TERMINAL 5 CARGO WHARF REHABILITATION, BERTH DEEPENING, AND IMPROVEMENTS

Draft Environmental Impact Statement
Volume I

Port of Seattle

SEPA Lead Agency
Project Proponent

THE NORTHWEST SEAPORT ALLIANCE

May 2016

POS SEPA No. 16-03

Port of Seattle

P.O. Box 1209
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May 2016

RE: TERMINAL 5 CARGO WHARF REHABILITATION, BERTH DEEPENING, AND IMPROVEMENTS PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Interested Parties, Jurisdictions, and Agencies:

Attached is a copy of the Draft Environmental Impact Statement (DEIS) for the Port of Seattle's Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements project (Terminal 5 Improvements Project). The Port of Seattle (Port) is proposing modifications to existing marine cargo facilities at Terminal 5. The Port is part of the Northwest Seaport Alliance (NWSA), a management authority governed by the Port and the Port of Tacoma, with each port acting through its elected commissioners. The ports remain separate organizations retaining ownership of their respective assets.

The proposed project includes rehabilitation of the existing Terminal 5 marine facility in order to serve larger vessels and includes: cargo wharf rehabilitation necessary to support larger and heavier cranes; deepening of the vessel berth; water and stormwater utility retrofits; and electrical utility capacity increases. Other elements include: reconfigured marine cargo marshalling area; reorganized intermodal rail facilities; cargo area lighting modifications; pavement repair and maintenance; stormwater drainage improvements; renovation of maintenance and repair buildings; and redesign of entrance/exit gates and heavy vehicle access points to serve increased capacity. Project construction of improvements is expected to begin upon receipt of regulatory approvals.

This DEIS addresses the likely probable significant impacts that could occur as a result of the proposed actions. For purposes of environmental review, three EIS Alternatives have been formulated and evaluated. The first alternative is the No-Action Alternative. Two development alternatives are also analyzed in this DEIS.

The following elements of the environment were analyzed in the DEIS: Earth, Air Quality, Water, Plants and Animals, Environmental Health, Noise, Land Use, Relationship to Plans and Policies, Aesthetics/Light and Glare, Historic and Cultural Resources, Transportation, Public Services, and Utilities. For each of these elements, the DEIS identifies probable environmental impacts, measures intended to avoid, minimize, and/or mitigate these impacts, and any significant unavoidable adverse impacts that may be anticipated.

Copies of the DEIS have been distributed to agencies, organizations, and individuals noted on the Distribution List. Copies of this document are also available for review at the Seattle Central Library, Delridge Library, South Park Library, and West Seattle Library. Copies are also available at the Port of Seattle, Maritime Environment and Sustainability Department, Pier 69, 2711 Alaskan Way, Seattle, WA,

during business hours of 8:30 AM to 4:00 PM. Persons interested in receiving a copy of the DEIS should contact Brenda Thomas at 206-728-3382 or e-mail at: SEPA.p@portseattle.org. Alternatively, the DEIS can be reviewed and downloaded at the Port of Seattle website at: http://www.portseattle.org/Environmental/Environmental-Documents/SEPA-NEPA/Pages/default.aspx and at the Terminal 5 Improvements Project Online Open House at: www.nwseaportalliance.com/about/strategic-plan/t5.

This DEIS has been prepared pursuant to the State Environmental Policy Act (SEPA – Chapter 43.21C RCW), SEPA Rules (Chapter 197-11 RCW), and Port of Seattle SEPA Resolution NO. 3650.

You are invited to participate in the environmental review process for the Terminal 5 Improvements Project through both your written comments on the DEIS and your involvement. Two public hearings have been scheduled at the following times and locations:

Date: Tuesday, June 7, 2016

Time: 5:00 PM to 8:30 PM

(Public testimony will be taken beginning at 6:45 PM)

Place: Georgetown Campus, South Seattle Community College, 6737 Corson Avenue, South, Seattle, WA

Date: Thursday, June 9, 2016

Time: 5:00 PM to 8:30 PM

(Public testimony will be taken beginning at 6:45 PM)

Place: Alki Masonic Center, 4736 40th Avenue SW, Seattle, WA

The deadline for submitting written comments is 4:00 PM on Tuesday, June 21, 2016. After the written comment period ends, the next stage of the environmental review process will be publishing a Final EIS. The Final EIS will respond to comments received on the DEIS.

Please address any comments or questions about this DEIS to Paul Meyer, Manager, Environmental Permitting and Compliance, Port of Seattle, Pier 69, PO Box 1209, Seattle, WA 98111-1209 or to the electronic mail address at SEPA.p@portseattle.org. Please include your mailing address when submitting comments to the electronic address.

Thank you for your interest and participation in this environmental review.

Sincerely,

Lindsay Pulsifer, Managing Director, Seattle Maritime

SEPA Responsible Official

Port of Seattle

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

TERMINAL 5 CARGO WHARF REHABILITATION, BERTH DEEPENING, AND IMPROVEMENTS

PORT OF SEATTLE
SEATTLE, WASHINGTON

POS SEPA NO. 16-03

Prepared for the Review and Comments of Citizens,
Groups, and Governmental Agencies

In Compliance With
The State Environmental Policy Act of 1971 (Chapter 43.21C RCW)
and Port of Seattle SEPA Policies and Procedures

SEPA FACT SHEET

SEPA FACT SHEET

Project Title

Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements Project (Terminal 5 Improvements Project)

Proposed Action

The Port of Seattle (Port) with the Northwest Seaport Alliance (NWSA) is proposing rehabilitation of the existing marine cargo facilities at Terminal 5. The proposed Project includes modifications to the existing Terminal 5 marine cargo facility in order to serve larger cargo vessels. The proposed changes consist of cargo wharf rehabilitation, deepening of the vessel berth, electrical service capacity improvements, and upland improvements to serve increased capacities. The proposed Project would rehabilitate Terminal 5 to serve existing large and emerging increased capacity container cargo vessels. Proposed actions also include reconfiguration of the existing upland marine cargo marshalling area, modification of intermodal rail facilities and pavement areas, improvement of stormwater systems, alteration of maintenance and repair buildings, and redesign of entrance/exit gates and heavy vehicle access points.

The proposed Project would begin as soon as city, state, and federal authorizations and approvals are received. The anticipated start for construction is mid-2017, with completion expected by 2020. Upland/landside construction elements would continue throughout this time period while the proposed in-water wharf improvements would be limited to three consecutive in-water work seasons to protect endangered species.

Upland improvements anticipated in the alternatives may be phased over a longer period of time. If upland improvements are phased, as required for operational needs, specific permit approvals linked with site development activities would be obtained prior to construction.

Alternatives

For purposes of environmental review, three EIS alternatives were reviewed.

Alternatives that are analyzed in the Draft EIS include:

- Alternative 1 – No-Action Alternative
- Alternative 2 – Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling

SEPA FACT SHEET

- Alternative 3 – Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements

Project Location

The Project site is located at Terminal 5 on the west margin of the West Waterway, in Elliott Bay, Seattle, Washington. The address for the site is 2701 26th Avenue SW, Seattle, Washington, 98106.

Proponent/Applicant

Port of Seattle (in association with the Northwest Seaport Alliance)

Lead Agency

Port of Seattle

SEPA Responsible Official

Lindsay Pulsifer, Managing Director, Maritime Division

Port of Seattle

Lead Agency Contact Person

Paul Meyer, Manager, Environmental Permitting and Compliance

Port of Seattle, Pier 69

PO Box 1209

Seattle, WA 98111-1209

(206) 728-3127

Permits and Approvals

Northwest Seaport Alliance (NWSA)

Management authority governed by Port of Seattle and Port of Tacoma, with each port acting through its elected commissioners

City of Seattle

Department of Construction and Inspections

Shoreline Substantial Development/Master Use Permit and associated demolition, grading and building permits

State of Washington

Department of Ecology

- National Pollutant Discharge Elimination System (NPDES) Construction permit
- Clean Water Act Section 401 Certification
- Model Toxics Control Act (MTCA) Coordination

- Certification and Coastal Zone Management Act Consistency Determination

Department of Archaeology and Historic Preservation (DAHP) Review

Department of Natural Resources Dredged Materials Management Office

- Suitability Determination and Open Water Disposal Permit
- Site Use Authorization

Department of Fish & Wildlife

- Hydraulic Project Approval

U.S. Government

U.S. Army Corps of Engineers (USACE)

- Section 10/404 Permit
- National Environmental Policy Act (NEPA) compliance evaluation

U.S. Environmental Protection Agency (EPA)

- Comprehensive Environmental Response, Compensation, and Liability -Act (CERCLA) Coordination

National Oceanic and Atmospheric Administration (NOAA) and U.S. Fish & Wildlife Service

- Endangered Species Act (ESA) Section 7 consultation, Biological Evaluation

Treaty tribe consultation, associated with federal permit determination (Muckleshoot Indian Tribe and Suquamish Tribe)

EIS Authors & Principal Contributors

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Date of Draft EIS Issuance	May 23, 2016
Date Draft EIS Comments Are Due	June 21, 2016 (4:00 PM)
Draft EIS Public Hearings	Two public hearings have been scheduled at the following times and locations: Date: Tuesday, June 7, 2016 Time: 5:00 PM to 8:30 PM (public testimony will be taken beginning at 6:45 PM) Place: Georgetown Campus, South Seattle Community College, 6737 Corson Avenue, South, Seattle, WA Date: Thursday, June 9, 2016 Time: 5:00 PM to 8:30 PM (public testimony will be taken beginning at 6:45 PM) Place: Alki Masonic Center, 4736 40th Avenue SW, Seattle, WA
Previous Environmental Document	Per WAC 197-11-635, this EIS builds upon and incorporates by reference the following environmental documents: Port of Seattle, Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening Project SEPA Checklist and DNS issued March 2, 2015; the Draft Southwest Harbor Cleanup and Redevelopment Project Draft EIS issued January 1994; the Southwest Harbor Cleanup and Redevelopment Project Final EIS issued November 1994; Southwest Harbor Cleanup and Redevelopment Addendums Numbers 1 through 4 issued in June 1995, April 1996, September 1996, and May 1998; and Terminal 5 Maintenance Dredging Program Determination of Nonsignificance issued January 2010.
Location of Background Information	Background material and supporting documents are located at:

Port of Seattle, Pier 69

2711 Alaskan Way

Seattle, WA 98111-1209

Availability of the Draft EIS

This DEIS has been distributed to agencies, organizations, and individuals noted on the Distribution List contained in Chapter 5.

Copies of this document are also available for review at the Seattle Central Library, Delridge Library, South Park Branch Library, and the West Seattle Library. Copies are also available at the Port of Seattle, Maritime Environment and Sustainability Department, Pier 69, 2711 Alaskan Way, Seattle, WA, during business hours of 8:30 AM to 4:00 PM. Persons interested in receiving a copy of the DEIS should contact Brenda Thomas at 206-728-3382 or e-mail at: SEPA.p@portseattle.org. Alternatively, the DEIS can be reviewed and downloaded at the Port of Seattle website at:

http://www.portseattle.org/Environmental/Environmental-Documents/SEPA-NEPA/Pages/default.aspx

and at the Terminal 5 Improvements Project Online Open House at: www.nwseaportalliance.com/about/strategic-plan/t5.

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VOLUME II APPENDICES

ACRONYMS AND ABBREVIATIONS

Abbreviation	Term
CHEMICAL ELEMENTS AND COMPOUNDS	
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
cPAH	carcinogenic polycyclic aromatic hydrocarbons
DO	dissolved oxygen
GHG	greenhouse gas
NO_x	nitrogen oxide
NO_2	nitrogen dioxide
O_3	ozone
$PM_{2.5}$	fine particulate matter
PM_{10}	inhalable particulate matter
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
SO_x	sulfur oxide
SO_2	sulfur dioxide
UNITS OF MEASURE	
$\mu g/m^3$	micrograms per cubic meter
µPa	micropascal
amp	ampere
cy	cubic yard(s)
dB	decibel(s)
dBA	A-weighted decibel(s)
ESU	engineering soil unit

Abbreviation	Term
g	grams
km	kilometer
kV	kilovolt
kW	kilowatt
Ldn	Day-night sound level
Leq	equivalent sound level
Lmax	maximum sound level
m	meter
mg/L	milligrams per liter
$MTCO_2e$	million metric tons of carbon dioxide equivalent
MVA	megavolt ampere
MW	megawatts
ng/kg	nanograms per kilogram
NTU	nephelometric turbidity units
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
TEU	twenty-foot equivalent unit
tpy	tons per year

GENERAL ACRONYMS/ABBREVIATIONS

AESS	automatic engine shutoff system
ASIL	Acceptable Source Impact Level
bgs	below ground surface
BINMIC	Ballard/Interbay Northend Manufacturing Industrial Center
BMP	best management practice
Caltrans	California Department of Transportation
CEM	the CEM property
CERCLA	Comprehensive Environmental Response,

Abbreviation	Term
	Compensation, and Liability Act of 1980
CHE	container handling equipment
Comprehensive Plan	City of Seattle comprehensive Plan
CPPs	King County Countywide Planning Policies
CWA	Clean Water Act
DAHP	Department of Archaeology and Historic Preservation
DCI	Department of Construction and Inspections
DEIS	Draft Environmental Impact Statement
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DNR	Washington State Department of Natural Resources
DNS	Determination of Nonsignificance
DPM	diesel engine exhaust particulate matter
ECA	environmentally critical areas
Ecology	Washington State Department of Ecology
EFH	essential fish habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GMA	Growth Management Act
HPA	Hydraulic Project Approval
IBC	International Building Code
IG1	General Industrial 1
IMO	International Maritime Organization
ISGP	Industrial Stormwater General Permit

Abbreviation	Term
LAAS	Larson Anthropological and Archaeological Services
LED	light-emitting diode
LEP	light-emitting plasma
LFOL	Longfellow Creek Overflow Line
LOS	level of service
MHHW	mean higher high water
MIC	Manufacturing Industrial Center
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MTCA	Washington State Model Toxics Control Act
NAAQS	National Ambient Air Quality Standard
NDZ	No Discharge Zone
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWSA	Northwest Seaport Alliance
OLM	Ozone Limiting Method
PHS	Priority Habitats and Species
PIANC	Permanent International Association of Navigational Congresses
PMA	Port Management Agreement
PNW	Pacific Northwest
Port	Port of Seattle
POSPD	Port of Seattle Police Department
Project	Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements Project (also referred to as the Terminal 5 Improvements

Abbreviation	Term
	Project)
PSCAA	Puget Sound Clean Air Agency
PSE	Puget Sound Energy
PSLM	Practical Spreading loss model
RA	Remediation Area
RCW	Revised Code of Washington
RLT	rapid load test
RMG	rail-mounted gantry (crane)
rms	root mean square
RTG	rubber-tired gantry (crane)
SCC	Source Category Code
SCL	Seattle City Light
SDOT	Seattle Department of Transportation
SEL	sound exposure level
SEPA	State Environmental Policy Act
SFD	Seattle Fire Department
SLM	Sound Level Measurement
SMA	Shoreline Management Act
SMC	Seattle Municipal Code
SMP	Shoreline Master Program
SoundEarth	SoundEarth Strategies, Inc.
SPCC	Spill Prevention, Control, and Countermeasure
SPL	sound pressure levels
SPU	Seattle Public Utilities
SQS	Sediment Quality Standards
STS	ship-to-shore
SWPPP	Stormwater Pollution Prevention Plan
TAP	toxic air pollutant
TP	top-pick

Abbreviation	Term
TSP	total suspended particulate
UG	Urban General
UGA	urban growth area
UI	Urban Industrial
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish & Wildlife Service
WA	Washington
WAC	Washington Administrative Code
WDFW	Washington Department of Fish & Wildlife
WSDOT	Washington State Department of Transportation
WSY	West Seattle Yard

TERMINOLOGY

AKART: all-known, available and reasonable methods of prevention, control and treatment. AKART represents the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants associated with a discharge. AKART applied to both point and nonpoint sources of pollution.

Benthic: the lowest level of a body of water.

CAIT Database: an online database maintained by the World Resources Institute of overall estimated global greenhouse gas emissions.

Comprehensive Plan: generalized coordinated land use policy statement of the governing body of a county or city that is adopted pursuant to Chapter 36.70A RCW.

Container: the box used to transport goods by several modes, including truck, rail, and ship. Containers come in a range of sizes from 20-feet long to 48-feet long. The most common containers are 40-feet long.

Dray: the movement of cargo by truck. In the Port of Seattle area, a "dray trip" generally refers to the short truck trip between a marine terminal and an intermodal rail terminal. Containers that are moved by truck to local or regional businesses are simply referred to as truck trips.

Force main: a sewer main that moves wastewater under pressure using pumps or compressors located in lift stations. Force mains are utilized when gravity flow is insufficient to move water.

GMA: Growth Management Act. Adopted in 1990 under the Revised Code of Washington Chapter 36.70A. The GMA provides a comprehensive framework for managing growth, and coordinating land use planning with infrastructure.

Greater Duwamish Manufacturing/Industrial Center: Center of regional industry located on the northern end of an industrial corridor that extends from downtown Seattle to the Kent Valley. The Greater Duwamish Manufacturing/Industrial Center is comprised of approximately 4,928 acres of marine and industrial land.

Intermodal: a transfer of cargo from one mode to another. In the shipping business, an "intermodal container" generally refers to one that will be transported from or to a ship by rail. Terminal 5 has an on-dock intermodal rail yard that allows the direct transfer of containers between rail and ship using yard equipment. However, it is expected that some containers will be trucked (see "dray" below) between the marine terminal and the near-dock rail yards operated by the BNSF Railway and Union Pacific (UP) Railroad.

MARPOL: The International Convention for the Prevention of Marine Pollution from Ships, which sets limits on emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances. MARPOL regulations also apply to potential discharges of petroleum materials, bilge/ballast water discharges, and release of solid waste.

MICs: Manufacturing Industrial Centers. Manufacturing Industrial Centers are envisioned as areas of concentrated employment, including manufacturing, industrial and advanced technology. Their purpose is to preserve and encourage the aggregation of land suitable for manufacturing/industrial uses, and discourage non-compatible uses.

OCR: optical character recognition. OCR portals are positions at terminal entry and exit points to automatically read identification numbers on trucks and containers.

Panamax/Super post-Panamax: Panamax-class ships are limited by the size of the original Panama Canal, and are capable of carrying 4,500 TEUs. The existing berth and cranes at Terminal 5 can accommodate Panamax-class vessels as well as post-Panamax vessels up to approximately 7,000 to 8,000 TEUs. Super post-Panamax vessels are capable of carrying 10,000 to 18,000 TEUs.

Pile: a structural column which is driven into the ground in order to support a vertical load.

RFID: radio frequency identification. These devices are used to track truck and container movements through the terminal gates.

Riparian: land directly adjacent to rivers, streams or other bodies of water.

Riprap: rock placed on shorelines in order to prevent water driven erosion.

RMG crane: rail-mounted gantry crane. The largest type of equipment used to lift and stack containers. They are guided by fixed rails, and although not as mobile as top-picks or RTGs, allow for more efficient use of container marshalling yard area, including densely stacked containers, increasing facility capacity.

RTG crane: rubber-tired gantry crane. Yard equipment used to lift and stack containers in container marshalling yard areas, increasing facility and capacity. They will typically span over trucks, railcars, and container stacks.

Seattle SMP: Seattle Shoreline Master Program. The SMP is mandated by the state Shoreline Management Act and includes the goals, policies, and regulations that govern land use and activities within the Seattle Shoreline District. The Seattle Shoreline District includes: the Duwamish River, the Ship Canal, Lake Union, Lake Washington, Green Lake, and Puget Sound; their associated wetlands and floodplains; and all land within 200 feet of these water bodies

Ship-to-shore crane: a large dockside gantry crane used for loading and unloading intermodal containers from container ships.

TEU: twenty-foot equivalent unit. A unit of measure used in the shipping industry. A 40-foot container equals two TEUs. In recent years, Port of Seattle shipments have averaged 1.74 TEUs per container.

Throughput: volume of container cargo that passes through a terminal, generally measured in TEUs per year.

Top-Pick: yard equipment that is used to lift containers off or onto a truck or rail car, and also used to stack containers in the yard.

Tribal Fishing Areas: Elliott Bay, the East and West Waterways, and the Duwamish Waterway are recognized as treaty fishing access areas managed by the Muckleshoot Tribe and the Suquamish Tribe with the Washington State Department of Fish & Wildlife. These areas are Treaty-protected fishing areas.

Turbid: in relation to water: the state of being cloudy with suspended sediment.

TWIC: Transportation Worker Identification Card, which is issued by the U.S. Department of Homeland Security, and is required to access Terminal 5.

Weir: a barrier constructed across a flowing body of water in order to alter its flow.

West Waterway: western navigational access channel to the Lower Duwamish Waterway.

Chapter 1

Summary

1.0 SUMMARY

1.1 INTRODUCTION

The Port of Seattle (the Port), in coordination with the Northwest Seaport Alliance (NWSA), is proposing the Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements project (Terminal 5 Improvements Project) on the West Waterway at Terminal 5. The proposed Project is required to be reviewed for impacts to the built and natural environment under the State Environmental Policy Act (SEPA) for Washington State. SEPA applies to decisions made by state and local agencies, including ports. The Port is lead agency for SEPA environmental review of the proposal and is responsible for conducting the environmental review. The environmental review process helps state and local agencies identify and consider possible environmental impacts that could result from government actions, including permit actions. A product of the environmental review process is the Draft Environmental Impact Statement (DEIS). This chapter provides an overview of the DEIS review, the proposed Project, and conclusions.

