ACTIONS AND APPLICANT-PROPOSED MITIGATIONS FOR COLLECTIVE IMPACTS OF UPLAND MINING – QUANTITATIVE AND QUALITATIVE IMPACTS TO SURFACE AND GROUNDWATER, INCLUDING WETLAND AND STREAMS. No mitigation measures are proposed for direct impacts wetland and stream impacts within Meridian because no wetlands or streams would be impacted as a result of the proposed project. The following ground and surface water mitigation measures are proposed:

GROUND AND SURFACE WATER

- Containing stormwater and spent process water within facility boundaries and infiltrating after appropriate water quality treatment.
- Maintaining a vegetated buffer between the mining areas and Thorndyke Creek.
- Collecting and reporting baseline flow characteristics for Thorndyke Creek, including estimation of groundwater input and base flow, prior to commencement of mining.
- Complying with conditions of the Washington State administered NPDES Permit and the Jefferson County Stormwater permit with regard to mining and material transport and processing. This would include application of construction specific BMPs to control stormwater impacts.
- Depth of mining is limited to 10-feet above the seasonal groundwater table.
- Controlling measures for spills and leaks from vehicles.
- Compliance with Critical Aquifer Resource Area (CARA) regulations.
- Temporary and permanent erosion control (see 4.1 4.1).

4.2 Additional Required Mitigation Actions and Applicant-Proposed Mitigations by Elements of the Environment

In addition to the proposed mitigation elements described for the Key Issues above, mitigation measures are proposed for each element of the environment addressed in Chapter 3 (Air, Earth, Water, etc.). Following is a comprehensive list of mitigating measures by element, including both construction and operational mitigating measures. Some of these measures repeat those identified under Key Issues.

3.1 Air

The following mitigation measures address potential impacts to Air:

- Compliance with **ORCAA** regulations requiring reasonable precautions to control and minimize dust emissions.
- Maintaining all motorized equipment to achieve peak performance to reduce the amount of emissions generated and minimize air quality impacts from equipment exhaust.
- Shutting off motorized equipment, rather than idling, during extended periods of non-use.
- Marine vessels will be compliant with EPA standards, thereby reducing the likelihood of impacts to air quality from marine based diesel engines.
- Bridge openings to be restricted to overnight off-peak travel hours.
- All proposed mining related activities that may impact air quality to be reviewed by **ORCAA**. If impacts are determined to be excessive, options for emission controls will be evaluated and implementation required.
- Mineral processing is prohibited within the Meridian to reduce dust generation.
- Transportation of aggregate between Meridian and Operations Hub to be done via the conveyor (vs. trucks) to minimize dust and fine particulates.
- Mechanical equipment, movement of materials, and stockpiles located within the Operations Hub must be consistent with **WDNR** best management procedures and **ORCAA** requirements.
- 20-ft high vegetated berm along south and southeast sides of Operation Hub to further contain potential fugitive dust.
- The sand and gravel transferred by conveyor to the Pier typically contains low concentrations of dust and particulates.
- Central Conveyor system and transfer points to be covered or enclosed along entire route.
- Thorndyke Road conveyor crossing to be fully enclosed.
- Water sprayers to be used to dampen dust from the sand and gravel on the uncovered Little Wahl and Wahl conveyors.
- Wetting material at Conveyor loading and Central Conveyor transfer points.
- Dust to be removed from the returning conveyor belts by sweepers at transfer points.
- Pans to be placed under conveyor belt at transfer points and specific locations where seasonal streams are crossed.
- Controlling the drop height of material at the pier load-out.
- On-site electrical power to be supplied by Jefferson County **PUD** #1 (vs. previous diesel generators).
- Vehicle traffic along the unpaved conveyor access road to be limited to daily maintenance, repair trips and monitoring of the conveyor.
- Conveyor operations over the shoreline and water will be conducted in an enclosed environment.
- Vessels involved in marine transportation will comply with **EPA** standards, reducing the likelihood of impacts to air quality from marine diesel engines.
- Provision of onshore power to vessels during loading activities to minimize generation of diesel emissions.

- Marine transport will replace a multitude of deliveries by truck and trailer combinations. Marine vessel transport will represent significant reduction in carbon dioxide and diesel PM2.5 generation compared to truck transport of similar volume of aggregate.

3.2 Earth, including Geology and Soils

The following mitigation measures address potential impacts to Earth:

- Temporary erosion control methods implemented through approved TESC Plan, to include efficient channeling of surface water runoff; minimizing the extent of disturbed areas; applying erosion preventing slope cover and channel liners; and constructing trench dissipaters, diversion ditches or levees.
- Seismic slope stability for cut areas to be addressed during final design and slope construction. Measures may include improved drainage, flatter slope angles, and slope benching.
- Abandoned portions of the FS Road 2900 will be re-graded and revegetated, thus limiting the impact to geology and soils.
- Prior to construction, a geotechnical design level study will be required. Study to include subsurface explorations and stability analyses, especially in areas identified as landslide hazard. Study required before issuance of any building permits.
- Conveyor will be set back at least 50 feet from the top of the steep slope areas in the north portion of the alignment.
- Cut slopes associated with construction may generally be built at lesser grades than existing slopes or may be supported by retaining structures, lessening the potential for erosion.
- Preliminary design incorporates significant soil cuts in this area to stabilize the area.
- Seep water and stormwater would be collected at various sources in the vicinity of the conveyor and tight lined downslope.
- Applicant limited to opening up maximum 40-acre segments or in accordance with **WDNR's** best management practices.
- Mining depth limited to no deeper than 10-feet above the elevation of the seasonal high groundwater table.
- Mine operator to post performance bond to assure reclamation.
- **BMPs** would keep both the stockpiled top soils and exposed soils from eroding.
- Permanent erosion control measures, including regular inspection and maintenance of slopes and disturbed areas, to ensure the surficial stability of cut slopes and disturbed areas.
- Required **NPDES** Permit will regulate stormwater control and release