1.2 DRAFT ENVIRONMENTAL IMPACT STATEMENT

SEPA requires an Environmental Impact Statement (EIS) for any proposal that is likely to have a significant adverse environmental impact and mitigation has not been able to reduce the impact to a nonsignificant level. The primary purpose of an EIS is to provide an impartial discussion of significant environmental impacts, and reasonable alternatives and mitigation measures that avoid or minimize adverse environmental impacts. The process includes the following activities:

- Gathering background information.
- Developing reasonable alternatives.
- Conducting analysis and review of the alternatives.
- Identifying potential environmental impacts from the alternatives.
- Identifying ways to avoid, reduce, or minimize the effects of significant adverse impacts.
- Conducting public involvement.

The DEIS includes a description of the proposed Project and the Project goals and objectives, Project site information and history, reasonable alternatives for the proposed Project that can meet the applicant's objectives, environmental impacts that may happen as a result of the proposed Project, and ways to avoid or reduce environmental impacts. Required federal, state, and local jurisdiction permits are also identified for the proposed Project. Detailed information on the SEPA EIS process is available on the Washington State Department of Ecology (Ecology) website at <http://www.ecy.wa.gov/programs/sea/sepa>.

The Port as SEPA lead agency for the proposed Project is responsible for conducting the environmental review. Copies of the DEIS have been distributed to agencies, organizations, and individuals noted on the Distribution List. Copies of this document are also available for review at the Seattle Central Library, Delridge Library, South Park Branch Library, and the West Seattle Library. Copies are also available at the Port of Seattle, Maritime Environment and Sustainability Department, Pier 69, 2711 Alaskan Way, Seattle, WA, during business hours of 8:30 AM to 4:00 PM.

Persons interested in receiving a copy of the DEIS should contact Brenda Thomas at 206-728-3382 or by e-mail at: SEPA.p@portseattle.org. Alternatively, the DEIS can be reviewed and downloaded at the Port of Seattle website at: http://www.portseattle.org/Environmental/Environmental-Documents/SEPA-NEPA/Pages/default.aspx

and at the Terminal 5 Improvements Project Online Open House at: www.nwseaportalliance.com/about/strategic-plan/t5.

Comments on the DEIS will be accepted during a 30-day comment period.

1.2.1 HISTORY OF THE TERMINAL 5 SITE

The existing Terminal 5 marine cargo site is approximately 197 acres committed to marine cargo uses and activities and has long been under Port ownership. It is one of four deep-draft container cargo facilities in Elliott Bay. Prior improvements to the existing Terminal 5 cargo terminal were completed in 1999. Cargo facility improvements completed in 1999 included the following: (1) adding approximately 90 acres of upland cargo marshalling area; (2) construction of intermodal[1] cargo transfer rail lines; (3) construction of approximately 400 linear feet of cargo wharf; (4) construction of a grade-separated vehicle/rail overpass entrance; and (5) improvement of approximately 13 acres of public shoreline access, landscaped buffer areas, pedestrian/bicycle pathways, and approximately 1.6 acres of fish and wildlife habitat restoration.

1.2.2 PROJECT PROPONENT

The Port is the Project proponent in coordination with the Northwest Seaport Alliance (NWSA). The NWSA is a management authority governed by the Port of Seattle and the Port of Tacoma as equal members, with each port acting through its elected commissioners. The ports remain separate organizations retaining ownership of their respective assets. The NWSA manages import and export container and break-bulk cargo, auto shipping facilities, and some bulk terminals in the Seattle and Tacoma harbors.

1.2.3 PROPOSED PROJECT

The proposed Project is the rehabilitation of the existing marine cargo facilities at Terminal 5. The Project includes modifications to the existing Terminal 5 marine cargo facility in order to serve larger cargo vessels. The proposed changes consist of cargo wharf rehabilitation, deepening of the vessel berth, electrical service capacity improvements, and upland improvements to serve increased

[1] **Intermodal:** A transfer of cargo from one mode to another. In the shipping business, an "intermodal container" generally refers to one that will be transported from or to a ship by rail. Terminal 5 has an on-dock intermodal rail yard that allows the direct transfer of containers between rail and ship within the terminal. However, it is expected that some containers will be trucked between the marine terminal and the near-dock rail yards operated by the Burlington Northern Santa Fe Railway and Union Pacific Railroad.

capacities. The proposed Project would rehabilitate Terminal 5 to serve existing large and emerging increased capacity container cargo vessels. Proposed actions also include reconfiguration of the existing upland marine cargo marshalling area, modification of intermodal rail facilities and pavement areas, improvement of stormwater systems, alteration of maintenance and repair buildings, and redesign of entrance/exit gates and heavy vehicle access points. Lay berthing, general cargo loading and unloading, and vessel provisioning and fueling would continue at the terminal.

1.2.4 PROJECT LOCATION

Terminal 5 is located on the west shoreline of the West Waterway, in southwest Elliott Bay, approximately 1.5 miles southwest from the City of Seattle urban center. The street address for the site is 2701 26th Avenue SW, Seattle, Washington 98106 (**see Figures 1.3-1 and 1.3-2**).

1.2.5 PROPOSED ALTERNATIVES

This DEIS evaluates the potential environmental impacts of constructing and operating two development alternatives and the No-Action Alternative.

Alternative 1 – No-Action Alternative. The No-Action Alternative would continue marine cargo operations and other allowable uses similar to previous shipping activities during the past 15 years. The existing lay berthing, general cargo loading and unloading, and provisioning and fueling would continue at the terminal for all three alternatives.

Alternative 2 – Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling. Alternative 2 proposes wharf rehabilitation, berth deepening, and upland improvements to allow for the service of larger vessels, and with the potential to increase container cargo shipping capacity to approximately 1.3 million twenty-foot equivalent units (TEUs).

Alternative 3 – Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements. Alternative 3 proposes wharf rehabilitation and berth deepening similar to Alternative 2. The difference between the two alternatives is that Alternative 3 proposes additional upland improvements and provides sufficient site facilities to allow service of larger vessels with the potential to increase container cargo shipping capacity up to approximately 1.7 million TEUs.

1.2.6 AREAS OF CONTROVERSY AND UNCERTAINTY

Determinations for specific future marine cargo operations, methods, and practices that are likely to be employed at Terminal 5 have not been made. However, it is likely that future long-term facility operations will consider serving the Terminal 5 site with larger capacity vessels compared with vessels that commonly served the site in past decades. This DEIS provides analysis and evaluation of environmental effects due to a likely range of long-term operational conditions anticipated from a rehabilitated Terminal 5 facility.

1.2.7 SCHEDULE AND PHASING

The proposed Project would begin as soon as city, state, and federal authorizations and approvals are received. The anticipated start for construction is mid-2017, with completion expected by 2020. Upland/landside construction elements would continue throughout this time period while the proposed in-water wharf improvements would be limited to three consecutive in-water work seasons to protect endangered species.

Upland improvements anticipated in the alternatives may be phased over a longer period of time. If upland improvements are phased, as required for operational needs, specific permit approvals linked with site development activities would be obtained prior to construction.

1.3 SUMMARY OF IMPACTS AND MITIGATION

The Potential Impacts and Mitigation Summary in Table 1.3-1 summarizes the potential impacts that would result from the alternatives analyzed in this DEIS. It also provides a summary of potential measures for avoiding and minimizing anticipated adverse effects for each of the alternatives. This summary table is not intended to be a substitute for the complete discussion of each element that is contained in Chapter 3. The table is intended to summarize how construction and operation of the proposed Project would likely impact each element of the built and natural environments. Impacts and potential mitigation are listed according to resource area.

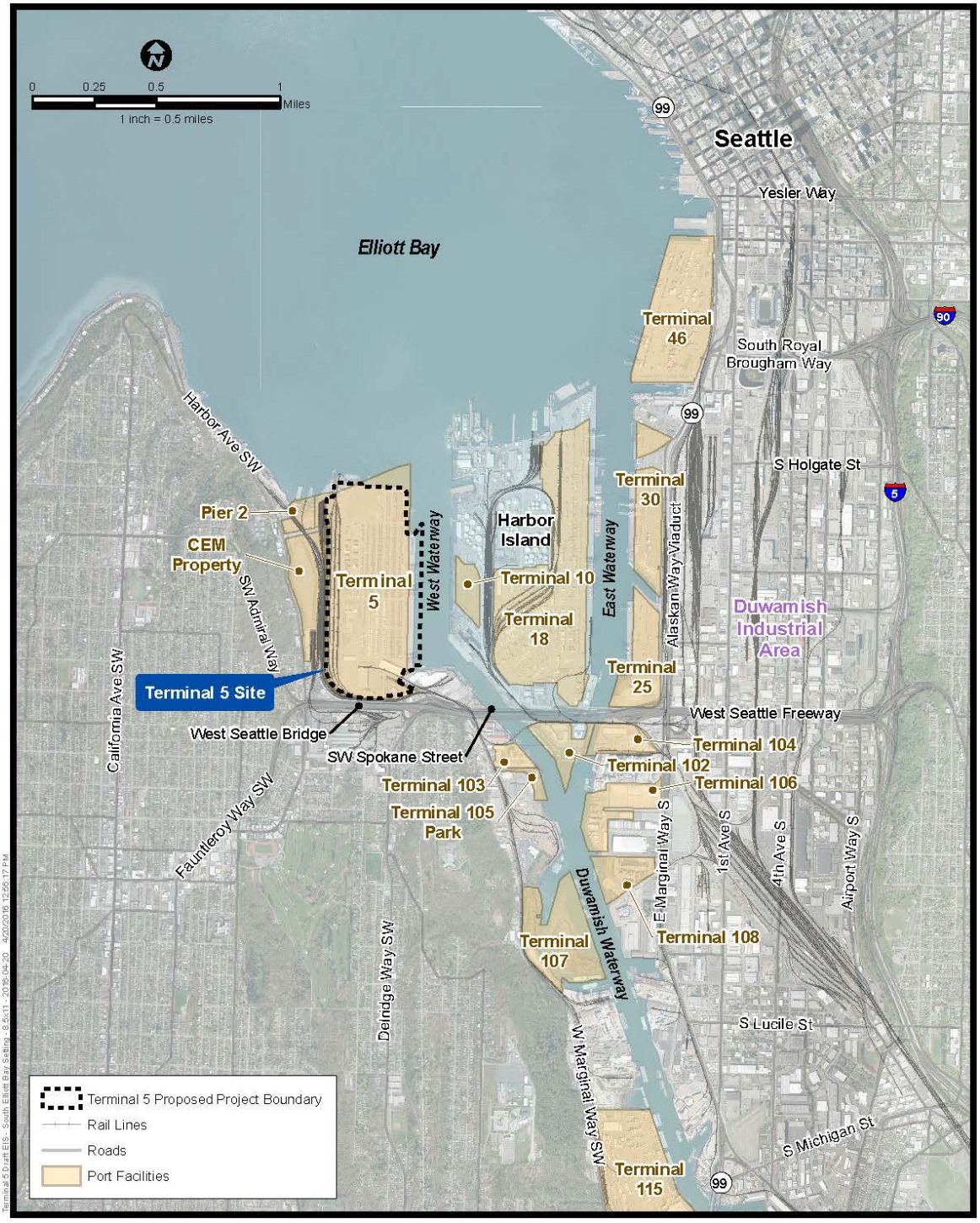

Figure 1.3.1: Vicinity Map

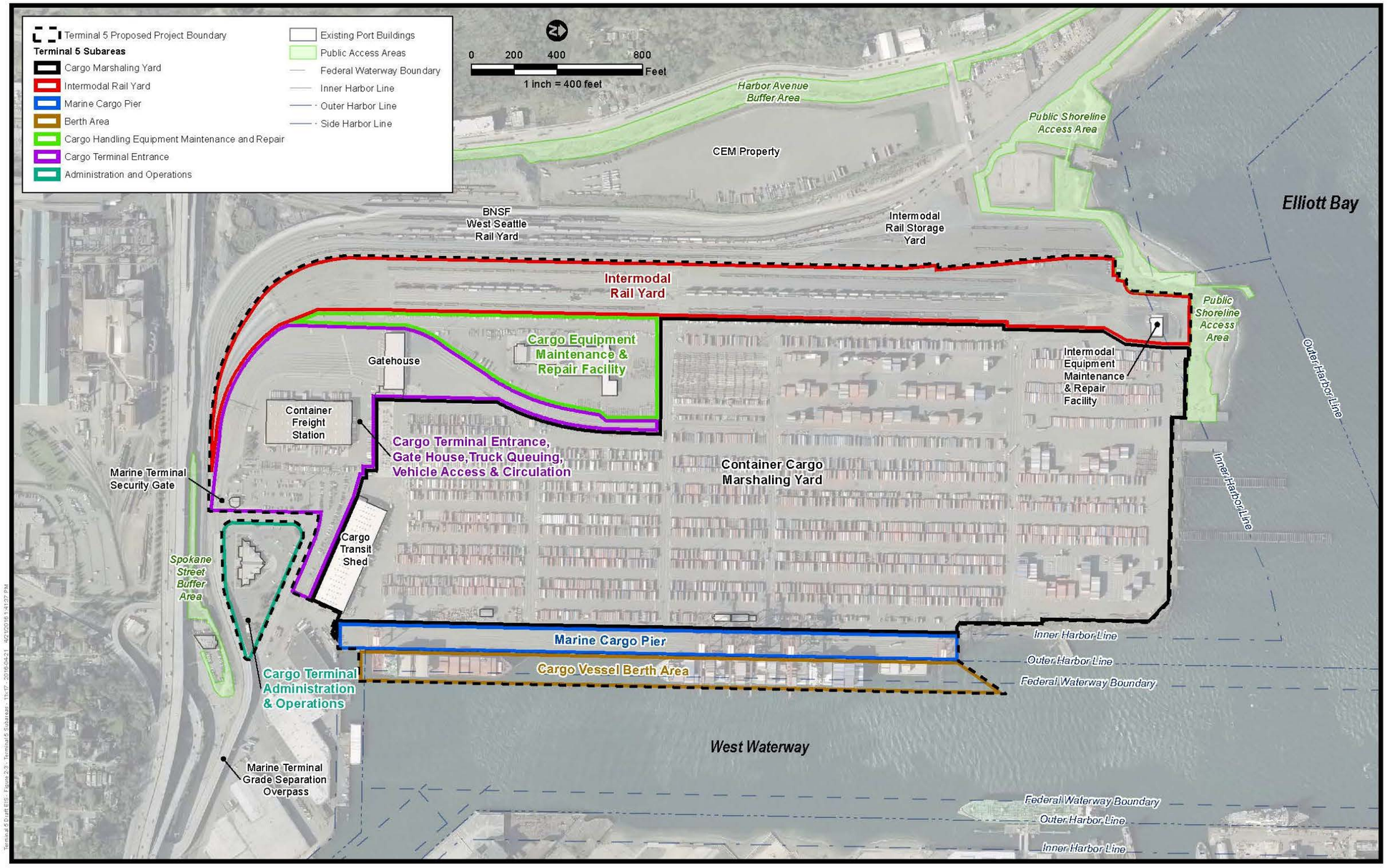

Figure 1.3.2: Terminal 5 Subarea Map

Table 1.3-1: Proposed Project Alternatives – Potential Impacts and Mitigation Summary

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
Earth	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work. No impacts to earth are expected. Operational ▪ Operational activities are not expected to cause impacts to earth.	Construction ▪ Construction BMPs to limit soil erosion. Operational ▪ No mitigation proposed.	Construction ▪ Short-term slope stability issues during berth dredging. ▪ Short-term soil erosion from grading and earthwork activities. ▪ Potential for spills of hazardous substances. ▪ Excavation and fill for new substation may cause potential for erosion ▪ Potential for turbidity during dredge activities in the West Waterway. Operational ▪ Risk of soil liquefaction, seismic lateral spreading, slope failure and ground shaking causing injury/death and structural damage during earthquakes. ▪ Long-term slope stability risk.	Construction ▪ SWPPP and BMPs to control stormwater runoff/erosion at the upland site. ▪ Conditions in construction stormwater permits. ▪ SPCCP used for hazardous materials storage, handling, and cleanup. ▪ BMPs to minimize turbidity generation during dredging. ▪ Compliance with Surface Water Quality Standards for Washington (WAC 173-201A). ▪ Conditions specified in the Water Quality Certification that manage turbidity during in water activities. ▪ Slope stabilization measures would be followed as recommended by geo-tech analysis. Operational ▪ Design measures for all new structures will be consistent with state and federal regulations, seismic and building code, and standard construction methods to avoid and minimize earthquake impacts. ▪ Per established agreements with the City, the rehabilitation of the existing wharf and slope will be designed to meet or exceed performance of the existing system. ▪ For new structures, measures such as foundation tie beams and grade beams to minimize ground movements and/or movements of structures as a result of seismically induced settlement and lateral spreading should be incorporated. ▪ Slope stabilization measures including ground improvements, such as pinch piles, stone columns, drilled shafts, or other methods. ▪ Use of pile-supported structures where necessary for new designs.	Construction ▪ Same as Alternative 2 except more upland ground disturbance. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
Air Quality and GHG Emissions	Construction ▪Construction activities would be limited and include only minor alterations and routine maintenance and repair work and are not expected to result in adverse impacts to air. Operational ▪No change from existing terminal cargo use.	Construction ▪ No mitigation proposed. Operational ▪ No mitigation proposed.	Construction ▪ Construction could cause short-term increases in local concentrations of dust and diesel-related air contaminants and possibly odors. ▪ No significant air quality impacts are expected. ▪ GHG emissions from construction activities were quantified during General Conformity review. GHG emissions were less than 10,000 tonnes/year and, under 25,000 tonnes/year the Department of Ecology considers the emissions not significant. Operational ▪ Model-predicted concentrations of criteria air pollutants, including shore power capability, indicate that emissions do not exceed any National Ambient Air Quality standards (NAAQSs). ▪ No significant impacts are expected with health-protective NAAQSs, air quality standards. ▪ Facility operations would result in emission of GHG's, but no impact thresholds have been established. Given the world-wide nature of climate change issues, and the relatively small contribution from this facility, the project would not result in significant impacts from GHGs. ▪ The Project would reduce world-wide emissions of GHGs due to improved efficiencies in commodity deliveries compared with existing transport systems – and due to improving emission controls in future years.	Construction ▪ Construction activities would comply with local, state, and federal air quality regulations requiring minimization of construction-related emissions. ▪ Implementation of BMPs to reduce potential for air quality impacts during construction. Operational ▪ A number of measures intended to reduce operational emissions, including GHG Emissions, would be implemented. No additional mitigation measures are proposed or warranted. Examples of emission-reducing components: o Reduction of at-berth emissions from ocean-going vessels through the use of shore power. o Use of newer, cleaner trucks required by the Northwest Ports Clean Air Strategy's Clean Truck Program. o Development of a facility with an electrical power supplier that obtains >90% of their power from non-fossil fuel sources. o Implement management systems to help manage truck traffic and spread it throughout the day and evening hours.	Construction ▪ The impacts would be the same as Alternative 2. Operational ▪ The air impacts are the same or lower than Alternative 2.	Construction ▪Same as Alternative 2. Operational ▪Conversion of diesel engine-powered container handling equipment to electrically powered equipment would avoid, minimize and reduce exhaust emissions. Alternative 3 maximizes the approach by electrifying most cargo handling moves. ▪ A number of measures intended to reduce operational emissions, including GHG Emissions, would be implemented. No additional mitigation measures are proposed or warranted. Examples of emission-reducing components: o Reduction of at-berth emissions from ocean-going vessels through the use of shore power. o Use of newer, cleaner trucks required by the Northwest Ports Clean Air Strategy's Clean Truck Program. o Development of a facility with an electrical power supplier that obtains >90% of their power from non-fossil fuel sources. o Implement management systems to help manage truck traffic and spread it throughout the day and evening hours.
Water	Construction ▪Construction activities include only minor alterations and routine maintenance and repair work and are not expected to result in adverse impacts to water. Operational ▪By not removing the creosote-treated timber piles, creosote from those piles remains in the environment.	Construction ▪ Continue to follow regulatory requirements and BMPs. Operational ▪ Continued improvement to water quality as the requirements of the ISGP are implemented.	Construction ▪ Dewatering effluent from excavations extending into groundwater, stormwater runoff during construction activities, vessel activity, and releases of debris or sediments into the West Waterway during dredging and wharf rehabilitation activities. ▪ Removal of asphalt for pile installation on the uplands could lead to hazardous materials spills entering the soil and groundwater. ▪ Temporary increases in turbidity caused by suspended sediments during pile removal and pile driving activities.	Construction ▪ Adherence to the Construction Stormwater General permit and implementing erosion control and stormwater protection BMPs. ▪ Management of toxic and hazardous materials consistent with rules and regulations. ▪ Turbidity impacts from on-land and dredging activity monitored and minimized using BMPs. ▪ Design features and BMPs to avoid or minimize impacts would be used during	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
			▪ Dredging and pile driving could lead to localized impacts on water quality from turbidity. <u>Operational</u> ▪ Potential scour risk up to 4 feet of scour for berthing and unberthing operations for larger vessels. This activity would increase turbidity. ▪ Vessel maneuvering may generate waves that could churn and locally mobilize sediment.	construction. Those required by agency standards and permits would be assumed to be part of the proposal. ▪ If dewatering is required, the control and management would be implemented in accordance with regulatory requirements. ▪ Scour monitoring program would be implemented to observe and track any scour trends. ▪ Vessels would be required to follow all overwater work BMPs. ▪ Disposal of all dredged sediments would be consistent with DMMP and other jurisdictional agencies. <u>Operational</u> ▪ Management of toxic and hazardous substances used during operations would be consistent with rules and regulations. ▪ Continued improvements in stormwater quality to meet ISGP would be implemented. ▪ All operating equipment would be subject to BMPs and SPCC plans. ▪ Fueling, ballast water management, and vessel sewage management would comply with regulatory requirements.		
Plants and Animals	<u>Construction</u> ▪ No change from existing conditions is expected other than minor repair and upgrade work. <u>Operational</u> ▪ No change from existing conditions is expected.	<u>Construction</u> ▪ BMPs for construction implemented for minor repair and upgrade work. <u>Operational</u> ▪ No mitigation proposed.	<u>Construction</u> ▪ Potential impacts on migratory salmon from in-water pile driving noise. ▪ Positive impacts may be decrease in shading, removal of creosote-treated wood fender piles, and increase algae and invertebrate production, as well as reduce migratory impediments to salmon. ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work and are not expected to result in adverse impacts to plants and animals. <u>Operational</u> ▪ Lighting levels could impact plants and animals.	<u>Construction</u> ▪ All in-water work would be limited to periods determined appropriate by participating state and federal agencies. ▪ Water quality monitoring plan would be developed and implemented. ▪ All equipment would be inspected daily. ▪ SPCC plan would be developed and used for the duration of the Project. ▪ Waste materials would not be allowed to enter the West Waterway. <u>Operational</u> ▪ Light fixtures would use directional shields and internal louvers to minimize light reflection onto the waterway.	<u>Construction</u> ▪ Same as Alternative 2. <u>Operational</u> ▪ Same as Alternative 2.	<u>Construction</u> ▪ Same as Alternative 2. <u>Operational</u> ▪ Same as Alternative 2.
Environmental Health	<u>Construction</u> ▪ Construction activities would be limited	<u>Construction</u>	<u>Construction</u> ▪ Potential to encounter, expose, or excavate	<u>Construction</u> ▪ Implement appropriate mitigation	<u>Construction</u>	<u>Construction</u>