3.3 Marine Shorelines

The following mitigation measures address potential impacts to Marine Shorelines:

- Permits and licenses from **USACE**, **WDFW**, and Jefferson County required prior to any construction.
- Project proponent to complete design level studies for the pier and over water conveyor delivery system.

- Each study borehole would be backfilled with grout and wave action will likely cover each borehole area with sediment.
- Activities would be regulated for stormwater discharges, turbidity and spills as a result of in-water work under this program.
- Coastal zone management certification required through Ecology.
- Piles to support the pier would be installed during the summer or early fall during the approved fish “work window” to avoid fish migration.
- Piles to be installed in portions of the sand flat area during low tide conditions.
- Local currents will disperse suspended sediments from pile driving and barging operations at a moderate to rapid rate.
- No shoreline armoring is proposed as part of the project.
- Fueling of vessels will not occur onsite, any spill or leak would be limited to that contained within the tug or ship.
- **BMPs** will be implemented in marine areas to minimize the risk of fuel spills and other potential sources of contamination.
- A spill prevention response plan that includes provisions for onsite containment equipment will be developed prior to any construction activities.
- Final design, orientation of the pier must ensure that long shore sediment transport will not be obstructed, and that waves will not be deflected in a manner that causes the sediments near the surface of the seabed on either side to accumulate or be scoured away by tidal action.
- Final design will minimize alterations to drift cell dynamics.
- Assuming that propeller depth will be 75 feet, boat orientation and other boat and operating specifics, scouring impacts from propeller wash would likely be short term, localized and have no significant adverse impact.
- Runoff will be minimized by a design feature that would geotechnically stabilize the lower portion of the single conveyor route along the shoreline bluff. A cut and drainage system will be placed to minimize bank erosion capturing runoff.
- Strong currents and tidal exchanges in the project area will also reduce potential for accumulation of metals and organotins within the water column and substrate.
- No antifouling paint to be applied onsite.
- Fueling of vessels will not occur onsite, any spill or leak would be limited to that contained within the tug or ship.
- A **MOP** would be prepared and would include standard procedures and protocols to covering safety and environmental elements to address fuel spill prevention and response plan.
- All tugboats and ships will hold and dispose of their sewage and greywater in accordance with applicable federal and state rules and regulations.
- Restroom facilities located at the end of the pier will be pumped out, maintained, and contained and disposed at the upland facility.
- Federal law requires vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore before they are allowed to discharge ballast into waters of the state, minimizing the risk of introducing exotic species or potential deleterious effects to listed species.
- Only treated sewage or greywater may be discharged within 3 miles of shore.
- Discharge of greywater by vessels associated with this project will be prohibited.

3.4 Water, including Surface Water and Groundwater

The following mitigation measures address potential impacts to Water:

- Project avoids direct impacts to lakes and streams.
- Application of construction-specific **BMPs** to control erosion.
- Compliance with **NPDES** Permit and Jefferson County Stormwater Permit with regard to mining and material transport and processing, including application of construction specific **BMPs** to control stormwater impacts.
- Containing stormwater and spent process water within facility boundaries and infiltrating after appropriate water quality treatment.
- Generally allowing stormwater generated along the proposed Conveyor routes to sheet flow off impervious surfaces to adjacent vegetated areas where it would infiltrate.
- Collecting baseline groundwater and surface water quality data prior to mining.
- Collecting and reporting baseline flow characteristics for Thorndyke Creek, including estimation of groundwater input and base flow, prior to commencement of mining.
- Controlling measures for spills and leaks from vehicles.
- Compliance with **CARA** regulations.
- Design and alignment of the Central Conveyor specifically avoids and/or minimizes impacts to wetlands and their associated buffers.
- Implementation of Wetland Mitigation Plan, with a buffer mitigation ratio of 2.1:1 and an estuarine wetland mitigation ratio of 24:1.
- To mitigate proposed impacts to Wetland B and associated buffers, approximately 2,600 square feet (1,392 square feet for Wetland B impact and 1,208 square feet for buffer impact) of Wetland B and 10,000 square feet of Wetland R (for Wetland B impact) would be enhanced at a 24:1 mitigation ratio.
- Enhancement of 2,699 square feet of temporarily disturbed Wetland B buffer.
- Relocation and restoration of the existing forest service road and restoration of old road, currently within approximately 70 feet of Wetland C, will increase Wetland C buffer to a minimum of 175 feet.
- Compliance with **NPDES** Permit and Jefferson County Stormwater Permit with regard to mining and material transport and processing, including application of operational specific **BMPs** to control stormwater impacts.
- Generally allowing stormwater generated along the Conveyor routes to sheet flow off impervious surfaces to adjacent vegetated areas where it would infiltrate.
- Controlling measures for spills and leaks from vehicles.

3.5 Marine Plants and Animals

The following mitigation measures address potential impacts to Marine Plants and Animals:

- Update previous macrovegetation studies to locate vegetation prior to construction to more accurately define potential eelgrass impacts and determine any required mitigation.
- Eelgrass is seasonal and likely shifts in the proposed project area due to currents and wave action.

- Alignment and depth of the proposed pier were chosen to directly avoid impacts to native eelgrass (*Z. marina*).
- Grounding of barges during construction activities can be avoided when possible.
- **BMPs** will minimize the risk of fuel spills and an agency approved spill prevention and response plan will be developed.
- Agency approved in-water work windows will be adhered to minimize impacts to juvenile salmon.
- To minimize the underwater noise during pile driving a vibratory hammer would be used for the majority of pile installation. A bubble curtain will be used when proofing with an impact hammer.
- A soft start approach using the vibratory and impact pile driving hammers to encourage fish to move away from the area.
- If required, conduct a pre-construction forage fish survey at the location of the proposed pier alignment.
- Required monitoring of marine mammals during pile driving will reduce the potential for exposure to noise.
- If pinnipeds are spotted within the injury zones, pile driving would cease until the animals have left the respective zones.
- A marbled murrelet monitoring program will likely be required and all work will stop when a marbled murrelet is spotted within the project area.
- Impacts will be temporary and limited to the two month in-water work construction period.
- After in- water work, daily tidal inundations will quickly restore bottom habitats to their pre-construction grade.
- Data from Hood Canal Bridge pile driving indicated no significant impacts to seabirds as a result of that impact pile driving.
- A bubble curtain will be used when pile driving.
- The enclosed design of the conveyor in all overwater marine areas minimizes the potential aggregate spill impacts.
- Barge aggregate spills, if they occur will not impact marine macrovegetation since the barges are moored in deep water.
- The alignment of the conveyor was designed to avoid the native eelgrass.
- During major growth periods of eelgrass, shadows from the conveyor and pier are not expected to reach the large patch of native eelgrass north and east of the pier except in the early morning.
- Given the height and width of the pier and average sun angle, shading from the pier will traverse marine water along the pier alignment throughout each day and remain over any specific eelgrass patch for a maximum of one to two hours each day.
- Because of the low sun angle in the early morning, light refraction off the water surface will be great and the amount of photo synthetically active radiation reaching the bottom/eelgrass will likely be below the threshold for photosynthesis with or without the project structures.
- Conveyor support structure and service walkway will have open steel girders and grated decking to minimize shading effects.

- Given the initial height of the overwater conveyor and relatively narrow width, shading will be minor and well below the thresholds that elicit avoidance of juvenile salmon.
- Given the piers height above the water, airborne noises will be low.
- Ships and tugs will move slowly to reduce the potential for marine mammal collisions.
- To prevent alterations in drift cell dynamics, the design proposes spacing the pilings sufficiently apart, with the overwater conveyor designed to be elevated above the **OHW**. By substantially allowing current and natural sediment transport to occur unimpeded, no impacts are expected to occur.
- Providing a substantially greater area of hard surface for attachment of epibenthic plants and animals to offset the direct loss of existing habitat and biota resulting from destruction of benthos and habitat.

3.6 Terrestrial Plants and Animals

The following mitigation measures address potential impacts to Terrestrial Plants and Animals:

- Construction of the proposed central conveyor will be completed primarily from existing gravel forestry service roads.
- Direct clearing for the access road and conveyor supports would be small scale, localized and not likely to impact wildlife given the undisturbed vegetation in surrounding areas.
- Staging areas will utilize recently cleared lands from timber harvesting where possible.
- Efforts will be made to minimize the removal of trees during construction to reduce loss of habitat.
- Vegetation similar to that removed will be allowed to reestablish in some areas, limiting wildlife impacts.
- Displaced animals and birds will likely return to the area once construction is complete.
- Proper implementation of **BMPs** and quick cleanup will prevent or minimize any potential effects of spills.
- Mining operations incrementally in segments not exceeding 40 acres, and reclaiming and replanting cleared and actively mined areas once mining in that segment is complete.
- Disturbed upland habitat along the central conveyor will be restored through replanting of native vegetation.
- Abandoned portions of forestry service roads will be realigned and revegetated.
- Vegetation under the proposed pier approach would transition to a shrub dominated area to minimize maintenance.
- Activities at the Operations Hub would be located within an area already used as a processing center. Wildlife and birds are likely to be acclimated to these longstanding noise conditions.
- Activities would be conducted per the Ecology administered **NPDES** general sand and gravel permit and county stormwater permit conditions.

- Central Conveyor to have a minimum 2-foot ground clearance below the return belt for wildlife crossings, with 4-foot ground clearance crossings every 300 feet, and 6-foot crossings every 900 feet.
- Animals may cross under the conveyor or move into habitat away from the structure to avoid noise disturbance.