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
	and include only minor alterations and routine maintenance and repair work and are not expected to result in adverse impacts to environmental health. Operational ▪ Operational activities are not expected to result in adverse impacts to environmental health.	▪ No mitigation proposed. Operational ▪ No mitigation proposed.	buried contamination during construction. ▪ Potential increase in leaching of contaminants. ▪ Excavations for utilities may require dewatering and affect receiving waters. ▪ Some groundwater monitoring wells may need to be modified or become damaged during construction. ▪ Disposal of materials requires characterization. ▪ Potential release of hazardous materials to the environment. Operational ▪ No impacts expected.	measures if cleanup areas are impacted during construction. ▪ Demolition of structures would require surveys. ▪ Site specific work plans that address management in known contaminated areas. ▪ Construction design would identify locations of known soil and groundwater contamination and provide specifications to guide management of contaminated soil and groundwater. Operational ▪ No mitigation proposed.	▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.	▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.
Noise	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work and noise impacts would be short term. Operational ▪ No change from existing operations.	Construction • No mitigation proposed. Operational • No mitigation proposed.	Construction ▪ Pile driving would cause short-term noise impacts during construction. Operational ▪ Noise model calculations predict potential nighttime noise exceedances from cargo handling equipment and truck operations for future, more intense cargo activity. ▪ Pure tone safety alarms on mobile cargo handling equipment, although not regulated, are an annoyance noise. ▪ Train horn noise required for public and private crossings and presence of human activity, although not regulated, are an annoyance noise. ▪ On-vessel power generators are perceived as annoyance noise.	Construction ▪ Construction would be conducted during daytime hours and would be subject to noise limits established by the City of Seattle. Operational • Establish a Facility Operations Noise Management Plan. Use of a noise management plan would provide a process and a set of tools to identify reasonable and feasible best practices to comply with applicable noise limits. The noise management plan would include measurement, reporting, and compliance steps to meet applicable Seattle City noise limits. This program would be developed with the Seattle Department of Construction & Inspections (DCI). • Annoyance Control Measures: o Ensure that all mobile cargo handling broadband safety alarms. o Addition of safety measures to the rail corridor between the bridge across the Duwamish and the terminal. Adding safety measures to	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
				the corridor, such as chain link fence and installation of crossing gates and wayside horns at suitable at-grade crossings in all four quadrants of each driveway, would substantially improve the safe operation of trains. As a result, the need to sound audible alarms should be reduced. These measures could also be used as a basis to begin the process of requesting the corridor be converted into a railroad quiet zone. o Reduction in noise from on-vessel power generators due to the provision of shorepower for moored vessels.		
Land Use	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work and would not alter surrounding land uses or otherwise affect land use patterns. Operational ▪ No change to land use is proposed.	Construction ▪ No mitigation proposed. Operational ▪ No mitigation proposed.	Construction ▪ Construction activities would be temporary and would not alter surrounding land uses or otherwise affect land use patterns. ▪ Appropriate shoreline, land use and building permits are required. Operational ▪ Operational activities would not alter surrounding land uses or otherwise affect land use patterns. ▪ The Port may need to obtain aquatic area use authorization or PMA boundary amendments.	Construction ▪ The Port would obtain all required permits. Operational ▪ The Port would work with DNR to obtain any necessary aquatic area use authorization or PMA boundary amendments required.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.
Relationship to Plans and Policies	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work and would be consistent with Plans and Policies. ▪ Century Agenda goals would not be met. Operational ▪ No impacts expected.	Construction ▪ No mitigation proposed. Operational ▪ No mitigation proposed.	Construction ▪ All proposed construction is consistent with Plans and Policies. Operational ▪ All proposed operations are consistent with Plans and Policies. ▪ Proposed Project addresses some of the goals in the Century Agenda.	Construction ▪ No mitigation proposed. Operational ▪ No mitigation proposed.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.
Aesthetics/ Light and Glare	Construction ▪ Construction activities would be limited and include only minor alterations and	Construction ▪ No mitigation proposed.	Construction ▪ Construction of the proposed Project would introduce new temporary sources of light	Construction ▪ Lighting associated with exterior construction activities would be	Construction ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2.

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
	routine maintenance and repair work. Operational ▪ Operational activities are not expected to result in changes to the terminal aesthetics or light and glare.	Operational ▪ No mitigation proposed.	associated with utility and wharf construction, trucks, and other construction equipment. Operational ▪ The proposed Project would result in improved lighting features. ▪ The aesthetics are not expected to change significantly as a result of Alternative 2. ▪ Current views of Terminal 5 are dominated by industrial facilities, operations, and activities. Views from public viewpoints are not expected to be impacted by Alternative 2.	controlled by City of Seattle regulations, potentially limiting the hours of construction, and thereby limiting construction lighting during nighttime hours. No other measures are expected to be required during construction. Operational ▪ New lighting would be designed with the latest lighting standards to minimize glare and confine the lighting using directional lighting and shields. It is expected that new operational lighting would provide the same level of lighting existing.	Operational ▪ Same as Alternative 2.	Operational ▪ Same as Alternative 2.
Historic and Cultural Resources	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work. These activities would be consistent with current operations at Terminal 5. Operational ▪ Terminal 5 is within the tribal treaty fishing area. Vessel activity to and from Terminal 5 may, at times, move through these fishing areas.	Construction ▪ No mitigation proposed. Operational ▪ The Port works in partnership with the Muckleshoot Indian Tribe and the Suquamish Indian Tribe to inform treaty fishermen of vessel activity in the vicinity of Terminal 5 during fishing periods. Information detailing vessel activity would be provided as a means of avoiding potential fishing use and vessel operation conflicts and to ensure continuing mutual access to this area of the West Waterway.	Construction ▪ Construction has the potential to interfere with undiscovered resources; however, the possibility of historic or cultural resources being present is low because Terminal 5 consists of filled upland areas. ▪ Construction equipment used for dredging activities could potentially impede on fishing locations. Operational ▪ Terminal 5 is within the tribal treaty fishing area. Vessel activity to and from Terminal 5 may, at times, move through these fishing areas.	Construction ▪ Construction would follow the SMC for Standards for Archaeological and Historic Resources. If archaeological resources are uncovered during construction, work would be stopped and the City of Seattle, affected tribes, and the Washington State Department of Archaeology and Historic Preservation would be notified. ▪ Dredging activities would be coordinated with fishing periods to minimize potential disruption of fishing locations. Operational ▪ The Port works in partnership with the Muckleshoot Indian Tribe and the Suquamish Indian Tribe to inform treaty fishermen of vessel activity in the vicinity of Terminal 5 during fishing periods. Information detailing vessel activity would be provided as a means of avoiding potential fishing use and vessel operation conflicts and to ensure continuing mutual access to this area of the West Waterway.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.
Transportation	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work. These activities would be consistent with	Construction ▪ No mitigation proposed. Operational	Construction ▪ Potential detours required during construction.	Construction ▪ BMPs for traffic control and safety during construction and adherence to SDOT permits and requirements. Coordination	Construction ▪ Same as Alternative 2. Operational	Construction ▪ Same as Alternative 2. Operational

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
	current operations at Terminal 5. Operational ▪ No impacts to traffic would be caused by the No-Action Alternative.	▪ No mitigation proposed.	Operational ▪ Some additional utilization of storage tracks in the West Seattle Yard (WSY) to support the increased rail volume. ▪ Trains could increase from 9 to 18 trains in the peak week. ▪ Increased rail volumes moving to and from Terminal 5 would result in additional closure times of near-terminal driveways and at-grade crossings. ▪ Arriving and departing trains would have additional impacts on near-terminal crossings. ▪ The arrival-departure of full 7,200-foot trains would impact all five of the crossings west of the West Waterway. ▪ The switching movements to break down or build a train would add further delay at these crossings. ▪ Traffic generated by the Terminal 5 improvements is projected to add up to about 20 seconds of average of delay per vehicle. ▪ Gate queuing would be impacted.	with other construction projects. Operational ▪ North leg of the intersection at SW Spokane Street/West Marginal Way SW/Chelan Avenue SW closed to all vehicular traffic except emergency vehicles and out of gauge cargo. All traffic to and from Terminal 5 as well as local businesses at Terminal 7A, 7B, and 7C, should be directed to use the Terminal 4 Access Bridge which has capacity to accommodate this diverted traffic. ▪ Comprehensive signal improvement project be implemented as part of the Terminal 5 Improvements Project that would reprogram signals along SW Spokane Street from Harbor Avenue SW to E Marginal Way S, and include the signal at E Marginal Way S/S Hanford Street. This project should include upgrading the signal controller at the five-legged intersection and improving interconnection equipment, if needed. ▪ Signal upgraded on SW Spokane Street Corridor. ▪ Gate design and operations improvement measures. ▪ On-dock intermodal rail improvements. Increase use of storage tracks in the WSY.	▪ Same as Alternative 2 except for increased capacity of the yard. ▪ Trains could increase from 9 to 24 trains in the peak week.	▪ Same as Alternative 2 except for changes in rail improvements to add on terminal air system and locate qualified technicians on terminal to perform brake tests for staged cuts of cars. ▪ Some train building operations would have to be transferred to the WSY, and on-terminal air compressor equipment would be added so that the brakes on a fully-built train could be tested prior to connecting to the locomotive.
Public Services	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work. Operational	Construction ▪ No mitigation proposed. Operational ▪ No mitigation proposed.	Construction ▪ There could be an increase in service calls related to short-term traffic revisions, site security, and site construction, including potential construction-related injuries and accidental fires.	Construction ▪ On-site security features, such as fencing and securing areas where equipment is stored, could be implemented to reduce the potential for construction-related incidents.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.

RESOURCES	PROPOSED PROJECT ALTERNATIVES – POTENTIAL IMPACTS AND MITIGATION SUMMARY					
	Alternative 1 No-Action		Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling		Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements	
	Potential Impacts	Mitigation	Potential Impacts	Mitigation	Potential Impacts	Mitigation
	▪ Operational activities are not expected to result in adverse impacts.		Operational ▪ Additional security services may be needed due to increase in container terminal traffic.	Operational ▪ POSPD would coordinate with US Coast Guard on security plans. ▪ Existing utility systems would be installed and improved, as needed.		
Utilities	Construction ▪ Construction activities would be limited and include only minor alterations and routine maintenance and repair work. Operational ▪ ISGP would require meeting benchmarks.	Construction ▪ No mitigation is proposed. Operational ▪ Stormwater adaptive management may be required if ISGP benchmarks not met.	Construction ▪ Utility upgrades would be constructed or installed to meet anticipated site demand and to comply with all applicable local, state, and federal code requirements. Implementation of any improvements would be coordinated with, and approved by, the applicable utility provider. ▪ Lighting associated with exterior construction activities would be controlled by City of Seattle regulations, potentially limiting the hours of construction, and thereby limiting construction lighting during nighttime hours. ▪ Upgrade to the existing electrical power supply to Terminal 5 by SCL. ▪ Water and sewer distribution system would be removed and replaced. Operational ▪ No impacts.	Construction ▪ Stormwater improvements would meet state and City of Seattle stormwater regulations. ▪ Mitigation measures for utility construction impacts would include those described for general construction activities on the terminal site (See Chapter 2, Section 2.2.2). Construction impacts required for utility. Operational ▪ Proposed lighting levels would conform to all applicable federal, state, and local standards. Mitigation to minimize light and glare impacts is described in Section 3.9 . ▪ Compliance with the Clean Water Act through compliance with Industrial Stormwater General Permit and City Stormwater code provides the regulatory-based mitigation standards for potential operational impacts to stormwater. See Section 3.3 and Volume II, Appendix D for detailed information.	Construction ▪ Additional upgrades to the existing power supply to the terminal would be required to accommodate electrification of the new equipment and systems. ▪ Removal of most of high mast lighting in the container yard and only new lighting in the truck circulation areas and near the wharf. ▪ New conduit duct bank system. ▪ Water and sewer distribution system would be removed and replaced. ▪ Relocated buildings. ▪ May need more aggressive BMPs for stormwater. Operational ▪ Same as Alternative 2.	Construction ▪ Same as Alternative 2. Operational ▪ Same as Alternative 2.

Chapter 2

Description of Proposed Action(s) and Alternatives

2.0 DESCRIPTION OF PROPOSED ACTION(S) AND ALTERNATIVES

2.1 INTRODUCTION

The Port of Seattle (Port), in coordination with the Northwest Seaport Alliance (NWSA), is proposing the Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements project (Terminal 5 Improvements Project) on the West Waterway at the existing Terminal 5 facility. The Project site is located on the West Waterway in Seattle as shown on Figure 1.3.1.

The proposed Project includes modifications to the existing Terminal 5 marine cargo facility in order to serve larger cargo vessels, with proposed site changes principally consisting of cargo wharf rehabilitation, deepening of berth navigational access, electrical service capacity improvements, and upland improvements.

This chapter provides background information about the Project, states the goals and objectives for the proposed Project and describes the alternatives. The alternatives include a No-Action alternative and two development alternatives.

2.1.1 ENVIRONMENTAL REVIEW BACKGROUND

The proposed Project is subject to environmental review under SEPA and the Port is lead agency. The Port previously issued a Determination of Nonsignificance (DNS) for the Terminal 5 Wharf Rehabilitation and Berth Deepening Project on March 2, 2015. Specific information characterizing potential Terminal 5 marine cargo operations, including site cargo handling equipment and cargo capacity, was not available when the March 2015 DNS was distributed. The Port received 52 comments from the public during the public comment period for the March 2, 2015, SEPA DNS. Many of the comments were concerned with potential air, noise, and traffic effects. In addition, some commenters requested that the Port prepare an EIS for the proposed Project.

The information provided in the SEPA DNS and checklist, published on March 2, 2015, listed potential environmental effects associated with cargo operations at Terminal 5, including increased capacity vessels and changes in cargo operations and cargo handling and crane equipment expected at the terminal following wharf rehabilitation. The DNS was the first step in a SEPA "phased review" process proscribed by SEPA guidelines, WAC 197-11-0559(2)(A)(i) and 197-11-060(5)(e). A phased SEPA review process was used because future Terminal 5 operations would be shaped by shipping industry scale and efficiency requirements, which were unclear with respect to marine cargo facilities in Elliott Bay when the DNS was prepared. Phased review, as identified in the DNS, provided a framework for evaluation of future Terminal 5 operations and anticipated the likely environmental effects due to potential operational changes at the site, including larger, increased capacity vessels and alternative cargo handling operations.

The Port noted in the previous SEPA DNS that additional environmental review would be conducted when marine cargo operation information and data were available for analysis and evaluation. Subsequent to the issuance of the SEPA DNS for the Cargo Wharf Rehabilitation and Berth Deepening Project, the Port received additional information describing potential marine cargo site

use and obtained operational information available for analysis, indicating the potential for substantial changes in Terminal 5 cargo operations, compared to cargo operations and volumes anticipated and evaluated in the DNS.

As a result of the new information characterizing potential changes in cargo operations and volume, the Port withdrew the March 2015 Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening Project SEPA DNS and issued a new threshold determination of a Determination of Significance (DS) for the Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements Project (Terminal 5 Improvements Project) on October 22, 2015, and started the analysis necessary for an Environmental Impact Statement.

2.1.2 CURRENT ENVIRONMENTAL REVIEW

A public scoping meeting on the environmental impacts and other issues to be addressed in the Draft Environmental Impact Statement (DEIS) for the Terminal 5 Improvements Project was held on November 12, 2015, at the Hall at Fauntleroy, 9131 California Avenue Southwest, Seattle. The SEPA scoping comment period began on October 22, 2015, and ended on November 23, 2015. Forty-eight members of the public attended the meeting. Three written comments were received and seventeen speakers provided comment at the scoping meeting. Seventy-nine comments were received via email or via the online open house website. A total of ninety-six comments were received during the scoping process.

This document is a SEPA DEIS intended to meet the environmental needs of the Port and other state and local agencies with jurisdiction over the proposed Project. The Port prepared this EIS as required by SEPA Chapter 43.21C RCW. The following environmental elements are analyzed in this EIS: Earth, Air Quality, Water Resources, Plants and Animals, Environmental Health, Noise, Land Use, Relationship to Plans and Policies, Aesthetics/Light and Glare, Historic and Cultural Resources, Transportation, Public Services, and Utilities.

Per WAC 197-11-635, this EIS builds upon and incorporates by reference the following environmental documents: Port of Seattle, Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening Project SEPA Checklist issued March 2, 2015; the Draft Southwest Harbor Cleanup and Redevelopment Project Draft EIS issued January 1994; Southwest Harbor Cleanup and Redevelopment Project Final EIS issued November 1994; Southwest Harbor Cleanup and Redevelopment Addendums Numbers 1 through 4 issued in June 1995, April 1996, September 1996, and May 1998; and Terminal 5 Maintenance Dredging Program DNS issued January 2010.

2.2 PROJECT BACKGROUND

2.2.1 INTERNATIONAL MARINE CARGO FACILITY TRENDS

Terminal 5 redevelopment in the late 1990s was necessary in order to serve rapidly expanding trans-Pacific container cargo trade and substantially increased cargo volumes requiring transshipment locations at port facilities in California and Washington. Changes in the container cargo shipping

industry occurred subsequent to substantial redevelopment of the Terminal 5 marine cargo facility completed in 1999.

Increased capacity vessels that benefit from economy of scale to increase efficiency and reduce operating costs are currently being deployed in trade routes between Asia and the West Coast. Vessels with 10,000- to 14,000-twenty-foot-equivalent-unit (TEU) capacities are now in common service at West Coast cargo terminals. Vessels of 18,000-TEU capacity, new "Super post-Panamax" vessels[2], are in the early stages of West Coast deployment. Panamax-class ships are limited by the size of the original Panama Canal, and are capable of carrying 4,500 TEUs. The existing berth and cranes at Terminal 5 can accommodate Panamax-class vessels as well as post-Panamax vessels up to approximately 7,000 to 8,000 TEUs. Super post-Panamax vessels are capable of carrying 10,000 to 18,000 TEUs.

Terminal 5 currently is approved for cargo terminal and commercial moorage. This may include the lay berthing of vessels and seasonal berthing of vessels. Fueling, provisioning, and on board maintenance and repair of active, stored, and lay-berthed vessels may also take place.

Changes are now required at marine cargo facilities to prepare them to serve large existing and anticipated larger cargo capacity vessels. In the period prior to 2013, Terminal 5 cargo pier and container cranes served Panamax container cargo vessels and post-Panamax vessels, up to 6,000 to 8,000 TEU capacities. However, the Terminal 5 facility was limited in capability to accommodate these large vessels and emerging service from larger capacity vessels. As a result of the rapidly expanding size of vessels on the trans-Pacific trade route, some of the Terminal 5 cargo operations were relocated to other recently improved and more capable port cargo facilities in southeast Elliott Bay.