3.7 Threatened and Endangered Species

The following mitigation measures address potential impacts to Threatened and Endangered Species:

- Work will be conducted during the agency regulated in-water work window when the fewest juvenile salmonids are expected to be present in the proposed project areas.
- A soft start approach using the vibratory and impact pile driving hammers will be utilized to encourage fish to move away from the area prior to initiation of the pile driving.
- To minimize the underwater noise during pile driving, a vibratory hammer will be used for a majority of pile installations.
- A bubble curtain or equivalent will be utilized to decrease noise levels.
- Adherence to an agency approved marbled murrelet construction monitoring plan.
- Adherence to a federal agency approved marine mammal construction monitoring plan.
- Potential effects would be temporary, highly localized and cease once construction is complete.
- Depending on tidal stage, local currents will disperse suspended sediments from pile driving operations at a moderate to rapid rate, making it unlikely to directly affect juvenile or adult salmonids or listed rockfish that may be present.
- Hollow steel piles will be used for pier construction will not introduce or leach contaminants into the sediment surrounding the project site.
- Loss of benthic habitat will be partially offset by pilings with a vertical hard substratum habitat upon which invertebrate and algal colonization will occur.
- Alignment and depth of pier were chosen to directly avoid impacts to native eelgrass.
- No forage fish spawning areas have been documented in proximity of the pier alignment. **WDFW** may require pre-construction forage fish survey to ensure nominal impacts to forage fish spawning.
- **BMPs** will be used to control site erosion, reducing any potential turbidity effects.
- Location of pilings and construction techniques will minimize any impacts to the disturbed riparian wetland which reduces impacts to wetland prey resources for upland species.
- The preferred method of construction would try to avoid grounding of barges.
- In-water construction activities will be limited to a 2-month period.
- Permanent loss of benthic or epibenthic habitat will be minimized.

- Pier was designed to avoid interference with the natural littoral drift of sediment and natural processes affecting recruitment and productivity of food sources (benthic, epibenthic and zooplankton communities) along the Toandos Peninsula.
- Elevated conveyor would span local drainages and be equipped with pans under the return belt at specific locations such as transfer points which would minimize potential of spillage.
- Transported sand and gravel will be relatively free of fine materials further minimizing potential for turbidity.
- Strong currents and tidal exchanges in the proposed project area will also reduce potential for accumulation of metals and organotins within the water column and substrate.
- No antifouling paint will be applied onsite.
- Assuming that propeller depth will be 75 feet, boat orientation and other boat and operating specifics, scouring impacts from propeller wash would likely be short term, localized and have no significant adverse impact.
- Runoff will be minimized by a design feature that would geotechnically stabilize the lower portion of the single conveyor route along the shoreline bluff. A cut and drainage system will be placed to minimize bank erosion, capturing runoff.
- Fueling of vessels will not occur onsite, any spill or leak would be limited to that contained within the tug or ship.
- A MOP would be prepared and would include standard procedures and protocols to covering safety and environmental elements to address fuel spill prevention and response plan.
- Only treated sewage or greywater may be discharged within 3 miles of shore.
- All tugboats and ships will hold and dispose of their sewage and greywater in accordance with applicable federal and state rules and regulations.
- Discharge of greywater by vessels associated with this project will be prohibited.
- Federal law also requires vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore before they are allowed to discharge ballast into waters of the state, minimizing the risk of introducing exotic species or potential deleterious effects to listed species.
- Effects of shading will be minimized by utilizing open steel girders and grated decking for the maintenance walkway.
- Pier shading will move throughout the day further minimizing impacts.
- Steep slope of the seafloor at the transfer point will likely prevent any accumulation of sand and gravel resulting from potential spillage.
- Lighting of the conveyor and pier across marine habitats would be restricted to the minimum required to conform to applicable safety requirements.
- Direct lighting of the water surface would be minimized with shielding.
- Pier lighting would be turned off except as required for loading operations, maritime safety and navigation

3.8 Land and Shoreline Use, Recreation, Consistency with Plan and Policies

The following mitigation measures address potential impacts to Land and Shoreline Use:

- Hours of Construction - construction activities to be limited to 7:00 a.m. to 7:00 p.m., weekdays only – no nights or weekends. Applicant to further limit Pier construction to starting 1 hour past sunrise or 7:00 a.m., whichever is later.
- Construction activities to be complete within 1 year time frame. In-water portion of Pier construction period estimated to last 2-3 months.
- Use of construction equipment in good working order, especially properly maintained noise muffling systems.
- Staging work efficiently to minimize the necessary construction days.
- Meridian Extraction Area located within approved Mineral Land Resource Overlay.
- Operations Hub located within previously approved mining area, at site of previous Operations Hub, within commercial tree farm.
- 20-foot high vegetated earthen berm to be constructed along southeastern property line to provide screening.
- 90% of conveyor not visible to adjacent rural residential uses.
- Conveyor structure to be painted in low reflective natural colored material to help blend into the surrounding area.
- Conveyor will not block important views.
- Barge loading times range from 1-8 hours, typical barges loaded in 2-3 hours. No more than two barges to be berthed at Pier at one time, and no more than 6 barges/day.
- Ship loading times range between 8-24 hours. No barges to be loaded when ships are present.
- Protocols to be established to minimize the lighting necessary on the pier for loading, and on-board lighting of ships
- Existing recreational use of the project shoreline is limited. The recreational experience along the beach will be changed, but will not be prohibited.
- Approval of Jefferson County Zoning Conditional Use Permit and Shoreline Conditional Use Permit required.

3.9 Noise

The following mitigation measures address potential impacts from Noise:

- Construction workers required to strictly follow occupational noise standards, protocols and **BMPs**, including state regulations protecting workers from hearing loss, and **MSHA** and **OSHA** standards for workplace exposure to sound.
- Construction worksites to comply with all applicable federal and state occupational noise rules and regulations.
- State and County noise rules and regulations exempt construction activities from compliance with the maximum permissible environmental noise levels during weekday daytime work hours.
- Use of construction equipment that is in good working order, especially properly maintained noise muffling systems.
- Staging work efficiently to minimize the days needed to construct.

- Restricting all construction activities to the hours of 7:00 a.m. to 7:00 p.m., weekdays only—no work at night or on the weekends.
- Further restrict the daily start of any construction activities for building of the pier to one hour past sunrise or 7 a.m., whatever time is later.
- All work related activities of the action are subject to the rules and regulations of at least one of federal and state occupational safety regulatory agency.
- The Operations Hub would have a twenty foot high earthen berm, situated between the operations and the neighboring residential properties to the southeast. The berm will provide a visual barrier but will not materially reduce operational noise levels at residential properties located more than 3,000 feet distant.
- Central conveyor design considerations, included covering or enclosing the central conveyor along its entire route, reducing the noise level it produces.
- Proposed pier structure would be fully enclosed including the control room and supporting gantry of the load out conveyor arm and the enclosure will attenuate noise heard outside the structure from noise generated from within.
- The proposed Pier would only be used up to 300 days annually.
- Establishing continuous noise monitoring at the nearest residential receptors to the proposed pier to identify actual noise generated from the project.
- Possibly restricting the use of backup alarms and whistles prior to startup of the conveyor during nighttime operations.

3.10 Aesthetics, Light and Glare

The following mitigation measures address potential impacts related to Aesthetics, Light and Glare:

- Ridgelines located west and east of the Meridian Extraction Area would completely screen the operation from surrounding rural residences.
- The hub would have a twenty foot high earthen berm situated on the south property lines. The berm will be planted with fast growing deciduous trees and conifers to provide screening.
- Require structures to be painted in low reflective natural colored material to help blend in to the surrounding area
- Given the generally higher elevation of the Hub, the processing area would not directly obstruct views and would make up only a small portion of existing views, with relatively low overall prominence.
- Views of the Olympic Mountains from State Route 104 may be somewhat obstructed, but not blocked by fleeting glimpses of the Operations Hub activities.
- Residences from Squamish Harbor area are primarily oriented away from the Shine Pit and toward the water, so primary waterfront views would be unaltered.
- Project components would not block the mountain views.
- In compliance with US National Park Service Interim Design Guidelines for Outdoor lighting, all outdoor lighting at the Operations Hub would be of the type and design to minimize glare leaving the site.
- Submit a landscape plan along with the grading plan for the cut section at the top of the shoreline bluff to provide measures to reduce visual contrasts.

- Approximately 90 percent of the 4-mile long central conveyor would be located on upland private forested lands and not be visible to adjacent properties. It is a low proportion of the field of view and tends to blend into the background of surrounding tree farm.
- The central conveyor is not proposed to include outdoor lights.
- Type, orientation and design of the pier structure was done to minimize glare leaving the site.
- Specific lighting requirements of the pier would be developed in consultation with US Coast Guard to provide navigational safety lighting.
- Nighttime lighting would be minimal when not in use and limited to that required for navigation, safety and security.
- Lighting for the loading would be on the overhead load out gantry and directed downward.
- On the Jefferson County shoreline, South Point would block the view of the pier from residences in Bridgehaven and north including all but the eastern most edge of Suquamish Harbor.
- The pier would not be visible from the closest residences to the southwest.
- Establish protocols to minimize the lighting necessary on the pier to load the barges and ships and onboard lighting on ships berthed at the pier.
- Most of the time, prevailing winds and upward rise would disperse emissions to the point of not being visible.

3.11 Transportation

The following mitigation measures address potential impacts to Transportation:

- It is expected that in-water work would stop to make way for Tribal fishing.
- Delivery of construction equipment that will require bridge openings and that is needed to build the proposed pier, will occur during off peak traffic hours.
- Develop a **MOP** in consultation with the Coast Guard, **USACE**, Navy, **WSDOT**, **Ecology**, **WDFW**, Puget Sound Harbor Safety and Security Committee, and Jefferson County.
- A spill containment boom, a small tender capable of operating the boom and other safety and maintenance equipment will remain on site.
- Potential impacts and mitigating measures related to bridge collisions will be addressed in the federal permitting and **NEPA** process.
- All tugboats and barges calling on the Pier are proposed to cross under the Hood Canal Bridge eastern fixed span.
- All ships calling on the pier will travel through the draw span of the Hood Canal Bridge during overnight, off peak hours to limit impacts to traffic backups on Hood Canal Bridge.
- Worker start times are anticipated to be staggered rather than concurrent, and if necessary, workers can also access the Meridian Extraction Area through Wahl Lake Road to limit traffic backups on SR 104.