2.2.2 PROJECT PROPONENT

The Port, in coordination with the Northwest Seaport Alliance (NWSA) is the Project proponent. The recently established NWSA is a marine cargo operating partnership between the Port of Seattle and Port of Tacoma, combining marine cargo facilities in Elliott Bay and Commencement Bay, providing for optimal and coordinated use of marine cargo operations infrastructure. The NWSA was established in August 2015, following public review of proposed integrated management of marine cargo assets, approval of combined management by each of the port commissions, and authorization of the partnership by the Federal Maritime Commission.

2.2.3 PROJECT GOALS AND OBJECTIVES

The goal of the Project is to rehabilitate Terminal 5 as a long-term, modern, flexible, well-equipped, multimodal cargo terminal. The Terminal 5 facility requires modification in order to adequately

[2] Vessels too large to pass through the enlarged Panama Canal.

serve larger vessels, including increased berth depth, updated cargo crane equipment sufficient to reach up and over the larger vessels, and sufficient electrical power supply necessary to operate the new cargo handling equipment.

The objectives of the proposed Terminal 5 rehabilitation actions include the following:

- Rehabilitate and modernize the existing wharf areas facilities and establish berths of sufficient width, length, and depth to allow access to the docks by existing and future cargo vessels of up to 18,000 TEUs that are anticipated to call at the terminal.
- Strengthen the wharf structure to physically support new-generation cranes that are able to reach across new, larger vessels.
- Provide sufficient electrical and other utilities to accommodate current and future needs for terminal operations.
- Provide for efficient terminal traffic flow to accommodate projected daily peak increases in cargo movement into and out of the terminal resulting from handling of larger ships.
- Update cargo marshalling area for potential increasing cargo volumes over time.
- Avoid and minimize potential adverse environmental effects during construction and long-term cargo operations.
- Meet NWSA's strategic use and asset management plans and policies.
- Complete the Project in a timely manner within the financial goals set for the Project.
- Allow for interim and existing uses at Terminal 5 during construction and provide flexible facilities to manage multiple cargo types if required.

2.2.4 PROPOSED PROJECT

The proposed Project includes modifications to the existing Terminal 5 marine cargo facility in order to serve larger cargo vessels. The proposed changes consist of cargo wharf rehabilitation, deepening of the vessel berth, electrical service capacity improvements, and upland improvements to serve increased capacities. The proposed Project would rehabilitate Terminal 5 to serve existing large and emerging increased capacity container cargo vessels. Proposed actions also include reconfiguration of the existing upland marine cargo marshalling area, modification of intermodal rail facilities and pavement areas, improvement of stormwater systems, alteration of maintenance and repair buildings, and redesign of entrance/exit gates and heavy vehicle access points. Lay berthing, general cargo loading and unloading, and vessel provisioning and fueling would continue at the terminal.

The proposed Project would begin as soon as city, state, and federal authorizations and approvals are received. The anticipated commencement for construction is mid-2017, with completion expected by 2020. Upland/landside construction elements would continue throughout this time period while the proposed in-water wharf improvements would be limited to three consecutive in-water work seasons to protect endangered species.

Upland improvements anticipated in the alternatives may be phased over a longer period of time. If upland improvements are phased, as required for operational needs, specific permit approvals linked with site development activities would be obtained prior to construction.

This DEIS includes a range of structural improvements and operational practices and methods based on container cargo facilities in place throughout the shipping industry and prepared by professional marine planners. They are designed to implement the goals and objectives of the Project and the range should adequately provide analysis and evaluation of potential environmental impacts from the alternatives considered for Terminal 5.

The physical improvements and associated anticipated marine cargo operations analyzed in the alternatives in this DEIS include use of the existing Terminal 5 facility with no improvements, and with increases in cargo shipping capacity over time, extending to expected full capacity use of the site. For the purpose of analysis and evaluation, increased shipping capacity is assumed to start in 2020 through 2030, and to gradually increase through 2040.

The ten year interval Terminal 5 container cargo capacity volumes used for the DEIS environmental analyses were derived from west coast and northwest container cargo forecasts. Terminal 5 rehabilitation project alternatives match the proposed cargo terminal improvements and operations with the volume of anticipated northwest container cargo.

For the purpose of environmental analysis and evaluation, the Terminal 5 container shipping capacity "baseline" is approximately 647,000 TEUs. This is the capacity of the Terminal 5 facility following completion of the redevelopment of Terminal 5 in 1999. It is also the cargo capacity identified in Alternative 1, the No-Action alternative.

Based on a compounded container cargo growth rate between four and five percent for Pacific northwest ports, Terminal 5 could be serving up to approximately 1.3 million TEUs by 2030. This is because the additional cargo capacity could be accommodated by the cargo wharf rehabilitation, berth deepening, and addition of large cranes and more efficient cargo handling equipment. The TEU capacity of approximately 1.3 million is an important threshold, because substantial improvements would be necessary when the capacity is exceeded, particularly because of the need to increase intermodal rail yard to handle that capacity. This is the basis of environmental analysis for Alternative 2.

Terminal 5 container shipping capacity could reach approximately 1.7 million TEUs by 2040 if the same cargo trajectory is used. The cargo marshalling area would need to be redesigned, deployment of more efficient cargo handling equipment would be needed, and intermodal yard improvements would be required to handle the additional capacity. These actions are evaluated in Alternative 3.

The actual container cargo throughput volumes associated with proposed Project alternatives would be variable and may not follow a linear progression of increases or may be lower than projected volumes, due to trade and market conditions.

2.3 ALTERNATIVES

This document evaluates a reasonable range of alternatives for the proposed Project. For purposes of environmental review, three EIS alternatives were reviewed. Alternatives that are analyzed in this DEIS include:

- Alternative 1 – No-Action Alternative
- Alternative 2 – Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling
- Alternative 3 – Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements.

Table 2.3-1 provides a summary of container cargo facility operational plans and cargo handling equipment requirements prepared by marine cargo facility planners and design engineers for the purpose of analyzing and evaluating environmental effects resulting from future increases in container cargo volume transshipped at Terminal 5. The planning horizon years begin in 2020 and continue through planning horizon years of 2030 and 2040.

Table 2.3-1: Operational Assumptions for Each DEIS Alternative

Alternative	**Alternative 1**			**Alternative 2**			**Alternative 3**		
Planning Year	**2020**	**2030**	**2040**	**2020**	**2030**	**2040**	**2020**	**2030**	**2040**
Annual Throughput	647K	647K	647K	647K	1.27M (1.3M)	1.27M (1.3M)	647K	1.27M (1.3M)	1.7M
Vessel Traffic									
Vessel traffic per week	6	6	6	2	4	4	2	3	4
Vessels/year	312	312	312	104	208	208	104	156	208
Rail									
Trains weekly	9	9	9	9	18	18	9	18	24
Yard Storage									
TEU/Gross Acre	3,555	3,555	3,555	3,555	6,771	6,771	3,243	6,366	8,549
Gate									
Truck trips average day (one way)	1,770	1,770	1,770	1,770	2,450	2,450	1,770	2,450	3,320
Design Day Truck Trips per day (one way)	2,480	2,480	2,480	2,480	3,560	3,560	2,480	3,560	4,660
Cargo Handling Equipment									
STS cranes	6	6	6	8	8	8	8	10	12
Yard Tractors	67	67	67	71	92	92	13	13	18
Top-Picks	23	23	23	26	36	36			
RTG cranes	3	3	3	3	13	13			
Transporters							32	40	48
Waterside RMG cranes							18	22	26
Landside RMG cranes							16	19	26
Intermodal Rail Yard RMG cranes							4	4	6

Note:
Terminal operation and equipment calculation Information from Moffat & Nichol 2/2016
Truck trip information, Heffron 2016
K = thousand
M = million
RMG = rail-mounted gantry
RTG = rubber-tired gantry
STS – ship-to-shore
TEU = twenty-foot equivalent unit

2.3.1 NO-ACTION ALTERNATIVE

The existing Terminal 5 marine cargo facility is the result of substantial expansion and improvements completed in 1999. The construction and operation of the present facility was preceded by detailed environmental analyses and evaluations, including a combined federal, state, and local government EIS, Southwest Harbor Cleanup and Redevelopment Project, and subsequent authorizations received from federal, state, and local regulators and government entities, including substantial shoreline development approval from the City of Seattle. [3]

Cargo facility improvements completed in 1999 included the following: (1) adding approximately 90 acres of upland cargo marshalling area; (2) construction of intermodal cargo transfer rail lines; (3) construction of approximately 400 linear feet of cargo wharf; (4) construction of a grade-separated vehicle/rail overpass entrance; and (5) improvement of approximately 13 acres of public shoreline access, landscaped buffer areas, pedestrian/bicycle pathways, and approximately 1.6 acres of fish and wildlife habitat restoration.

[4]The No-Action Alternative proposes that no physical improvements would be made to the existing 197-acre site other than minor alterations and routine maintenance and repair work (including stormwater upgrades), none of which would increase container cargo capacity. Figure 2.6-1 shows the proposed conceptual construction elements of the No-Action Alternative.

The Terminal 5 shoreline and upland area would continue operating as a marine cargo transportation facility with vessel moorage, commercial moorage, cargo wharf, cargo marshalling, and truck and rail cargo operations taking place at the site. Figure 2.6-4 shows the conceptual operational elements of the No-Action Alternative. The terminal would continue to be capable of accommodating diverse marine cargo uses such as breakbulk or neo-bulk (goods that are loaded individually, and not in containers) and other water-dependent uses and activities intrinsic to marine transportation facilities. Marine cargo operations would be similar to Terminal 5 uses and activities during the past 15 years, making use of existing infrastructure designed and constructed to transship approximately 647,000 TEUs per year.

The No-Action Alternative would foreclose large post-Panamax vessels (vessels with TEU cargo capacities greater than approximately 8,000 TEUs) from using the site since they could not be accommodated by the existing wharf or cranes.

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[3] City of Seattle permits (Master Use Permit files 9404118 and 9404124).

[4] Before discussing this alternative, an explanation of “action” and “no-action” is in order, because “action” as defined in SEPA Rules (WAC 197-11-704) is not necessarily identical to “action” as used in ordinary language. Here it refers specifically to the Port’s decision on a particular project (namely, consideration of approval for proposed redevelopment of the subject properties). Therefore, “no-action” does not mean that the project site would remain unchanged indefinitely, but that the specific SEPA action that is the subject of this environmental document would not occur. SEPA’s inclusion of the No-Action Alternative provides a baseline case against which potential impacts of the proposal can be compared.

Under the No-Action Alternative, environmental conditions resulting from Terminal 5 marine cargo operations would not change significantly. Only minor modifications, including routine maintenance and repair work, would be conducted as necessary. The site would continue to meet existing regulatory requirements and best management practices. Stormwater improvements as required under the Industrial Stormwater General Permit would be implemented after evaluation and approval by the Washington State Department of Ecology (Ecology).

2.3.2 ALTERNATIVE 2 CARGO WHARF REHABILITATION, BERTH DEEPENING, AND INCREASED CARGO HANDLING

Alternative 2 proposes rehabilitation of the existing marine cargo facilities, including cargo wharf rehabilitation, berth deepening, water/stormwater utility retrofits, and electrical utility capacity improvements defined in the Project proposal. The cargo marshalling yard area upland of the rehabilitated cargo wharf would be redesigned and reorganized to provide economies in cargo operations and on-site cargo flow and movement. Changes to existing Terminal 5 facilities would accommodate increased annual container cargo shipping capability at the site to approximately 1.3 million TEUs. Figure 2.6-2 shows the proposed conceptual construction elements of Alternative 2.

2.3.3 PROPOSED ALTERNATIVE 2 CONSTRUCTION

2.3.3.1 DEMOLITION/DECONSTRUCTION

The waterward surface margin, approximately 20 feet of the existing approximately 110-foot-wide, aged and deteriorating cargo wharf structure would be removed, exposing the below-grade concrete beam grid-frame of the wharf and supporting concrete support piling. Approximately 87,000 square feet of existing asphalt wharf pavement and 59,000 square feet of existing horizontal concrete cargo wharf deck panels would be removed, with appropriate protection to prevent material from entering the marine environment. All piling cap beam repair and maintenance activities would take place in above-water portions of the underside of the existing wharf structure, with no in-water actions included. Table 3.4-1 in Section 3.4 of this DEIS provides a summary of in-water and over-water structures to be removed and added. The table includes the number of existing piles to be removed from the Project area subtidal zone by a barge or deck mounted crane. Other existing piles would be removed by extraction and additional structural piles would be cut off and removed.

Timber and concrete piles would be extracted from the substrate using a vibratory pile driver and crane hoist. Extracted piles would be stockpiled in an area with drainage control to prevent release of sediment-laden water to adjacent surface waters. If a pile breaks above the mudline during extraction, a chain would be used, if practical, to attempt to remove the broken pile. If unsuccessful, the pile would be cut off at the mudline. Most concrete structural piles would be cut off at the mudline with the above-water section hoisted out of the water by crane. The concrete piles remaining below the mudline would act as slope structural reinforcement instead of installing new pinch piles. The existing creosote- and ACZA-treated timber pile and steel pile wharf fender system would be removed and replaced with an above-water fender panel system.

2.3.3.2 REPLACEMENT OF CRANE RAIL BEAMS

Two stronger crane rail beams would replace existing crane rail beams at the Terminal 5 wharf, including a replacement waterside crane rail beam, supported by 24-inch octagonal structural concrete piling, installed within the footprint perimeter of the existing cargo wharf. A second replacement crane rail beam would be installed landward of the existing wharf. The landside crane rail beam is located in existing upland area and includes no in-water construction. Replacement of the waterside crane rail beam includes installation of approximately 420, 24-inch octagonal pre-stressed concrete octagonal piling, driven into the subtidal aquatic area (–35 to 40 feet mean lower low water [MLLW]) beneath the existing Terminal 5 wharf. Concrete piling would be driven with an impact pile driver conducted from a barge or landside crane. The new piling would support the new waterside, cast-in-place, concrete crane rail beam, connecting the upper portions of the 24-inch octagonal concrete support piling. Replacement of the landside crane rail beam would include installation of approximately 420, 30-inch-diameter steel pipe piles, driven with a land-based impact pile driver, providing a foundation for installation of a sufficiently strong, cast-in-place, concrete upland crane rail beam.

2.3.3.3 SLOPE STABILIZATION MEASURES

The existing slope beneath the Terminal 5 wharf includes a grade of approximately 1 vertical to 1.5 - 1.75 horizontal grade (1V:1.5H to 1V:1.75H). Geotechnical investigations have determined that the lower portions of the slope beneath the existing Terminal 5 wharf, constructed three to four decades ago, require structural stabilization measures coincident with strengthening the cargo wharf and deepening the adjacent vessel berths. Planned slope stabilization techniques would consist of installation of up to approximately 3,000, 10- to 14-inch-diameter, approximately 60-foot-long, untreated timber piling, penetrating the existing riprap slope, underlying select fill material, and entering native sediment layers. The timber piling would be installed using impact and vibratory pile driving devices, with the finished piling installation matching the existing riprap slope gradient. In addition, a short “toe-wall” would be installed at the transition between the constructed riprap slope beneath the existing cargo wharf and the adjacent container vessel berth area to stabilize the bottom margin of the riprap armored slope. Approximately 3,100 linear feet of combined steel sheet piling and “HZ” steel piling would be installed at the toe-of-slope. The top elevation of the new “toe-wall” would vary between –42 and –50 feet MLLW. The toe-wall steel sheet and HZ piling would be installed using a vibratory pile driving device. Limited impact pile driving may be required to complete portions of toe-wall piling installation, if soil conditions impede vibratory pile driving installation.

2.3.3.4 REPLACEMENT CONCRETE DECK STRUCTURE

Existing concrete wharf deck panels, pile caps and edge of wharf structures, removed to allow for replacement of the waterward crane rail beam, would be replaced with new concrete panels within the existing wharf footprint. Approximately 20,000 cubic yards of concrete would be placed in field constructed forms in order to replace the deck.

2.3.3.5 REPAIR AND REPLACEMENT OF EXISTING CONCRETE PILING CAPS BEAMS

The existing wharf includes piling cap beams oriented east-west, between the wharf crane rail beams, connecting the above water portions of structural piling, forming a grid to support the wharf deck panel surface would be repaired. Due to the age of the wharf, numerous sections of the cast-in-place piling cap beams have deteriorated and corroded. The proposed Project includes repair and maintenance of failing piling cap beam sections. This consists of removing spalled concrete and corroded reinforcing steel and installing replacement reinforcing steel and concrete grout. All piling cap beam repair and maintenance activities would take place in above-water portions of the underside of the existing wharf structure, with no in-water actions included.

2.3.3.6 REPLACEMENT FENDER SYSTEM

The existing treated wood piling and steel piling wharf fender system would be removed, totaling approximately 290 to 300 piling. They would be replaced with an alternative panelized, above-water fender system. The replacement fender panels would be spaced at approximately 60-foot intervals and would not include in-water elements. Up to 110 cubic yards of clean sand fill would be applied as a protective layer in subtidal aquatic area affected by removal of treated wood fender piling.

2.3.3.7 DREDGING

The subtidal sediments in the existing vessel berth area adjacent to the rehabilitated wharf would be deepened by underwater dredging. Existing depths in the proposed dredge prism are between -47 and –55 feet MLLW. Approximately 235,400 square feet of area (5.38 acres) adjacent to Terminal 5 would be dredged to a Project depth of –55 feet MLLW. An additional 1 foot of advanced maintenance dredge would be completed beyond the Project depth in critical and shoaling areas to avoid frequent redredging. The required Project grade is, therefore, –56 feet MLLW. It is anticipated that up to an additional 2 feet of allowable overdepth would be dredged, to a maximum depth of -58 feet MLLW.

Between 44,000 to 48,000 cubic yards of sediment would be removed from the Project area. Approximately 36,200 cubic yards of sediment would be removed to the Required Project Grade of -56 feet MLLW. Additional sediment volume for the overdepth is estimated to be between 7,900 to 11,800 cubic yards.

Disposal of all dredged sediments removed as part of the Project would be consistent with the requirements of the Dredged Material Management Plan (DMMP), DNR, Ecology, USACE, EPA, and other agencies with jurisdiction. Results of sediment sampling recently completed for DMMP characterization indicate that all of the sediments in the proposed dredge prism would be suitable for DMMP managed open water disposal operations.

The sediment that would be exposed by dredging has been tested and did not exceed any DMMP screening levels. Therefore, the sediment to be exposed by dredging is not considered to be

degraded relative to the currently exposed sediment surface. The DMMP agencies concluded that the Project was in compliance with the Washington State antidegradation policy.

Safety dredging of approximately 10,000 cubic yards may be required in the future to allow for unrestricted berth access for up to two 18,000-TEU vessel moorage. If needed, safety dredging would seek separate regulatory approvals including a new sediment characterization.

2.3.3.8 UPGRADE ELECTRICAL SYSTEM

The electrical supply and distribution would be upgraded for increased loads from its current capacity of 5 megavolt amperes (MVA) to 26 MVA. A new 26 MVA Primary Substation would be constructed to provide electrical power to the new cranes and associated terminal operations, such as cargo handling, marshalling, and refrigeration. Coordination with Seattle City Light (SCL) would provide power to the new Primary Substation from both the SCL Delridge Substation and the SCL South Substation. Even with these upgrades, balancing of the electrical load within the terminal's operations would be necessary to avoid exceeding the available capacity.

Up to four new electrical distribution substations would be constructed, serving container cranes and dock power and lighting systems. A new underground electrical duct bank would be constructed, connecting distribution elements. Distribution vaults and trenches would be constructed, providing electrical power to container crane equipment. HVAC would be provided for electrical enclosures.

The conduit, wiring, and a connection system would be provided for a shorepower system for two berths. This would allow the terminal to be "plug-in ready" for those ships with have the capability and choose to use shorepower.

2.3.3.9 REPLACE DOCKSIDE POTABLE WATER SYSTEM

The existing dockside water distribution system would be removed and replaced. A sectional distribution system would be provided and integrated with the existing looped water distribution system and existing fire hydrant layout. The existing vessel water supply system would be removed and replaced, including water use metering.

2.3.3.10 UPGRADE STORMWATER SYSTEM

The existing stormwater infrastructure would be modified for the facility to meet Correction Action Level 3 Industrial National Discharge Elimination System (NPDES) improvements and to support the operations of the new cargo wharf facility prior to beginning operations. The design would be reviewed and approved by Ecology prior to installation.

2.3.3.11 CARGO MARSHALLING AREA IMPROVEMENTS

Ground repairs and maintenance activities of container yard asphalt surface would include repaving over a portion of the facility in areas in with poor pavement condition. Approximately 20 acres of storage yard would be converted to a higher density grounded container storage serviced by motor-

powered rubber-tired gantry (RTG) cranes to move cargo. Up to 11,000 linear feet of concrete runways for use of the RTG cranes as improved cargo handling equipment would be added in portions of the container marshalling yard stacks.

The removal, relocation, and modification of underground conduits and pipes beneath the rails would be required, as needed, to accommodate repairs.

The existing approximately 130-acre marine cargo marshalling area would be reorganized for more efficient cargo receiving, staging, and transfer areas that would improve cargo handling efficiency and capacity, without increasing the area used for cargo shipping. Improvements would consist of relocating and changing the distribution of grounded and wheeled container cargo, including changes in internal circulation, travel lanes, restriping, and signage.