3.12 Public Services and Utilities

The following mitigation measures address potential impacts to Public Services and Utilities:

- Potable water fire suppression equipment, portable sanitation facilities and temporary construction stormwater controls would be required to be provided at every construction site.
- Construction would follow all applicable design and industry construction standards and occupational safety rules.
- Coast Guard regulations require all contractors involved with Pier and nearshore construction to have trained workers and equipment necessary to respond to emergencies.
- Implementation of the occupational safety rules and regulations required by the various federal and state agencies including worker training and required availability of onsite fire, rescue and emergency medical response equipment have been instrumental in minimizing incidents that might have required an emergency response.
- When actual construction of the operations hub occurs, if an upgrade to any component of the PUD's power grid became necessary, the cost to do so would be the responsibility of the Applicant.
- All public and private utilities would be installed, used and maintained in compliance with applicable state, county or utility regulations.
- The Applicant has agreed to install automatic fire suppression systems at the control, power and equipment rooms located at the end of the proposed Pier. There would also be firefighting, rescue and emergency medical equipment stationed within reach of the pier operators.
- A tender available for both rescue and placement of spill containment would be stationed on one of the mooring dolphins at the pier.
- Develop a **MOP** in consultation with the Coast Guard, **USACE**, Navy, **WSDOT**, **Ecology**, **WDFW**, Puget Sound Harbor Safety and Security Committee, and Jefferson County.

3.13 Archeological and Cultural Resources

The following mitigation measures address potential impacts to Historic, Archeological and Cultural Resources:

- Archeological and cultural resource assessments prepared for the proposed project found a low probability that historic properties would be encountered or disturbed.
- Distance and nearby vegetation would screen recorded historic properties from indirect impacts. None of the proposed project operations are visible from the nearest identified archaeological site (45JE287) near Shine Creek.
- Preparation of an Unanticipated Discovery Plan. If any discoveries of historic resources were to occur, permitted events in the immediately area would cease, and the area would be secured. Local Tribes and the State Office of Archeology and Historic Preservation would be notified.
- Beaches in the project vicinity would remain accessible to tribal undertakings.

- Regarding use of the Pier, up to 65 days will be allotted annually in consideration of tribal fishing, holidays, inclement weather and periods of non-use.
- Potential impacts to Tribal fishing and shellfish harvesting, and impacts to the Tribal Canoe Journey will be addressed in the federal permitting and environmental review (NEPA) process.

4.3 No Action Alternative

This SEPA DEIS evaluates the Proposed Project and No Action alternative. While there is no requirement to consider alternatives other than the No Action Alternative, the Applicant did consider alternative Pier sites prior to selecting the Proposed Pier location, as well as potential project design and operational modifications. The alternative Pier sites, design and operational modifications were eliminated from further consideration because they could not achieve project objectives at a lower environmental cost than the Proposed Project as described herein.

The No Action alternative represents existing conditions in the area of the Proposed Project. If the Proposed Project is not implemented, its primary components (Central Conveyor, Wahl Conveyor, Operations Hub and Pier) would not be built. Although land clearing associated with construction of the Central Conveyor would not occur, land clearing from ongoing commercial tree harvesting would continue, as would those related impacts on surface waters, groundwater, stormwater and wetlands. Reclamation of the Shine Operations Hub would proceed.

Sand and gravel mining with truck-based delivery would continue in the Wahl Extraction Area and likely would be conducted within the Meridian Extraction Area as future operations continued. Mining activities at the Meridian Extraction Area would comply with the **Ordinance** (or subsequent approval), and the most recent versions of the Jefferson County Stormwater Permit and the State administered NPDES Permit. Outside the Extraction Area, no change - either impacts or enhancements, would occur to existing wetlands or their associated buffers.

The No Action alternative would continue truck-based delivery of sand and gravel from upland extraction areas in the Hood Canal Tree Farm to local markets but at a lesser rate of mining than the marine (bulk) transport associated with the Proposed Project. Without the Proposed Project, extracting and processing from other sources may increase the rate of both the depletion of existing mines and development of new mines to meet market demands. Under the No Action alternative, the demand for aggregate would not be met by the supply offered by the Proposed Project. Sand and gravel is a basic construction commodity with historical market demands. Although trucking is neither viable nor, in some cases, possible for meeting project objectives to transport sand and gravel to local, regional, intrastate and interstate markets (e.g., Port Angeles, Seattle, Vancouver WA, California and Hawaii), the No Action alternative would likely result in increased truck delivery from sand and gravel mined in the Cascade foothills to Puget Sound urban markets and/or marine transportation from other regional Piers and deposits.

While the No Action alternative would not directly impact marine resources and habitats in the Proposed Project Pier area, increased trucking would increase existing cumulative transportation impacts to area roads, traffic congestion and related environmental impacts (e.g. air pollution, surface water pollution through vehicle oil spills/leakage). Cascade Mountain foothills truck-based sources provide comparable quantities and quality of aggregate to that offered by the Proposed Project. Transit distances from these landlocked foothill sources, however, are 25-40 miles away from the Puget Sound regional markets that the barges from the Proposed Project would supply. A heavily loaded truck typically gets 5 miles per gallon (mpg). If the volume of aggregate proposed to be moved by the proposed project was instead provided by Cascade Mountain foothill truck-based operations, the No Action alternative would involve some 125,000 (two-way) vehicle trips by truck and trailers, traveling between 6.2 to 10 million lane miles, using some 1.2 to 2 million gallons of fuel per year.