No substantial changes are proposed to the upland buildings, intermodal rail facilities, or truck gates. Up to eight container cargo cranes capable of ship-to-shore (STS) cargo operations would replace the existing six cranes to service larger container ships. Existing light poles would be reutilized to provide safe levels of lighting for industrial purposes except where conflicts exist with needed improvements, such as the relocation of light poles necessary to allow safe operation of newer, larger STS cranes. High pressure sodium vapor luminaries currently in use would be replaced with specialized light-emitting diode (LED) or equivalent lamps with energy efficient computerized controls.

The existing longshore employee parking would be maintained on the site. Striping, fencing, barricades, gates, sheds, and signage may be required or relocated for better access and circulation.

Temporary construction trailers may be placed on site during building and wharf improvement construction work. Construction trailers are typically 12 feet wide by 56 feet long (672 square feet of interior space), and 12 feet high. The painted exterior of the trailers would be a neutral color. Construction contractors typically select energy-efficient trailers for temporary construction use. The trailers would be equipped for electrical heating. No excavation is required for placement of temporary construction office and storage trailers, as no permanent foundations would be constructed. Utility services (water, power, and telecommunications) would be provided through connections to existing site utilities, or provided by the contractor (e.g., portable toilets). Vehicular access to trailers would be through existing paved Terminal 5 areas and no striped or designated parking spaces would be required.

2.3.4 PROPOSED ALTERNATIVE 2 OPERATIONS

Alternative 2 evaluates increasing the density of storage within the existing boundary of Terminal 5 and reusing the existing configuration of the intermodal rail yard. Alternative 2 is limited to managing container cargo shipping volumes up to approximately 1.3 million TEUs per year by the capacity of the intermodal rail yard as currently configured and limitations of the storage yard using a combination of diesel powered RTG cranes oriented parallel to the berth and cargo handling service provided by motor powered top-picks (TPs). Figure 2.6.2 is a conceptual plan for Alternative 2 operations and summarizes anticipated operational characteristics for vessels, trains, and cargo

handling equipment for each alternative. See Table 2.3-1 for a summary of the expected cargo handling equipment needs for 2020 to Alternative 2 full capacity buildout in 2030 and continuing through 2040.

2.3.4.1 ANTICIPATED THROUGHPUT

The proposed Alternative 2 operations would improve the container-handling efficiency of the existing site to serve larger container vessels up to 18,000 TEUs that are anticipated to call at Terminal 5 through 2040. Alternative 2 would increase the throughput capability of the existing Terminal 5 marine cargo site from 647,000 TEUs annually to the potential for container cargo shipping volumes up to approximately 1.3 million TEUs per year by 2030 and continuing at that level through the 2040 planning horizon. Modifications to the container cargo marshalling yard would be required to achieve the amount of densification necessary to accommodate 1.3 million TEUs per year. Efficiencies at the terminal would take advantage of more efficient STS crane transfer, use of more efficient cargo handling equipment, and improvements for transshipment of cargo through the existing intermodal rail yard.

The DEIS analyses and evaluations for the proposed Terminal 5 actions are based on completion of Project actions in 2020, with cargo volumes increasing from approximately 647,000 TEUs to an upper capacity level of approximately 1.3 million TEUs by 2030. The actual throughput levels may be lower than the projected throughput at capacity as analyzed in this document due to market conditions.

2.3.4.2 VESSEL CALLS AND OPERATIONS

The Port anticipates that larger container cargo vessels would continue to serve Puget Sound ports and that new larger vessels would become the dominant vessel in the Pacific Northwest trade. For purposes of this analysis, we assume that Terminal 5 would have 2 vessel calls, one 14,000-TEU ship discharging and loading 30 percent of their capacity, and one 8,000-TEU ship discharging and loading 24 percent of their cargo. At full capacity expected to be reached by 2030 and continuing through to 2040, Terminal 5 would have 4 vessel calls, two 14,000-TEU ships discharging and loading 30 percent of their capacity, and two 8,000-TEU ships discharging and loading 24 percent of their cargo. Berth utilization[5] would be approximately 57 percent. Large 18,000-TEU ships may call instead of the 14,000-TEU ships, but a smaller percentage of container transshipment would be expected for such vessels, compared with other ships (approximately 23 percent).

2.3.4.3 SHIP-TO-SHORE OPERATIONS

Large vessels serving Terminal 5, following completion of proposed Project actions in 2020, would require a minimum of four STS cranes to work each ship (total of eight container cranes in service at

[5] The percentage of time a ship is occupying each berth.

facility). Longshore crews would be anticipated to work continuously while the ship is at berth in order to maintain a rate of container unloading/loading that keeps the ship on schedule for its next port of call. Ships would be anticipated to require between 25 to 50 hours at berth for loading and unloading activities.

A yard tractor would haul the container to a designated location in the cargo marshaling area where cargo handling equipment would remove it and place it in the stack. The yard tractor would then return to the crane to retrieve another container. Loading operations would be similar with the containers traveling from the container stack to the STS cranes.

2.3.4.4 CARGO HANDLING AND CONTAINER YARD OPERATIONS

To achieve the density of storage required for this scenario, the yard would likely be operated with motor powered, RTG cranes oriented parallel to the berth and served by motor powered TPs. The container storage yard would likely be required to operate two shifts seven days per week to accommodate this throughput. Additional shifts may be required to in order to maintain a rate of container unloading/loading that keeps the ship on schedule for its next port of call.

2.3.4.5 RAIL OPERATIONS

Containers would be transferred between the intermodal rail yard and the container marshalling yard stack by yard tractors. A motor powered TP would remove the container from the chassis and place it in the intermodal rail car well.

When rail car segments are filled for a common destination on the storage tracks, a shunting engine combines them into a single unit train (approximately 7,500 feet of connected length). Once a unit train is assembled, large “road-power” locomotives would arrive and haul the unit train off terminal and onto the rail mainline bound for eastern destinations. A new train would arrive and be separated into pieces suitable for the intermodal rail yard to discharge them to the terminal stacks. On average, 18 trains each way are anticipated to be processed weekly at maximum capacity anticipated by 2030. The intermodal rail yard would be required to work two shifts 7 days per week to accommodate this throughput. Additional shifts may be required to in order to maintain a rate of container unloading/loading.

2.3.4.6 TRUCK AND GATE OPERATIONS

Gate operations are anticipated to be consistent with current operating procedures. Trucks are allowed to deliver or retrieve a container within a designated window as it relates to the ship schedule.

The gate would be required to operate one shift up to six days per week to accommodate the anticipated throughput. Additional shifts may be required to in order to maintain a rate of container unloading/loading that keeps the ship on schedule for its next port of call.

2.3.4.7 BUILDING AND SUPPORT ACTIVITIES

The majority of the existing buildings would be reused, although they may require renovation. The maintenance building may be renovated to better serve the new cargo handling equipment (RTG cranes, hostlers, and the new STS cranes). A Labor/Marine Building may be required to provide a break facility to the crews. The Administration Building may remain and/or be remodeled to accommodate additional cargo management and facility operational needs. Employees of the facility would park at the existing parking area at the south end of the terminal.

2.3.5 ALTERNATIVE 3 CARGO WHARF REHABILITATION, BERTH DEEPENING, INCREASED CARGO HANDLING, AND ADDITIONAL UPLAND IMPROVEMENTS

Alternative 3 proposes the same rehabilitation of the existing marine cargo facilities, including cargo wharf rehabilitation, berth deepening, water/stormwater utility retrofits, and electrical utility capacity improvements, defined in the Project proposal and Alternative 2. Alternative 3 additionally proposes significant changes and improvements to the cargo marshalling yard area upland, intermodal rail yard configuration, and electrical capacity increases to the site and on site electric utility upgrades in order accommodate increased annual container cargo transshipment capability at the site to approximately 1.7 million TEUs instead of approximately 1.3 million TEUs stated in Alternative 2. Figure 2.6-3 shows the proposed conceptual construction elements of Alternative 3.

2.3.6 PROPOSED ALTERNATIVE 3 CONSTRUCTION

Alternative 3 proposes the same cargo wharf rehabilitation, berth deepening, utility upgrades, and building and support activities identified in the Project description for Alternative 2**.** Alternative 3 includes upland improvements as part of the proposal to be able to handle increase cargo handling. Details of the additional improvements proposed as part of Alternative 3 are described in more detail below.

2.3.6.1 UPLAND IMPROVEMENTS

The area defined for container yard and cargo marshalling area would be increased as part of Alternative 3 through relocation or demolition of the existing entrance gate, freight station, transit shed, maintenance and repair buildings, and operations buildings.

The container cargo marshalling yard capacity would be increased through use of grounded container storage served by RTG or rail-mounted gantry (RMG) cranes oriented perpendicular to the berth. The use of RTG and RMG cranes allows for containers to be stacked higher and packed more closely between rows of stacks as the cranes are restricted to their appropriate rail widths and do not require additional room for maneuvering. The entire paved surface yard would be removed and regraded, new concrete beams for RTG cranes or RTG cranes would be installed, and the entire yard would be repaved. Exposed utility systems would be reconfigured, as required.

The truck gate would be relocated and require a new gate system, guard booth, truck scales and optical character recognition complex along with associated paving, drainage, power supply, and data network.

The electrical capacity may need to be increased to accommodate additional crane load and to power electrified cargo handling equipment. Additional transmission and electricity of up to 70 MV can be made available from SCL. On-site electric utilities would be upgraded as required to serve new STS, RMG, and RTG cranes and receive the electricity that SCL would provide. The increased SCL power supply from 26 MV expected to be available at the start of operations in 2020 under Alternative 2 would be phased in as capacity is made available. The full demand would not be expected to be needed when a tenant first operates at the site. It may take approximately 10 years or more for SCL to design, undergo separate environmental review appropriate, and build the full demand of power supply. It is expected that this time period for permitting and construction would coincide with the needs of any tenant at the Terminal 5 site.

The intermodal rail yard would require reconstruction to remove existing rail and add approximately eight new tracks and construct RTG crane support infrastructure. The intermodal rail yard would require new paving, stormwater facilities and electrical power improvement's to serve the new crane.

2.3.7 PROPOSED ALTERNATIVE 3 OPERATIONS

This operational scenario evaluates maximizing the density of storage within the existing boundary of Terminal 5 and improves cargo handling ability to transship 1.7 million TEUs per year by 2040 planning horizon. Alternative 3 is limited to managing container cargo shipping volumes up to approximately 1.7 million TEUs per year, making use of modified intermodal rail yard facilities and reconfigured operational dimensions and "layout" in the Terminal 5 cargo marshalling area. Figure 2.6.3 is a conceptual plan for Alternative 3 operations and summarizes anticipated operational characteristics for vessels, trains, and cargo handling equipment for each alternative (see Table 3.2-1).

2.3.7.1 ANTICIPATED THROUGHPUT

Proposed operations at Alternative 3 would improve the container-handling efficiency of the existing site to serve larger container vessels (up to 18,000 TEUs) that are anticipated to call at Terminal 5 through 2040. The throughput capacity of the terminal would increase from its current capability of approximately 647,000 TEUs, to up to approximately 1.7 million. This option would take advantage of more efficient STS crane transfer, use of more efficient cargo handling equipment, and improvements for transshipment of cargo through the existing intermodal rail yard. It is anticipated that annual container cargo volume at the site would increase gradually from the previous 647,000-TEU levels.

The DEIS analyses and evaluations are based on completion of Project wharf strengthening, berth deepening, and initial electrical and utility actions in 2020. Cargo volumes are expected to increase from approximately 647,000 TEUs to a throughput level of approximately 1.3 million TEUs by 2030

and continuing on to 1.7 million TEUs by 2040. The actual throughput levels and expected progressive timeline of expansion for the proposed Project may be extremely variable due to market conditions.

2.3.7.2 VESSEL CALLS AND OPERATIONS

The vessel calls and operations for Alternative 3 would be the same as Alternative 2 except for the assumptions for the number of expected vessel calls and cargo volumes as listed below:

- Terminal 5 would have 4 vessel calls each week, two 14,000-TEU ships discharging and loading 40 percent of their capacity instead of the 30 percent capacity of Alternative 2.
- Two 8,000-TEU ships would be discharging and loading at 32 percent of their cargo instead of 24 percent in Alternative 2.
- Berth utilization would be on the order of 59 percent instead of the 57 percent for Alternative 2.
- An 18,000-TEU ship may call in lieu of the 14,000, but a smaller percentage of discharge would be expected for that ship (approximately 31 percent) as opposed to approximately 24 percent for Alternative 2.

2.3.7.3 CONTAINER YARD OPERATIONS

To achieve the density of storage required for this scenario, the cargo marshalling yard would likely be operated with electrically powered RTG cranes oriented perpendicular to the berth. Each container stack would be served by two RTG cranes. Table 2.3-1 summarizes the expected cargo handling equipment needs for 2020 to Alternative 3 full capacity buildout in 2040.

The container marshalling yard would be required to work two shifts 7 days per week to accommodate this throughput. Additional shifts may be required to in order to maintain a rate of container unloading/loading that keeps the ship on schedule for its next port of call.

2.3.7.4 RAIL OPERATIONS

Containers would be shunted between the intermodal rail yard and the container marshalling yard stack by yard tractors. The yard tractor would connect to chassis in the landside transfer zone, where the container marshalling yard electrically powered RTG cranes had previously staged chassis with loaded container, and would haul the chassis across the truck circulation area to the intermodal rail yard. The hostler would place the chassis in an available parking spot in the intermodal rail yard buffer and retrieve a different chassis bound for the container marshalling yard. The hostler would drop the chassis at the appropriate container stack and repeat with a new chassis bound for the intermodal rail yard.

RTG cranes would retrieve containers from the intermodal buffer and place it on the appropriate rail car. Once a set of cars is filled with containers, it would be removed by a shunting engine and stored in the adjacent storage tracks until enough segments can be combined into a single unit train (approximately 7,500 feet of connected length). Once a unit train is built, road engines would arrive

and haul the unit train off terminal and onto the rail mainline bound for eastern destinations. A new train would arrive and be broken (separated) into pieces suitable for the intermodal rail yard to discharge them to the terminal stacks.

On average, 24 trains each way are anticipated to be processed each week at maximum capacity anticipated by 2040. The rail yard would be required to work two shifts seven days per week to accommodate this throughput. Additional shifts may be required to in order to maintain a rate of container unloading/loading to maintain

2.3.7.5 TRUCK AND GATE OPERATIONS

To achieve maximum capacity, it is anticipated that the activity of trucks bringing cargo to the terminal or retrieving a container would be aided by a more controlled system managing queueing at the gate with container cargo ready for movement. An appointment system for trucks arrivals would ensure efficient and effective truck movement. Trucks arriving without an appointment would be turned away and given information on establishing an appointment to drop off or retrieve their container. In order to accommodate the anticipated throughput, the gate would be required to operate two shifts up to six days per week. Additional shifts may be required to in order to maintain a rate of container unloading/loading that keeps the ship on schedule for its next port of call.

2.3.7.6 BUILDING AND SUPPORT ACTIVITIES

The majority of the existing building would be relocated or renovated in the revised terminal configuration. The maintenance building would be relocated to accommodate the new container stacks and outfitted to better serve the new cargo handling equipment (RMG cranes, shuttle carriers, hostlers, and the new STS cranes). A labor building may be necessary to provide a break facility to the crews and potentially provide space for clerks to process gate transactions. The Administration Building may remain and be remodeled to accommodate additional cargo management and facility operational needs. There would be several additional ancillary structures, such as guard booths, security building, fueling facility, and container and equipment wash facilities, among others. Employees of the facility would park at the reconfigured parking area at the south end of the terminal.

2.3.8 SCHEDULE AND PHASING

The proposed Project would begin as soon as regulatory approval and permits are received. The anticipated commencement for construction is mid-2017, with completion for both Alternatives 2 and 3 expected within 3 years from that time (2020). Upland/landside construction elements would continue throughout this time period while in-water work would adhere to in-water work restrictions applied to Project permits (in-water work is approved between August 16 and February 15 of each construction year).

All of the proposed wharf improvements would be completed within three in-water work seasons from commencement of construction. Upland improvements may be phased over a longer period of time, implemented by the future tenant, over a period of 5, 10, or even 20 years. If upland

improvements are phased, specific permits affiliated with those upgrades (e.g., building permits) would be obtained closer to construction.

2.4 POSSIBLE FUTURE PROJECTS

Alternatives 2 and 3 are intended to accommodate container terminal tenants. All current uses remain the same. No other future projects related to the current proposal are currently planned.

2.5 DISADVANTAGES AND/OR BENEFITS OF FUTURE IMPLEMENTATION

The SEPA Rules (WAC 197-11-440) require that an EIS address the benefits and disadvantages of reserving for some future time the implementation of the proposal, as compared with possible approval at this time. This proposal is for the Port to redevelop properties for private entities. It is the responsibility of agencies receiving permit applications for this proposal to act on the proposal within the time limits established by regulatory authority.

A disadvantage of delaying implementation is that it would delay meeting the proponent's goals. Construction costs may be higher in the future. Public benefits of the Project, such as increased jobs and tax revenues, would be deferred or may not occur. Another disadvantage in delaying implementation is that the Port would not be able to meet projected demands for container cargo service, potentially reducing Seattle's market share of this business and losing business to more competitive ports elsewhere.

Deferring adoption of the Project would either postpone development on the site or may result in other development of the site. If adoption of the Project is postponed or denied, the site would remain in its existing condition. It is unknown what future uses within the site would be if the proposal was not adopted.

2.6 CUMULATIVE IMPACTS

This section evaluates and summarizes the potential cumulative impacts of the proposed Project. Cumulative impacts are impacts that could result from the incremental consequences of an action (in this case, the proposed Project) when added to other past, present, and reasonably foreseeable future actions. When impacts of an action are analyzed and evaluated individually, they may appear minor but, when considered collectively (cumulatively) with the impacts of other actions, especially over a period of time, the impacts can be more significant. The purpose of the cumulative impacts analysis is to ensure that decision-makers consider the full range of consequences for the proposed Project, including the proposed Project's incremental contribution to cumulative impacts on the environment.

2.6.1 REGULATORY CONTEXT

The Washington SEPA directs lead agencies to consider the direct, indirect, and cumulative impacts of proposed actions. This cumulative impact analysis is prepared in accordance with SEPA (Chapter 43-21C RCW), SEPA Rules (WAC 197-11-060 and 197-11-792), and the SEPA Handbook. The Council on Environmental Quality publication "Considering Cumulative Effects

under the NEPA" was also considered for additional guidance where National Environmental Policy Act (NEPA) cumulative impact review is consistent with SEPA requirements.

2.6.2 METHODOLOGY

This analysis provides a broad assessment of potential cumulative impacts related to implementing the proposed Project. A wide array of other past, present, and reasonably foreseeable future actions near the Project site and along the West Waterway were reviewed. The cumulative impact analysis used the following approach:

1. Identification of geographic boundaries (i.e., the study area). The preceding chapters of the DEIS describe the potential impacts of the proposed Project on environmental resources. As discussed in those chapters, the study areas are the areas where the proposed Project has the potential to affect environmental resources. In general, the study areas include the Project site and surrounding areas, as well as the West Waterway for the marine terminal and vessel traffic related to the proposed Project. The cumulative impact assessment uses the same study areas, as those study areas represent the areas where the proposed Project, in combination with other past, present, or reasonably foreseeable future actions, could result in cumulative impacts.
2. Identification of time-based boundaries. The proposed Project does not have a stated lifespan. Therefore, this assessment accounts for all reasonably foreseeable projects that could be constructed or operational during the same period as the proposed Project.
3. Identification of reasonably foreseeable future projects and actions within the geographic and time-based boundaries.

2.6.3 REASONABLY FORESEEABLE FUTURE PROJECTS

Reasonably foreseeable future projects considered in this cumulative impact analysis are listed below. The projects considered include public and private projects.

Several Port and non-Port proposals are in the conceptual planning stages or are scheduled for construction in the general vicinity of the proposed Project and may affect the Project area. However, the projects have been shown to be independent of one another: each would be undertaken regardless of the other and is not needed to support the other. If the projects listed below are permitted and proposed for construction coincident with time frames of the proposed Project, they would be closely coordinated. Each of the projects would be required to conduct separate, project-specific SEPA environmental review. Mitigation measures appropriate for each project would decrease the potential for cumulative impacts.

Lockheed West Federal Superfund. Site of Former Lockheed Shipyard Number Two, northwest margin of the West Waterway:

- Record of Decision: issued August 2013
- Consent Decree: expected 2015–2016
- Cleanup design: expected 2016–2018
- Implementation: 2018–2020

- Seattle Harbor Navigation Improvement Project (also referred to as the Corps of Engineers East and West Waterway Deepening Feasibility Study)
- Project reconnaissance report: completed 2104
- Project feasibility study: 2015–2017
- Project design and construction: 2018–2024

2.6.4 CUMULATIVE IMPACTS ANALYSIS CONCLUSION

None of the above activities are functionally related to the proposed Project (i.e., one could proceed without the other). If any of these projects were constructed at the same time, there is a potential for a cumulative impact. However, the impact would only be during construction and would be temporary for the duration of the construction activity. Therefore, no significant unavoidable cumulative impacts are expected to result from the proposed Project.

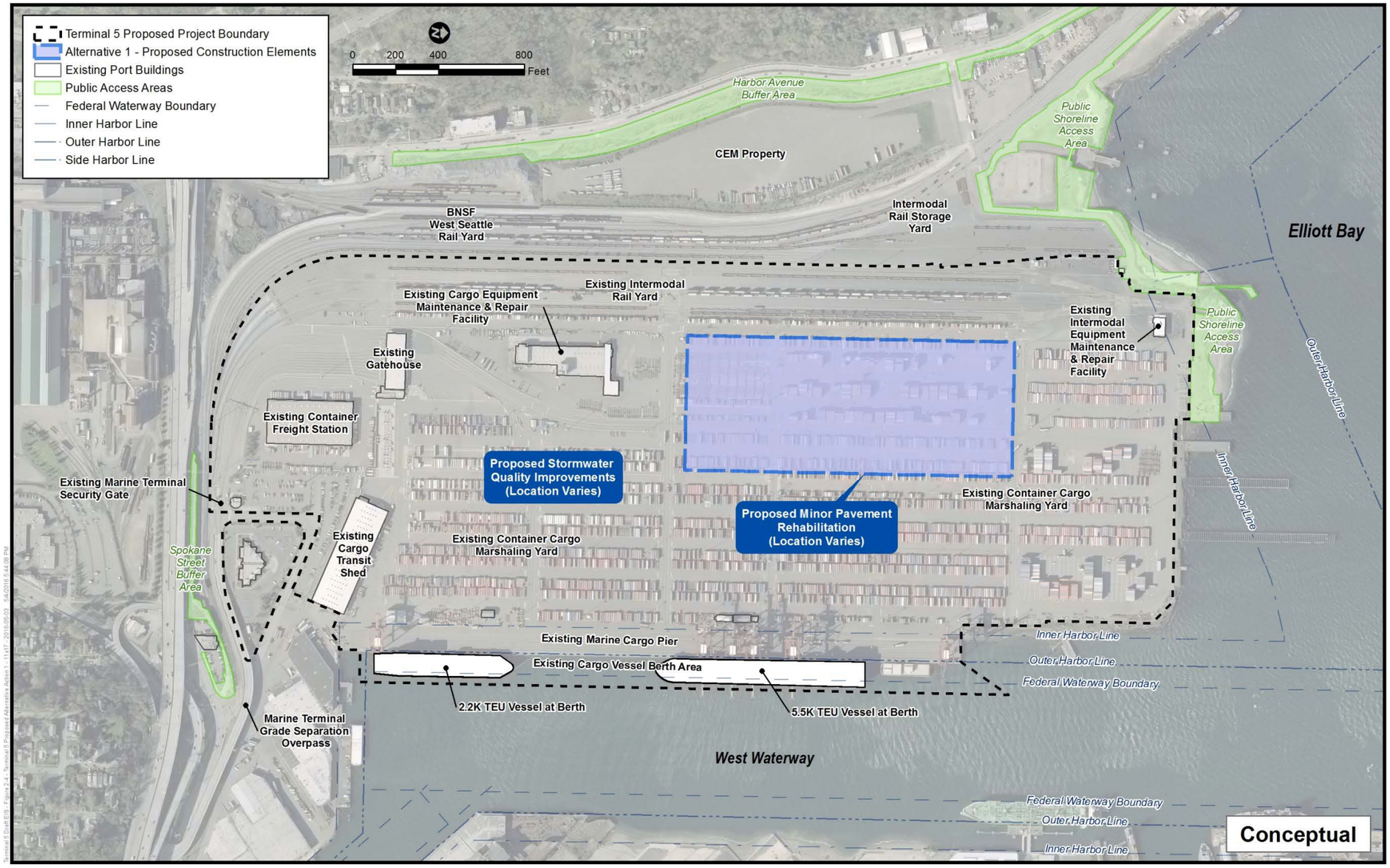

Figure 2.6.1: Alternative 1 No-Action Alternative Conceptual Construction Elements

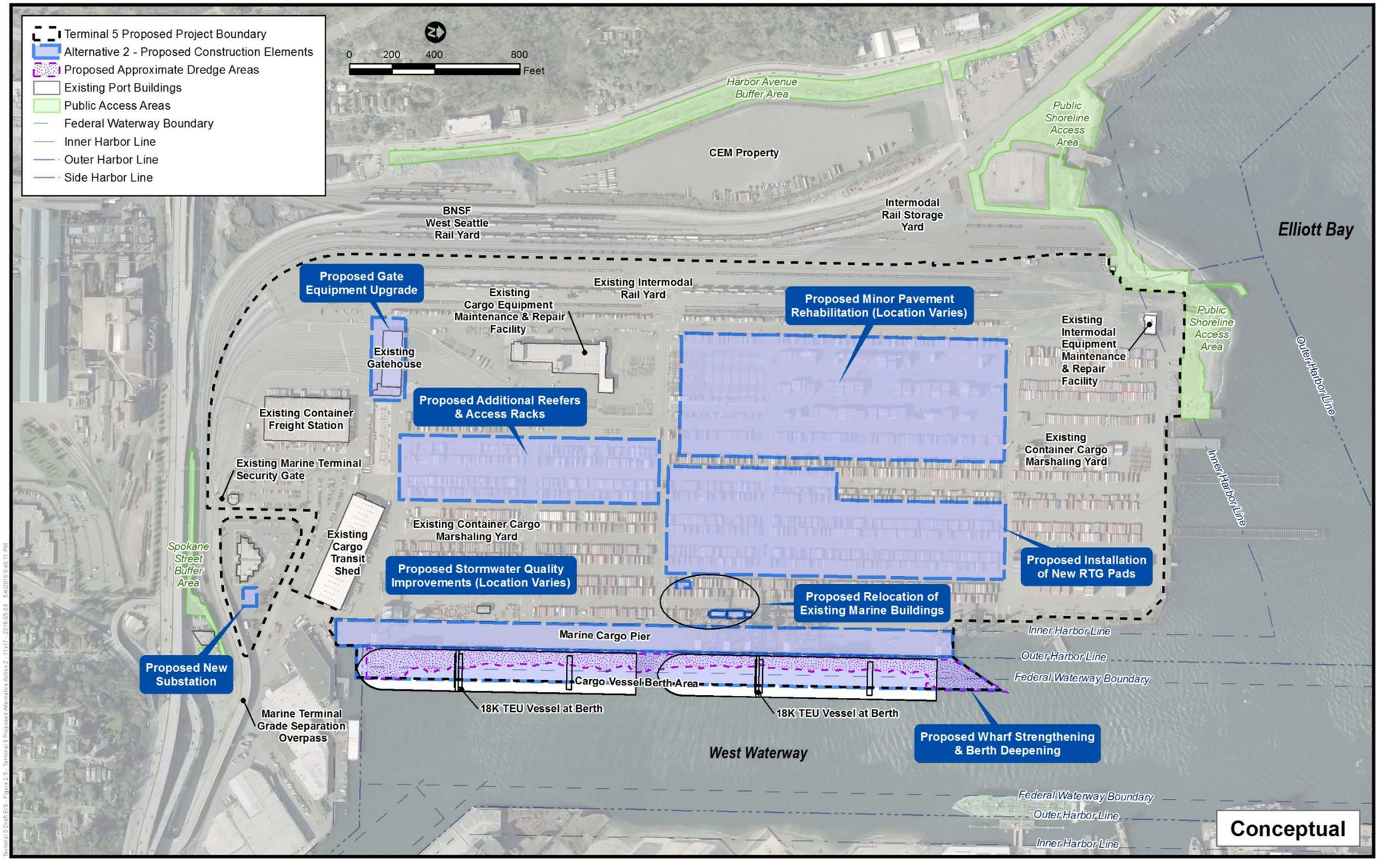

Figure 2.6.2: Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling Construction Elements

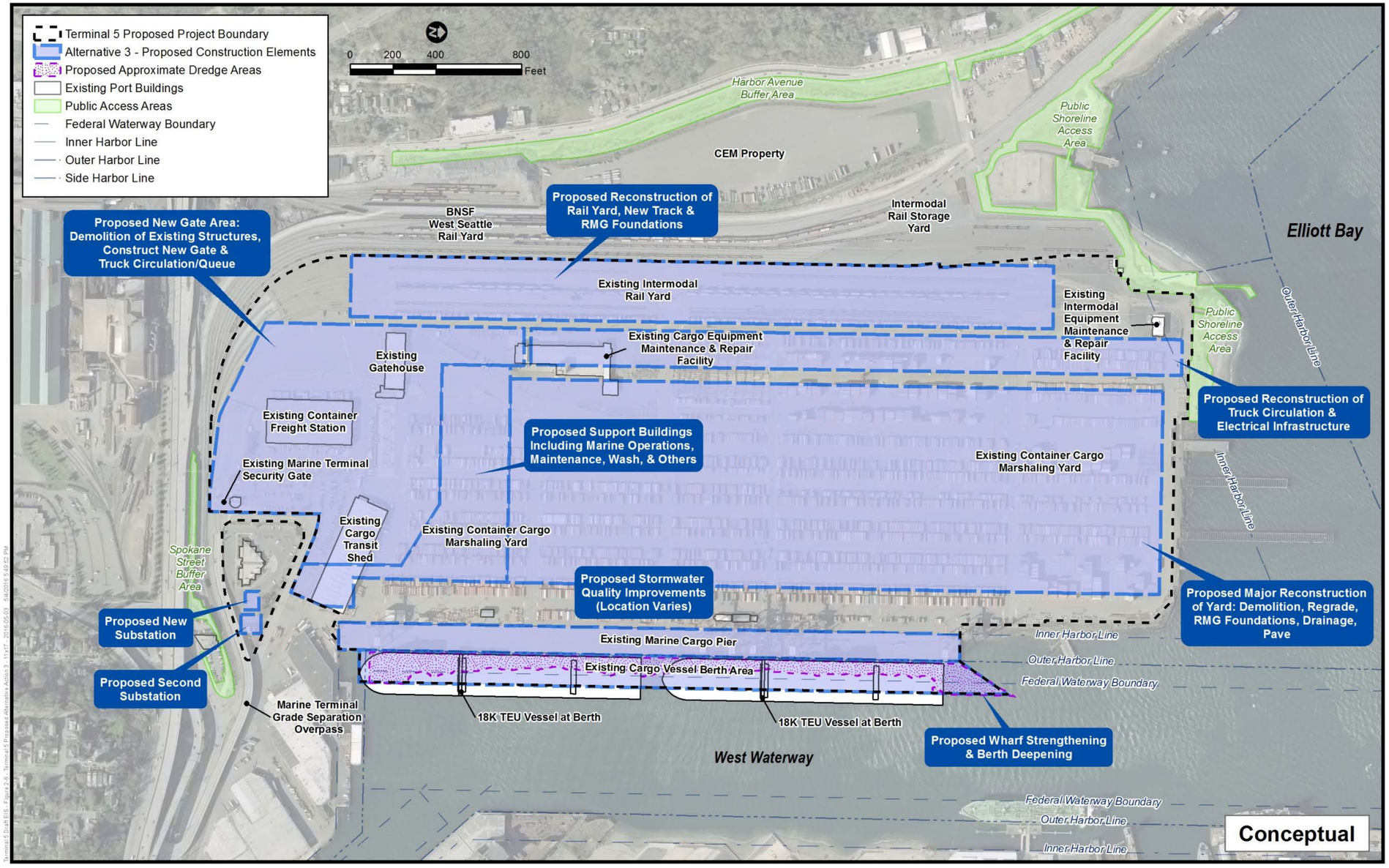

Figure 2.6.3: Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements Conceptual Construction Elements

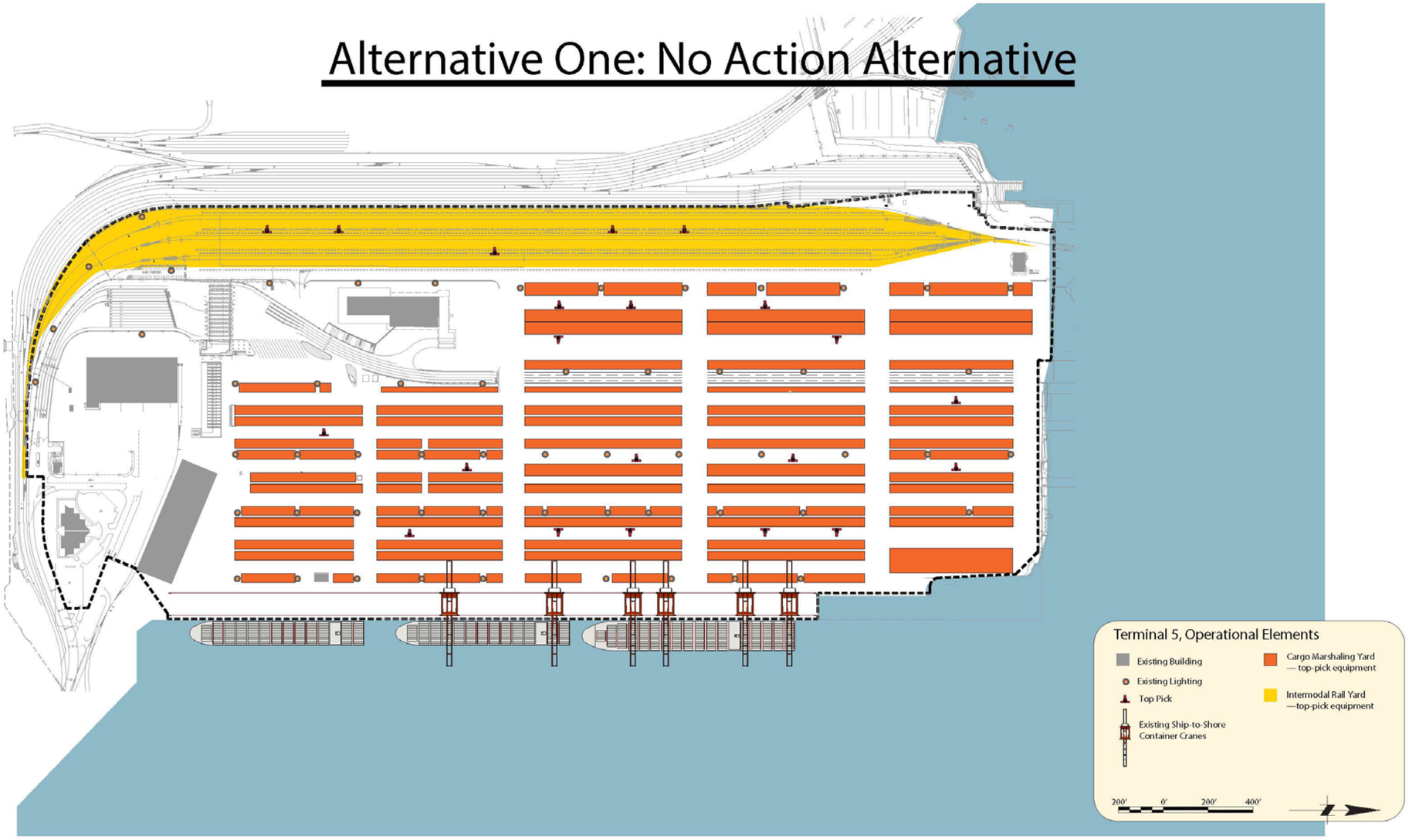

Figure 2.6.4: Alternative 1 No-Action Alternative Conceptual Operational Elements

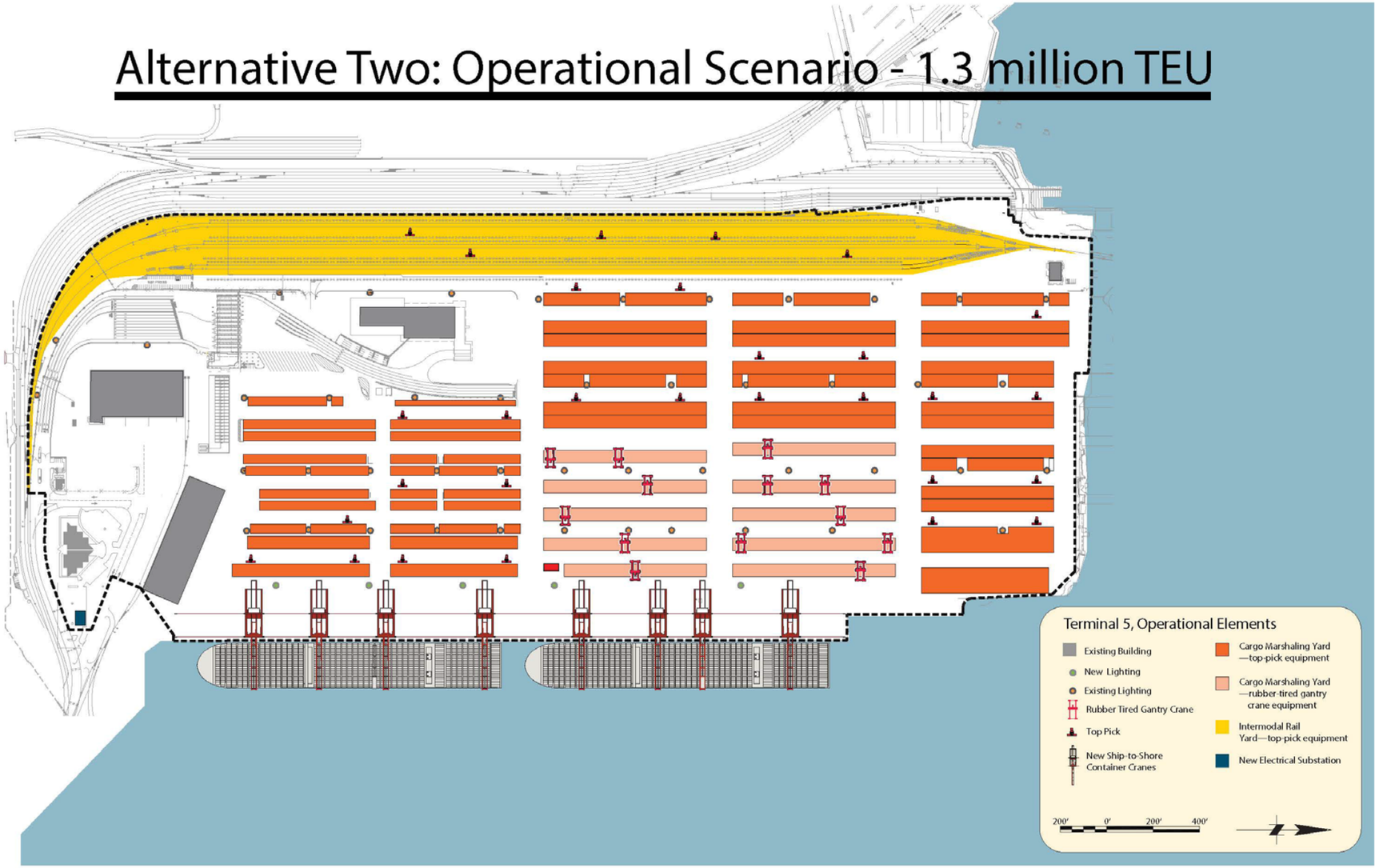

Figure 2.6.5: Alternative 2 Cargo Wharf Rehabilitation, Berth Deepening, and Increased Cargo Handling Conceptual Operational Elements

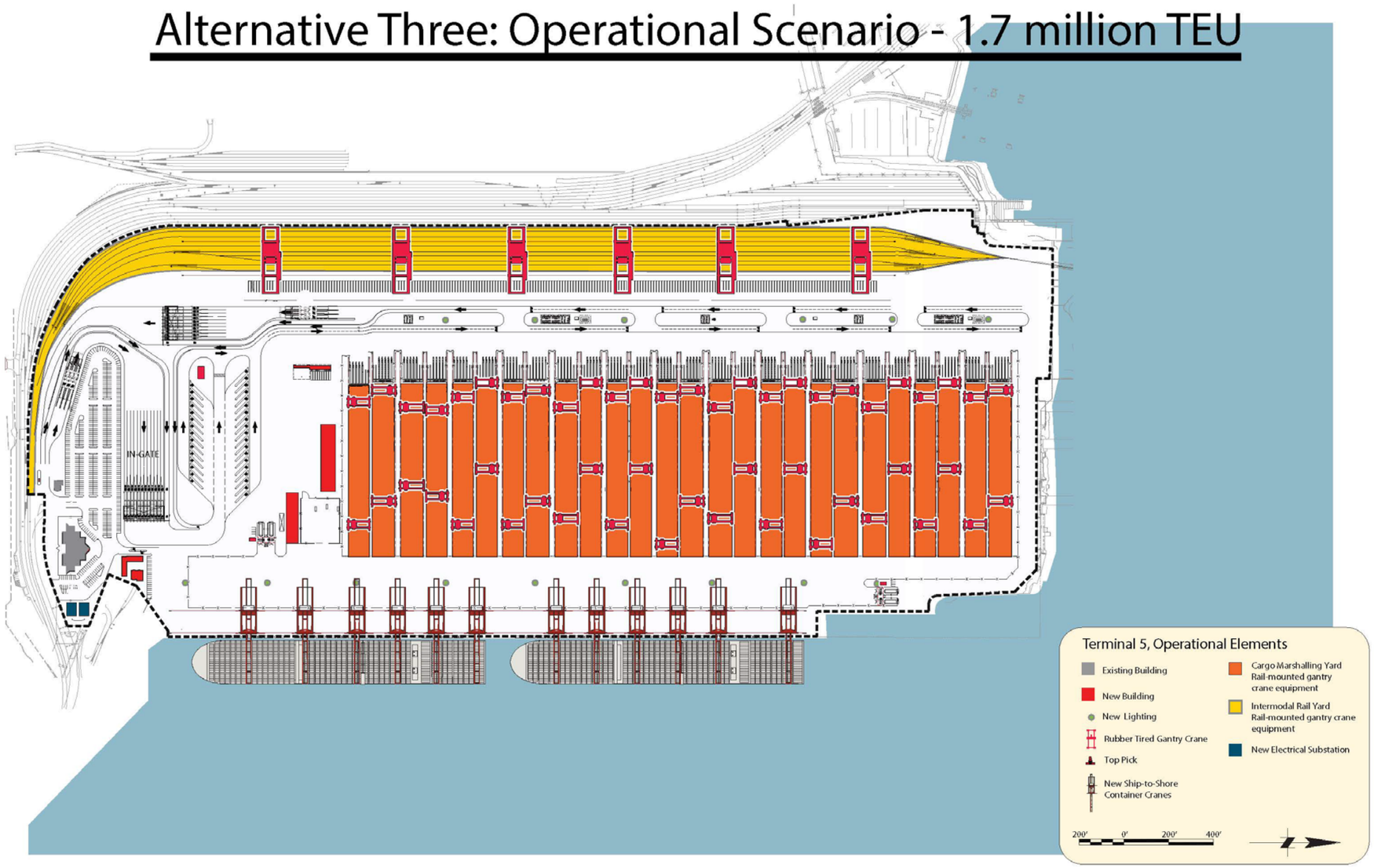

Figure 2.6.6: Alternative 3 Cargo Wharf Rehabilitation, Berth Deepening, Increased Cargo Handling, and Additional Upland Improvements Conceptual Operational Elements