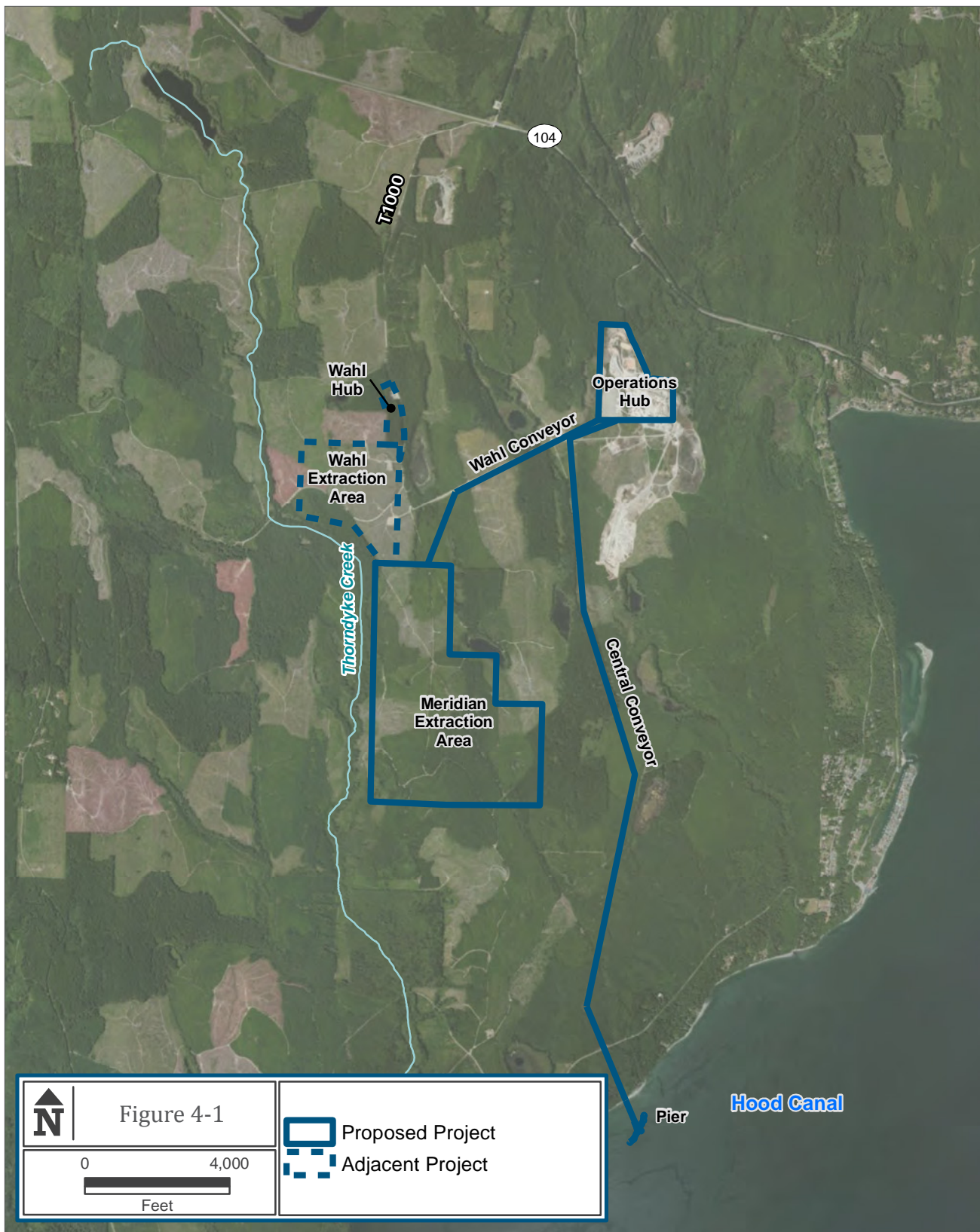
It is also reasonable to anticipate that much of the estimated sand and gravel tonnage that Thorndyke Resource would have delivered by barges and ships (2 million tons in Year 1 to 6.75 million tons annually by Year 25, subject to market demand) would instead be extracted, processed and transported from existing and new mines in Puget Sound, the Georgia Basin and British Columbia coastal area (Canada). Assuming all proposed aggregates were provided by British Columbian barges, tug operations under the no action alternative would involve additional transit times between 13,000 to 21,000 hours and consumption of 1.3 to 6.3 million more gallons of diesel fuel per year with associated particulate and greenhouse gas emissions.

Transporting volumes comparable to the Proposed Project from other sources would have separate environmental costs depending on the truck, barge, ship and/or rail delivery method of transportation. These costs or considerations could impact current import levels from Canada, local and regional job creation, commerce, economies, and county and state tax revenue generation.

4.4 Cumulative Impacts

In the **cumulative** analysis, the County must look at the “big picture” by evaluating **cumulative** impacts of development on the horizon, and the likelihood that the project will serve as a precedent for future actions (by Applicant or others) that may compound development impacts. The analysis should include how the impacts of the proposal will contribute towards the total impact of development in the region over time. However, a **cumulative** impact analysis need only occur when there is some evidence that the project under review will facilitate future action that will result in additional impacts; a project’s cumulative impacts that are merely speculative need not be considered. Accordingly, project proponents are only responsible for mitigation of the portion attributable to their own proposal. (WAC 197-11-660(4)(a)).