Chapter 3

Affected Environment, Impacts, Mitigation Measures, Significant Unavoidable Adverse Impacts

3.0 AFFECTED ENVIRONMENT, IMPACTS, MITIGATION MEASURES, SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.1 EARTH

Detailed earth technical reports were prepared to evaluate the Terminal 5 Improvements Project impacts to earth and geology at the site and are presented in Volume II, Appendix I, Appendix J, and Appendix K. The technical reports or memos summarized in this section are:

- *Sea Level Rise for the Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements Project*. Draft Memorandum prepared for the Port of Seattle. Prepared by Moffatt & Nichol. April 20, 2016 (Appendix I)
- *Preliminary Geotechnical Engineering Design Study, Terminal 5 Deepening and Crane Rail Upgrade, Seattle, Washington*. Prepared for the Port of Seattle. Prepared by Hart Crowser. May 30, 2014 (Appendix J)
- *Southwest Harbor Terminal 5 Groundwater Quality Monitoring Evaluation Report, Seattle, Washington.* Prepared for Port of Seattle. Prepared by Hart Crowser. July 8, 2014 (Appendix K)

These appendices provide a summary of geologic and geotechnical conditions at the site, as well as information on the geological and seismological settings, sea level rise, and a general assessment of potential geologic hazards at the proposed Project site. Key information about the earth affected environment, relevant to the Project impact assessment, is presented in the following section.

3.1.1 REGULATORY CONTEXT

3.1.1.1 CITY OF SEATTLE ENVIRONMENTALLY CRITICAL AREAS

The majority of the site is shown on the City of Seattle Environmental Critical Areas (ECA) map as a seismic hazard area and could be subject to liquefaction during a major seismic event. In general, before development is allowed in or immediately adjacent to mapped seismic hazard areas, detailed geotechnical studies must be conducted to address specific standards relating to site geology and soils, liquefaction potential, and building design. Accordingly, City of Seattle regulations require that certain studies and other requirements be met as part of the design and permitting process for future site development. See Section 3.8, for further discussion of the Seattle Critical Areas Ordinance.

The City of Seattle ECA map identifies Terminal 5 area as a liquefaction zone. A preliminary geotechnical engineering design study completed for the proposed Project concluded that this portion of the Terminal 5 property contains liquefiable soil corresponding to a classification of Site Class F, as defined in the 2012 International Building Code (IBC; Hart Crowser May 2014).

3.1.1.2 CITY OF SEATTLE SHORELINE CODE

Areas within 100 feet of the ordinary high water mark are environmentally critical areas.

3.1.1.3 CITY OF SEATTLE BUILDING CODE

The City of Seattle Building Code and building design standards establish (2012 IBC) requirement for the construction of above-ground structures. The Port has a Memorandum of Agreement with the City of Seattle to establish the basis of seismic design. The Port would apply its standards and specifications to the design of the proposed Project.

3.1.2 AFFECTED ENVIRONMENT

The study area for this assessment is the Project site and the analysis considers regional geology as well as local conditions. See Section 3.3 of this DEIS for a detailed analysis of dredging and stormwater issues.

Existing maps and technical reports published by the U.S. Geological Survey, Washington Department of Natural Resources (DNR), Soil Survey of King County, Seattle Area Geologic Mapping Project, City of Seattle ECA Map, City of Seattle Department of Construction and Inspections (DCI) project files, King County Technical Library, Washington State Department of Ecology (Ecology), well records, and other sources. Geological and geotechnical data reports, memos, and maps derived from previous subsurface investigations on the site were reviewed for site-specific information (Hart Crowser 2010, 2014). These reports are included as appendices to this DEIS (see Volume II, Appendices H, J, and K).

3.1.2.1 GEOLOGIC SETTING

The site is located in the central portion of the Puget Lowland. Regional topography is dominated by a series of north–south-trending elongated ridges and glacial uplands. The uplands are separated by large, glacially excavated troughs that were further modified by geologic processes following the retreat of the most recent ice sheet, and are now partially occupied by Puget Sound and other large bodies of water such as Lake Washington.

The site is in a seismically active area. The seismicity of Western Washington is dominated by the Cascadia Subduction Zone, in which the offshore Juan de Fuca Plate is subducting beneath the continental North American Plate.

3.1.2.2 SITE TOPOGRAPHY AND GEOLOGIC CONDITIONS

The Terminal 5 Improvements Project area consists of approximately 197 acres of existing wharf, berth area, and marine cargo use adjacent to the west margin of the West Waterway in southwest Elliott Bay. This portion of the Terminal 5 facility has a general surface elevation approximately 17 to 18 feet above mean lower low water (MLLW), and was constructed by the placement of fill materials over shallow subtidal and estuarine areas prior to the 1970s. The Terminal 5 surface is generally flat, with constructed impervious pavement slopes of approximately two percent, allowing for collection and management of stormwater.

Some portions of the site are part of cleanup actions conducted under the Superfund program with U.S. Environmental Protection Agency (EPA) oversight. Information about the environmental health at Terminal 5 is provided in Section 3.5 of this DEIS.

The steepest slopes within or adjacent to the proposed Project area are located along the margin of the West Waterway shoreline area beneath the existing pile-supported wharf. The wharf structure provides a connection between the vessel-berthing areas in the West Waterway to the upland cargo operations area. The slope beneath the wharf ranges from 1.5–1.75 Horizontal to 1 Vertical (57 to 67 percent) extending down to the bottom of the West Waterway. The toe of the slope ranges from about –40 to –50 **f**eet MLLW. The constructed slope beneath the wharf is stabilized by concrete piling, a select fill riprap armored slope, top-of-slope bulkhead, pinch piling along the northern end of the slope, and a low toe-wall along portions of lower slope.

3.1.2.3 SUBSURFACE CONDITIONS

The Terminal 5 site is constructed on filled former tideland area of the Duwamish River estuary. Fill at the site consists of sediments dredged from the previous tideland area, excavated in the first two decades of the last century, in order to create deep-draft navigational access in south Elliott Bay and more recently placed fill materials from adjacent upland locations.

3.1.2.4 GROUNDWATER CONDITIONS

The Terminal 5 site is underlain by two aquifers; a shallow fill aquifer and a deeper estuarine aquifer. The fill aquifer consists of groundwater in various fill materials between 20 to 40 feet below ground surface (bgs). The estuarine aquifer is underlain by a lower permeability unit that occurs at depths ranging from 30 to 50 feet bgs. The fill aquifer/estuarine aquifer system is bounded to the north by Elliott Bay. Groundwater levels fluctuate in response to river levels, tidal influence and precipitation. Detailed information on groundwater conditions is provided in Volume II, Appendix K.

3.1.2.5 EARTHQUAKE HAZARDS

General Seismic. Seismic hazard areas are generally defined as those areas subject to severe risk of earthquake damage as a result of ground shaking, ground rupture, or soil liquefaction. Ground shaking can occur large distances from the earthquake source; ground rupture only occurs along the active fault trace; and liquefaction requires a certain combination of soil and groundwater conditions at a given site.

Ground Shaking and Ground Motion Amplification. The entire Puget Sound region lies within a seismically active area, and the potential for moderate to high levels of ground shaking exists. The Terminal 5 site is also located over thick deposits of relatively soft soils that could be susceptible to amplified earthquake ground motions at various frequencies. Consequently, the near-surface soils at the site could affect the level of earthquake ground shaking felt in the site area.

Ground Rupture. The Puget Sound region contains numerous fault zones, and the Seattle Fault Zone, located about 4 kilometers south of the North Bay site, and is the closest reported fault zone. The Seattle Fault Zone is about 4 to 6 kilometers wide and consists of a series of east–west-trending faults. Geologic evidence unearthed on Bainbridge Island suggests that the most recent earthquake to rupture the ground surface occurred about 1,100 years ago with about 20 feet of permanent vertical displacement at that location. Future ground rupture may occur within the Seattle Fault Zone.

3.1.2.6 LIQUEFACTION

Soil liquefaction may occur as a result of seismic shaking because Terminal 5 was constructed on filled former tidelands. When shaken by an earthquake, certain soils lose strength and temporarily behave as if they were liquid. This phenomenon is known as liquefaction. The seismically induced loss of strength can result in loss of bearing capacity for shallow foundations, reduction in vertical and lateral deep foundation capacities, downdrag forces on deep foundations, ground surface settlement, embankment instability, and lateral spreading. Seismically induced liquefaction typically occurs in loose, saturated, sandy material commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose saturated fill.

3.1.2.7 SEISMIC WATER WAVES (TSUNAMIS AND SEICHES)

The tsunami hazard within Puget Sound is controlled by crustal faults. According to the Tsunami Hazard Map of the Elliott Bay Area, Seattle, Washington, prepared by the DNR (Walsh et al. 2003), a tsunami originating from a Seattle Fault earthquake is predicted to cause widespread inundation ranging from 0.5 to 2 meters deep across the Project site. In addition, inundation could be 2 to 5 meters in localized areas. Because of the relatively long return period of the Seattle Fault, the tsunami hazard during the design life of the structure is also low, but is larger than the potential for fault surface rupture.

3.1.2.8 EROSION

Erosion is a condition that can significantly and adversely affect development on any site. The susceptibility to erosion is generally a function of soil type, topography, occurrence of groundwater seepage or surface runoff, and the built environment. Structures located above or below actively eroding natural slopes or manufactured slopes could be susceptible to the effects of erosion. In addition, development could exacerbate erosion conditions, if they exist, by exposing soils and adding additional water to the soil from irrigation and runoff from new impervious surfaces.

3.1.2.9 LANDSLIDE HAZARDS

Landslides are mass movement of soil down a slope. They can range from small localized failures (sloughing) to massive earth movements that cause extensive damage to the natural and built environments and may cause injury and death to humans and wildlife.

Landslide hazard areas are typically defined as areas with a combination of slope inclination, soil type, geologic structure, and the presence of water, that are susceptible to failure and subsequent downhill movement. Known slide areas are defined by the City of Seattle ECA map. There are no known slide areas on the Terminal 5 Improvements Project site. However, there are known slide areas in the vicinity of Terminal 5 to the south and to the west.

3.1.2.10 SEA LEVEL RISE

Sea level rise is the relative increase in mean sea level, primarily caused by two processes: additional water in the ocean from glacial and land-based ice sheet melt, and thermal expansion of ocean

waters due to warmer sea temperatures (Adelsman and Ekrem 2012). Sea level rise is a global occurrence; however, observed sea level rise varies by location due to changes in land elevation and wind. Detailed information on sea level rise can be found in Volume II, Appendix I.

3.1.3 IMPACTS

No additional detail would be provided in this section for seismic ground failure, tsunamis, or sea level rise because no Project-related construction or operational impacts are anticipated from the proposed Project under any alternative. Additional detail can be found in Appendices I, J and K of this DEIS.

3.1.3.1 NO-ACTION ALTERNATIVE

SLOPE STABILITY

Construction and Operations

The No-Action Alternative is not expected to result in slope stability impacts because only minor maintenance and repair and minor upgrades at the terminal are expected and the proposed operations would not change under this alternative from existing conditions.

EROSION

Construction

No new construction other than minor repairs and upgrades are proposed under the No-Action Alternative. The potential for soil erosion is limited under the No-Action Alternative.

Operations

The No-Action Alternative is not expected to result in erosion impacts because operations are not proposed to change from existing conditions. The site would remain a flat surface of asphalt and concrete covering.

EARTHWORK

Construction and Operations

The No-Action Alternative is not expected to result in earthwork impacts because only minor maintenance and repair and minor upgrades at Terminal 5 are expected and proposed operations would not change from existing conditions.

3.1.3.2 ALTERNATIVES 2 AND 3

SLOPE STABILITY

Construction

There could be slope stability issues during berth dredging as part of Alternatives 2 and 3. The existing slope beneath the Terminal 5 wharf includes a grade of approximately 1 Vertical to 1.5–1.75 Horizontal grade (1V:1.5H to 1V:1.75H). Geotechnical investigations have determined that the lower portions of the slope beneath the existing Terminal 5 wharf, constructed three to four decades ago, require structural stabilization measures coincident with strengthening the cargo wharf and deepening the adjacent vessel berths.

Operations

No impacts are expected from operations under Alternatives 2 and 3.

EROSION

Construction

Erosion and the loss of topsoil could occur during implementation of the proposed Project. Terminal 5 upland improvements involve pavement removal and repaving, and these activities could result in the temporary exposure and loss of soils. Currently, the potential for significant soil erosion or loss of topsoil without implementation of the proposed Project is very low because the Terminal 5 site is paved and impacts are not expected to differ as a result of the proposed Project.

Operations

No additional excavation activities, either with or without shoring, are anticipated during operations under Alternatives 2 and 3. Therefore, on-site soils would not be exposed to erosion. The site would remain a flat surface of asphalt and concrete covering fill, sand and gravel, and estuarine sediments, making erosion negligible and impacts are not expected to differ from existing conditions.

EARTHWORK

Construction

Alternative 2 would require construction of approximately 1 acre of concrete RTG runways requiring approximately 12,000 cubic yards of excavation and fill. Stormwater improvements including excavation for vaults, repair, and new conveyance structures would cover approximately 3 acres and require approximately 4,000 cubic yards of excavation and fill. Approximately 30 acres of the facility pavement would be grounded and repaved with approximately 30,000 cubic yards of new asphalt added. New water lines and duct bank utility trenching would require approximately 10,000 cubic yards of excavation and fill over an area of approximately 4 acres. A new substation would require an area of approximately 1 acre for a new substation foundation.

Alternative 3 would require upgrades to the facility surface, upgrades to utilities, and construction of concrete RMG foundation and rails. New stormwater improvements may include excavation for vaults, repair, and new conveyance structures over an area of approximately 3 acres. This would

require approximately 4,000 cubic yards of excavation. Stormwater improvements in the upgraded rail yard would require additional utility trenching for conveyance and catch basins along with additional vaults. This activity would cover approximately 1 acre and require approximately 70,000 cubic yards of excavation and fill.

New truck circulation may require full depth replacement paving which would take place in an area of up to 15 acres and require approximately 33,000 cubic yards of new asphalt. Approximately 120 acres of the existing asphalt surface in the container yard would be re-ground and repaved with approximately 300,000 cubic yards of new asphalt. New water lines and duct bank utility trenching would require approximately 20,000 cubic yards over an area of approximately 8 acres. Construction of approximately 8 acres of concrete RMG runways would require approximately 70,000 cubic yards of excavation and fill for foundations. Approximately 10,000 cubic yards of excavation and fill would be required for a new substation foundation. New foundations for the expanded reefer racks may impact approximately 15 acres and require approximately 35,000 cubic yards of excavation and fill.

Dredging would remove between 45,000 to 49,000 yards of sediment.

Operations

No impacts are expected from existing conditions under Alternatives 2 and 3.

3.1.4 MITIGATION MEASURES

3.1.4.1 NO-ACTION ALTERNATIVE

EROSION

Construction

No construction other than minor repairs and upgrades is planned. All proposed work that would have the potential to expose soils would be completed with required best management practices (BMPs). Therefore, no additional mitigation is proposed.

Operations

During operation of the proposed alternatives, no additional excavation activities, either with or without shoring, are anticipated; thus, on-site soils would not expose soils to erosion. The site would remain a flat surface covered by asphalt and covering fill, sand and gravel, and estuarine sediments. No impacts are expected from the proposed Project operations.

3.1.4.2 ALTERNATIVES 2 AND 3

EROSION

Construction

Impacts would be limited by implementation of a site-specific Stormwater Pollution Prevention Plan (SWPPP) required under the state-mandated permit for all work that exposes soils or creates stockpiles. Impacts would also be limited by use of BMPs to control potential sources of erosion

implemented during all demolition and construction activities as consistent with the City of Seattle Stormwater, Grading, and Drainage Control Ordinance and DCI Director's Rules (City of Seattle Stormwater Code Chapter 22.800). No other mitigation is required.

Operations

No mitigation is required as a result of the proposed Project. Ongoing routine condition monitoring and evaluation of the pavement surface is necessary to predict and mitigate adverse effect of traffic loads, environmental degradation, and interaction of loads. Monitoring predicts necessary maintenance to ensure safe working surface and protect personnel and equipment. In addition, a specific monitoring program for the barrier remediation caps conducted by the Port is required by the EPA and Ecology. The cap monitoring program started following completion of the terminal in 1999 and would continue indefinitely. The monitoring program prescribes actions to ensure barrier cap continues to function as prescribed by agreed orders. See Section 3.5, for detailed information on the cap monitoring program.

SLOPE STABILITY

Construction

Planned slope stabilization techniques would consist of installation of up to approximately 3,000, 10- to 14-inch-diameter, approximately 60-foot-long, untreated timber piling, penetrating the existing riprap slope, underlying select fill material, and entering native sediment layers. The timber piling would be installed using impact and vibratory pile driving devices, with the finished piling installation matching the existing riprap slope gradient. In addition, a short "toe-wall" would be installed at the transition between the constructed riprap slope beneath the existing cargo wharf and the adjacent container vessel berth area to stabilize the bottom margin of the riprap armored slope. Approximately 3,100 linear feet of combined steel sheet piling and "HZ" steel piling would be installed at the toe-of-slope. The top elevation of the new "toe-wall" would vary between –42 and -50 feet MLLW. The toe-wall steel sheet and HZ piling would be installed using a vibratory pile driving device. Limited impact pile driving may be required to complete portions of toe-wall piling installation, if soil conditions impede vibratory pile driving installation.

Ground improvements and structural reinforcement of the slope are designed to meet or exceed the current condition safety factors and no slope stability impacts from construction are expected. The City of Seattle Building Code and building design standards establish (2012 IBC) requirement for the construction of above-ground structures. The Port has a Memorandum of Agreement with the City of Seattle to establish the basis of seismic design. The Port would apply its standards and specifications to the design of the proposed Project. See Appendix J in Volume II of this DEIS for a detailed discussion of slope stability during construction.

Operations

Operations would not create impacts to slope stability from current conditions under Alternatives 2 and 3.

3.1.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.1.5.1 ALL ALTERNATIVES

The proposed Project would not result in unavoidable significant adverse impacts related to earth and geology under any of the alternatives

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3.2 AIR QUALITY

A detailed analysis of the air quality implications of the Terminal 5 improvements was conducted, and a technical report is provided in Volume II, Appendix A (*Terminal 5 Wharf Rehabilitation, Berth Deepening, and Improvements Project, Air Quality Technical Report* [Ramboll Environ 2016a]). Information from the technical report was used in the preparation of this section.

3.2.1 REGULATORY CONTEXT

3.2.1.1 AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS

Air quality is generally assessed in terms of whether concentrations of air pollutants are higher or lower than ambient air quality standards set to protect human health and welfare. Ambient air quality standards are set for "criteria" pollutants (e.g., carbon monoxide [CO], particulate matter [in two size ranges described later], nitrogen dioxide [NO_2], and sulfur dioxide [SO_2]). Three agencies have jurisdiction over the ambient air quality near Terminal 5: the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA). These agencies establish regulations that govern the concentrations of pollutants in outdoor air. Although their regulations are similar in stringency, each agency has established its own ambient air quality standards. These standards have been set at levels that EPA and Ecology have determined will protect human health with a margin of safety, including the health of sensitive individuals such as the elderly, the chronically ill, and the very young. Applicable local, state, and federal ambient air quality standards are displayed in the modeling result tables of Section 3.2.2 and explained in further detail within Volume II, Appendix A of this DEIS.