See Figure 4-1 For this analysis, the only project considered in terms of cumulative impacts is concurrent mining in the 156-acre Wahl Extraction area and concurrent processing in the Wahl Hub. The Wahl Extraction Area is located immediately north of the Meridian Extraction Area, within the same **MRLO**, but operated by a different entity.



Adjacent Projects The Proposed Project shown in relation to the adjacent mining activity.

The Wahl Operations Hub, with its truck-based sand and gravel delivery system, is located at Wahl Lake, just north of the Wahl Extraction Area. Wahl employees and trucks access SR 104 via the private Wahl Lake Road (T-1000), located approximately one mile west of the access to the Shine Hub at Rock-To-Go Road.

No other development projects are located in close proximity to the proposed project, or propose new impacts to the waters of Hood Canal. It is anticipated that construction of the new pier at Naval Base Kitsap Bangor will be completed prior to construction of the proposed Thorndyke project. Once construction of the new Navy Pier is complete, that project will not result in additional marine traffic in Hood Canal.

Potential impacts of mining within the Wahl-Meridian **MRLO** as a whole were addressed in the programmatic Supplemental **EIS** prepared for Adoption of the Mineral Resource Land Overlay in 2004. Jefferson County's approval of the **MRLO** included several conditions, some of which apply to the **MRLO** as a whole and may require coordination between the two mining operations.

Concurrent mining in Meridian and Wahl could result in mining of up to two non-contiguous 40-acres segments within the **MRLO** at one time. Potential impacts associated with the concurrent mining include impacts to:

- Air quality
- Vegetation and wildlife habitat
- Surface water and groundwater
- Background noise levels
- Visible light and glare

Mineral extraction and processing activities typically include a variety of sources that emit air pollutants. The mining in both Meridian and Wahl and related processing activities must individually comply with **ORCAA**, **WDNR** Reclamation, and Jefferson County **Ordinance** #08-0706-04 requirements governing control and minimization of dust emissions. **ORCAA** regulations also address emissions from equipment exhaust. Both Meridian and Wahl will generate emissions from mining and processing equipment. In addition, Wahl generates emissions from its truck-based delivery system, while Meridian would generate emissions from marine transport. Given the existing federal, state and county regulations regarding air quality, no cumulative impacts are anticipated. Delivery of the sand gravel from both areas will, however, contribute incrementally to an increase greenhouse gas emissions.

Existing vegetation and associated wildlife habitat will be removed in up to two non-contiguous 40-acre segments. The distance between any two segments is unknown at this time and may not be determined until the individual 40-acre County permits are requested. Because Meridian and Wahl are located within managed forest lands, habitat conditions within each area vary based on the stage of reforestation. Both areas provide cover and foraging habitat for both small and large animals.

No direct impacts to streams and wetlands, with their associated buffers and habitat, are permitted within either Meridian or Wahl. No threatened or endangered species are found in either Meridian or Wahl. The required clearing for mining will result in increased edge habitat in those areas that currently support forested habitat. Both Meridian and Wahl are required to reclaim and replant each mining segment upon completion of mining within that segment, reducing potential impacts to wildlife. The extent to which concurrent mining with increased human activity and noise levels will indirectly impact habitat is dependent upon the proximity of the Meridian and Wahl active mining segments; increased noise levels may alter wildlife migratory behavior, cause altered behavior and avoidance, and affect birds' vocal communications.

The concurrent mining will alter existing topography in each segment which, in turn, alters flows and the rate of flow to wetlands, surface water, and recharge to groundwater. Improperly managed stormwater runoff can result in erosion and sedimentation impacts to wetlands and surface waters. Both Meridian and Wahl are required to obtain and comply with both a **NPDES** permit and a County stormwater permit.

The western portion of Meridian and the southeastern edge of Wahl lie within designated Critical Aquifer Resource Areas. Both Meridian and Wahl must individually comply with the requirements of **Ordinance** #08-0706-04 requirements regarding protection of surface and groundwater. These requirements include collection of baseline data, reports and inspections, and limitation of the mining to at least 10-feet above the seasonal high water table.

Noise will be generated by both Meridian and Wahl mining. Per County **Ordinance**, the maximum permitted sound level at any and all receiving properties outside of the Thorndyke Tree Farm is restricted to 57 dBA between the hours of 7:00 a.m. and 7:00 p.m. on weekdays, and 47 dBA on weekends, holidays, and between the hours of 7:00 p.m. and 7:00 a.m. on weekdays. Establishment of a compliance protocol is required.

Outdoor lighting anywhere within the **MRLO** must meet specifications of the U.S. National Park Service Interim Design Guidelines for Outdoor Lighting. Lighting required for mineral extraction, processing, and transportation activities must be independently mounted to allow for a more downward throw of light to further limit the potential for direct light to reach offsite areas.

No cumulative impacts to vehicular traffic are anticipated, as material from Meridian will be moved via marine transport, rather than adding to the truck transport from Wahl. The Meridian and Wahl Operations Hubs have separate access to SR 104; these access points are located approximately one mile apart.

Neither the Meridian nor Wahl mining operations will be visible from adjacent residential uses.

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