Ecology and PSCAA maintain a network of air quality monitoring stations throughout the Puget Sound area. In general, these stations are located where there may be air quality problems, and so are usually in or near urban areas or close to specific large air pollution sources. Other stations located in more remote areas provide indications of regional or background air pollution levels.

Based on monitoring information for criteria air pollutants collected over a period of years, Ecology and EPA designate regions as being "attainment" or "nonattainment" areas for particular pollutants. Attainment status is, therefore, a measure of whether air quality in an area complies with the federal health-based ambient air quality standards for criteria pollutants. Once a nonattainment area achieves compliance with the National Ambient Air Quality Standards (NAAQSs), the area is considered an air quality "maintenance" area.

The Project study area is considered an air quality maintenance area for carbon monoxide (CO) and for fine particulate matter ($PM_{2.5}$). There have not been violations of the CO or the fine particulate matter ($PM_{2.5}$) standards in the area in many years.

3.2.1.2 AIR QUALITY CONFORMITY REVIEW

Federal air quality "conformity" rules (Transportation and General) require review of some projects in areas that are designated as nonattainment or maintenance for one or more air pollutants.

The Transportation conformity rules apply to large transportation projects and to components of other projects that would adversely affect operation of the regional transportation system. For this Project, this means considering the emissions of both CO and fine particulate matter (defined and discussed later) from off-site Project-related traffic. The transportation conformity review of the Terminal 5 Improvements Project was conducted using an approved method to consider the potential for pollutant "hot spots." The specific actions and pollutants considered for Transportation Conformity are described in Section3.2.2.

The General conformity rules apply to the portions of projects that are subject to permits or approvals by federal agencies. Each type of air quality conformity is discussed in further detail below. For the Terminal 5 Improvements Project, this means considering emissions of several air pollutants related to some parts of construction of the facility, while excluding both construction activities that are not subject to federal review and emissions from operation of the facility. The specific actions and pollutants considered for General Conformity are described in Section 3.2.2.

3.2.2 AFFECTED ENVIRONMENT

3.2.2.1 EXISTING AIR QUALITY CONDITIONS

Existing sources of air pollution in the vicinity of the proposed Project site include industry and transportation, including marine diesel-fueled vessels and both diesel and gas vehicles on the nearby roadways. Criteria air pollutants of primary concern are NO_2 and particulate matter (PM_{10} [coarse particulate matter of 10 microns in diameter or less] and $PM_{2.5}$ [fine particulate matter of 2.5 microns in diameter or less]). Other pollutants include ozone precursors (hydrocarbons and nitrogen oxides [NO_x]), SO_2, ozone, and CO. Given the setting, industrial and transportation sources likely comprise the largest contributors to ambient pollutant concentrations in the vicinity of the Project site. Wood smoke from residential wood combustion may also be a significant contributor to particulate matter concentrations during winter months.

Estimated existing concentrations of air pollutants in the general vicinity of the Project site were developed based on monitored air data during 2012–2014 at the Beacon Hill and 10th and Weller monitoring sites. Data from these monitors were used to estimate existing background concentrations for a variety of air pollutants. Modeled estimates of background provided by the Northwest International Air Quality Environmental Science and Technology Consortium[6] were used if monitoring data were unavailable. Additionally, if the monitor data were less than that of the modeled estimates, the higher value was used to remain conservative. The exception to this rule was the background 1-hour NO_2 concentrations from Beacon Hill. These measurements provided background NO_2 variations by season and by hour of day. Applying background in this manner is consistent with EPA methodologies used for permitting purposes and accounts for the considerable

[6] Northwest International Air Quality Environmental Science and Technology Consortium Overview (https://www.lar.wsu.edu/nw-airquest/lookup_overview.html).

variation in seasonal NO_2 concentrations. The background pollutant concentrations are included in the result tables in Section 3.2.2.

The pollutants of primary concern (particulates and NO_x) are described in more detail below. The other pollutants are described in further detail within Volume II, Appendix A.

3.2.2.2 INHALABLE COARSE AND FINE PARTICULATE MATTER

Particulate matter air pollution is generated by industrial activities, fuel combustion sources like marine vessels, residential wood burning, locomotives, motor vehicle engines and tires, and other sources. Federal, state, and local regulations set limits for particulate concentrations in the air based on the size of the particles and the related potential threat to health. There are currently health-based ambient air quality standards for PM_{10}, as well as for $PM_{2.5}$. $PM_{2.5}$ and even smaller (ultra-fine) particles are now thought to be the most harmful size fractions of airborne particulate matter.

With the revocation of the federal annual standard for PM_{10} in October 2006, the focus of ambient air monitoring and control efforts related to particle air pollution in the region has been almost entirely on $PM_{2.5}$. The background $PM_{2.5}$ concentrations, shown in the results tables in Section 3.2.2, represent about half the daily and annual NAAQSs. Particulate matter emissions attributable to Terminal 5 were analysed in detail as part of the air quality review documented here.

3.2.2.3 NITROGEN OXIDES

Collectively, nitric oxide and NO_2 are commonly called oxides of nitrogen or NO_x. Other oxides of nitrogen, including nitrous acid and nitric acid are part of the nitrogen oxide family. Of this family of gasses, NO_2 is the only component for which ambient air quality standards have been established. An annual average standard for NO_2 has been in effect for many years.

EPA adopted a new 1-hour standard for NO_2 that became effective in April 2010. NO_2 has not been measured in the Project vicinity, though measurements have been taken at Beacon Hill. The 1-hour (by season and by hour of day) NO_2 background concentrations (described above) and the reported annual average concentrations presented by the modeling results tables in Section 3.2.2 indicate that background NO_2 concentrations are well below the current NAAQSs. NO_2 concentrations attributable to sources associated with the proposed Terminal 5 Improvements Project are considered in detail in the air quality review documented in this report.

3.2.2.4 TOXIC AIR POLLUTANTS

In addition to the criteria air pollutants for which health-protective air quality standards have been set, fuel combustion sources emit a number of known or suspected toxic air pollutants that may be directly harmful due to their chemistry and/or cause cancer or other detrimental effects to human health with long-term exposure. Although there are not any specific health-related air quality standards for such pollutants, Ecology and have established screening levels for a variety of toxic air pollutants (TAPs) that can be used in assess predicted concentrations. One TAP, diesel engine exhaust particulate matter (DPM), was considered in this analysis. DPM is described in more detail in Volume II, Appendix A.

3.2.2.5 METEOROLOGICAL CONDITIONS AND CLIMATE

Air quality is substantially influenced by climate and meteorological conditions. Prevalent weather patterns and regional geography are major factors in both short- and long-term air quality conditions. The combination of mountains and water create a regional meteorology unique to the Pacific Northwest. The climate in the proposed Project study area is predominately temperate, characterized by wet, mild winters and dry, warm summers. The climate is influenced by the relative proximity of the Pacific Ocean and the Cascade Range of Washington State.

Wind direction and wind speed are affected by geography, so it is more difficult to represent predominant winds using more distant climatological data. A 5-year meteorological data set was created for purposes of dispersion modeling using data from PSCAA's Duwamish monitoring site. These data captured all hourly combinations of meteorological conditions from 2010 through 2014 and provided the basis of the air quality modeling. These meteorological data are described more thoroughly in Volume II, Appendix A.

3.2.2.6 GREENHOUSE GASES AND GLOBAL CLIMATE CHANGE

The phenomena of natural and human-caused effects on the atmosphere that cause changes in long-term meteorological patterns is known as climate change. Due to the importance of the greenhouse effect and related atmospheric warming to climate change, the gases that affect such warming are called greenhouse gasses (GHGs). The GHGs of primary importance are CO_2, methane, and nitrous oxide. Because CO_2 is the most abundant of these gases, GHGs are usually quantified in terms of CO_2e (carbon dioxide equivalent), based on their relative longevity in the atmosphere and the related "global warming potential" of these constituents. CO_2 is not considered an air "pollutant" that causes direct health-related effects, so it is not subject to ambient air quality standards used to gauge pollutant concentrations in the air.

Fuel combustion used for transportation is a significant source of GHG emissions, primarily through the burning of gasoline and diesel fuels. National estimates indicate the transportation sector (including on-road, construction, airplanes, and vessels) accounts for about 31 percent of total domestic CO_2e emissions from fossil fuels in 2014.[7] In an interim tabulation of 2012 emissions within Washington, Ecology estimated transportation accounted for about 46 percent of statewide GHG emissions;[8] the higher percentage is due to lower GHG emissions from electrical generation because the state relies heavily on hydropower for electricity.

[7] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2014*, April 2016, https://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Chapter-3-Energy.pdf .

[8] *2012 Washington State Greenhouse Gas Inventory Report Table,* http://www.ecy.wa.gov/climatechange/docs/2012GHGtable.pdf .

No specific federal, state, or local emission reduction requirements or targets are applicable to the proposed Project, and there are no generally accepted emission level thresholds against which to assess potential localized or global consequences of GHG emissions. Ecology has issued internal guidance to assist its staff in determining which projects should be evaluated and how to evaluate GHG emissions under SEPA.[9] This DEIS includes an analysis of GHG emissions that may be associated with construction and long-term emissions related to operations at the facility.

3.2.2.7 ANALYTICAL METHODS

EMISSION INVENTORY METHODS

The proposed modifications to Terminal 5 would result in emissions from ocean-going vessels, harbor craft, locomotives, cargo-handling equipment, and on-road trucks. The emissions derived from these sources change in response to fleet turnover, engine deterioration rates, and regulatory triggers. These sources of emissions and their forecast changes in emissions were considered in the analysis and documented here.

Emission Factor Tools and Sources

The emissions estimates for project-related sources employed several standard computer tools, as well as emission rate calculations using formulas published by the EPA, the California Air Resources Board, and topic-specific studies conducted by individual ports. Important assumptions employed in this portion of the assessment are provided in Volume II, Appendix A.

Facility Operational Criteria Pollutant Air Emissions

Combustion source emissions associated with operation of the terminal in 2020, 2030, and 2040 were estimated based on the maximum expected commodity throughput. The combustion source emissions assessment used detailed operational scenarios of peak hour, peak day, and annual levels of activities developed in discussions with the Port. Emission estimates considered the following sources:

- Vessels in transit, maneuvering, and hoteling at berth.
- Tugs assisting vessels during docking and undocking.
- Empty and loaded trains traveling between E Marginal Way S and the facility.
- A switch engine arranging train cars.
- Cargo handling equipment, including yard tractors, top-picks, rubber-tired gantry cranes, and rail-mounted gantry cranes.

On-road trucks traveling between E Marginal Way S and the facility, queueing before the main gate, queueing at the main gate, and traveling on the facility.

[9] *Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews.* June 2011.

Appendix A details the critical assumptions regarding terminal operations and basic dispersion modeling parameters associated with Project-related combustion sources.

GREENHOUSE GAS EMISSIONS

Short-term GHG emissions associated with construction and long-term emissions related to operation of the proposed facility were estimated based on the proposed configurations and combustion source activity. Those emissions estimates considered combustion source emissions directly related to the construction and operation of the facility (Scope 1), indirect emissions from purchased energy (Scope 2), and indirect emissions due to combustion sources associated with the operational activities of the facility (Scope 3). Emissions of CO_2, N_2O, and CH_4 were calculated using the assumptions and models described in Volume II, Appendix A, Table 2.

3.2.2.8 DISPERSION MODELING

Air quality dispersion modeling simulations were used to estimate air pollutant concentrations due to emissions from on-site emission sources associated with selected alternatives and throughputs. This section discusses the methods used to develop these simulations for Terminal 5.

MODEL USED

The EPA has designated AERMOD as the preferred guideline air dispersion model for air dispersion modeling (EPA "Guideline on Air Quality Models," codified as Appendix W to 40 CFR Part 51) for complex source configurations and for sources subject to exhaust plume downwash. The most recent version of AERMOD (version 15181) was employed with meteorological data from PSCAA's Duwamish monitoring station and regional upper air data from Quillayute, Washington. Missing surface data observations were substituted from the Boeing Field station. The meteorological pre-processing also included an analysis of the physical characteristics of land use surrounding the terminal.

Dispersion modeling calculates pollutant concentrations at locations referred to as receptors. The Terminal 5 dispersion modeling analyses used receptors spaced 1,000 meters apart covering the 10-kilometer (km) by 15-km simulation domain, with a 10-km by 10-km nested receptor grid at 500-meter (m) spacing; a 5-km by 5-km nested receptor grid at 200-m spacing; a 3-km by 3-km nested receptor grid at 50-m spacing; a 1.8-km by 1.8-km nested receptor grid at 25-m spacing; and fence line receptors with 10-m spacing. The modeling domain and receptor locations are depicted in Figure 3.2.1. Note that the dispersion modeling results discussed in Section 3.2.2 present the maximum concentrations of each pollutant from the more than 7,000 receptors displayed in Figure 3.2.1.

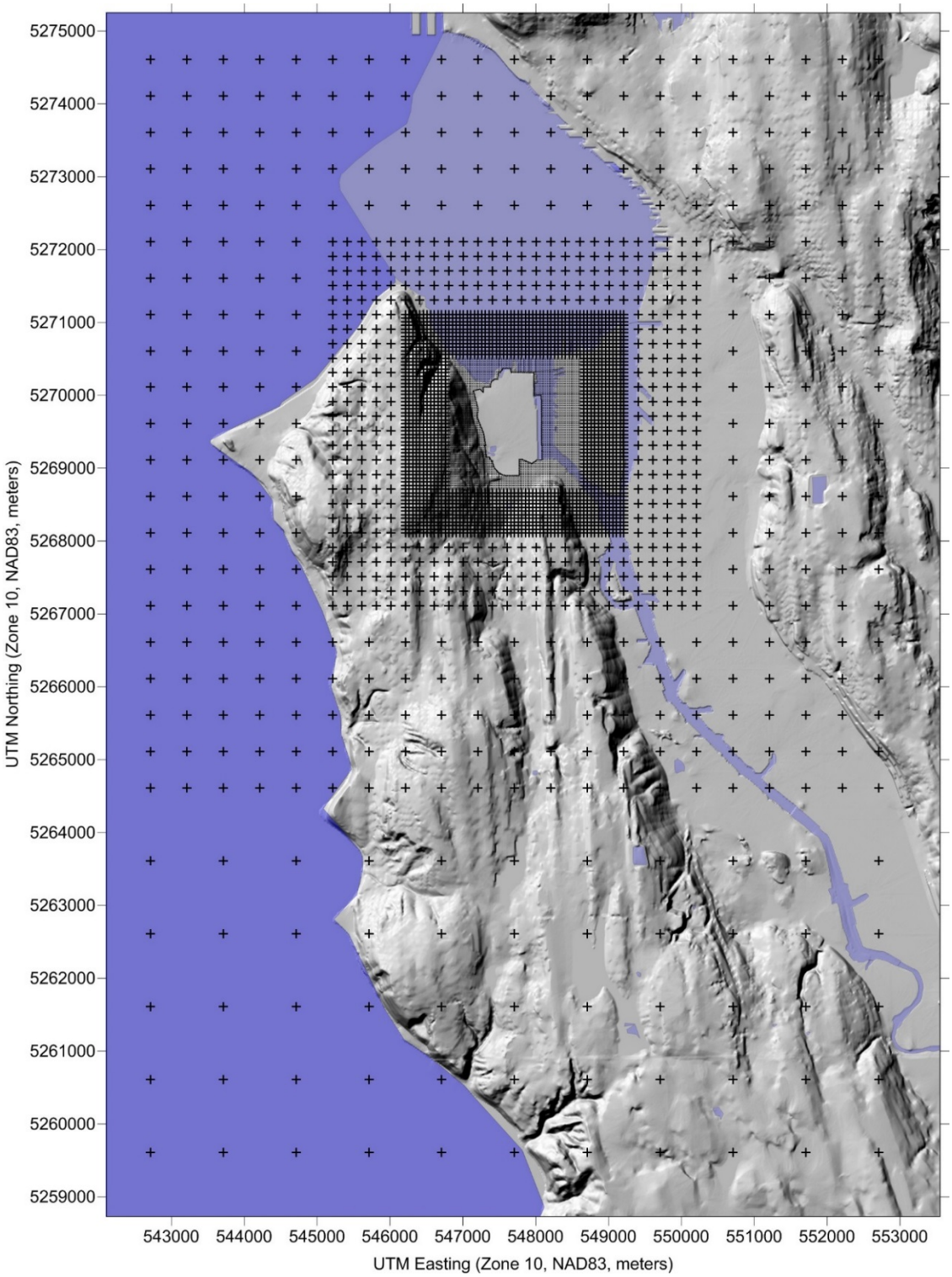

Figure 3.2.1: AERMOD Modeling Domain and Receptor Locations

OPERATIONAL SCENARIO SELECTION

Six modeling scenarios were developed for the terminal based on alternative throughputs and associated modeling years. The modeling analysis assumed peak throughput operation for all emission source activities. The selected modeling scenarios considered with air quality modeling are shown in Table 3.2-1 with filled cells. Empty cells in this table were not considered with modeling because operations would not be possible due to physical and year-based economic limitations of the facility.

Table 3.2-1: Operational Scenarios Considered with Air Quality Modeling

Operational Scenarios Considered with Air Quality Modeling				
Throughput	**Year**	**Alternative 1**	**Alternative 2**	**Alternative 3**
647,000 TEU	2020	✓	✓	✓
1,270,000 TEU	2030		✓	✓
1,700,000 TEU	2040			✓

Modeling was not conducted for the 2030 and 2040 throughput scenarios for Alternative 1, or the 2040 throughput scenario for Alternative 2. Alternative 1, with no improvements, would not allow the Port to expand throughput beyond 647,000 twenty-foot equivalent units (TEUs). Similarly, Alternative 2 could not support 1,700,000-TEU throughput without the cargo-handling equipment changes proposed in Alternative 3. Assessing emissions in future years without additional growth in throughput would result in lower emissions due to fleet turnover and regulatory changes. In other words, the scenarios not modeled would be expected to produce lower maximum concentrations than the modeled scenarios. The selected scenarios provided in Table 3.2-1 are reflective of the most conservative configurations with the highest emissions and maximized throughput. See Table 3.2-2 for total emissions (reported in tons per year) expected for each alternative in each year.

TRANSPORTATION CONFORMITY "HOT-SPOT" MODELING

The need for CO and PM hot-spot modeling was assessed using traffic data (Volume II, Appendix C of this DEIS) to determine intersection level of service (LOS) and to assess diesel truck volumes.[10] Data for the worst-performing intersection indicates the LOS and delays at SW Spokane Street, W Marginal Way S, and Chelan Avenue SW would be two or more times worse than any other intersection under every alternative. Since idling vehicle emissions represent the greatest source of traffic-related CO emissions, this five-way intersection was selected for quantitative CO "hot-spot" modeling. The quantitative hot-spot modeling used emission factors from the EPA Motor Vehicle Emission Simulator model and assessed dispersion using the EPA's CAL3QHC intersection model.

[10] *Transportation Technical Report for Draft EIS*, Heffron Transportation, Inc., May 5, 2016

Details on the development of emission factors and the configuration of the dispersion model are provided in Volume II, Appendix A.

PM hot-spot analyses are only required for transportation projects that involve significant levels of diesel vehicle traffic. EPA has indicated facilities serving greater than 125,000 annual average daily traffic with 8 percent or more (i.e., 10,000 or more) of such annual average daily traffic as diesel truck traffic would be considered a significant level of diesel vehicle traffic.[11] Based on review of the traffic study, the maximum total average daily trips would occur in 2040 with the Project. Under Alternative 3 in 2040, Terminal 5 is expected to serve 3,320 average daily truck trips and 4,660 design day truck trips. These volumes are well below the 10,000 average annual daily truck trips that would represent significant levels of diesel vehicle traffic. Therefore, a quantitative hot-spot analysis was not required for PM per EPA guidance.

3.2.3 IMPACTS

3.2.3.1 NO-ACTION ALTERNATIVE

CONSTRUCTION

As indicated in the Project description, Alternative 1 represents no change to the current facility or operating practices except for minor maintenance and repair. Without wharf rehabilitation, berth deepening, or other improvements, no construction-related emissions would be produced.

OPERATIONAL EMISSIONS

The total estimated annual operational emissions for the three DEIS alternatives are presented in Table 3.2-2. Detailed emission factors and source-specific annual emission totals are provided as attachments in Volume II, Appendix A. Note that the shaded scenarios in Table 3.2-2 were not considered with air quality dispersion modeling because they represent conditions with no operational or site configuration changes. Emissions for these scenarios are presented for comparison with those scenarios that were evaluated with modeling.

The shaded scenarios shown in in Table 3.2-2 have estimated emissions equal to or less than with the same facility configurations in the decade prior (e.g., Alternative 2 at 1.3 million-TEU throughput in 2040 has lower emissions than Alternative 2 at 1.3 million-TEU throughput in 2030). These decreases are due to equipment fleet turnover. For these reasons, there was no need to conduct modeling to be able to conclude that emissions associated with the shaded scenarios would be expected to comply with the NAAQS if the prior decade scenario was in compliance.

[11] *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas*. USEPA, November 2015.

Table 3.2-2: Annual Project Emissions (tons per year)

Pollutant	2020			2030			2040		
	647K TEUs			647K TEUs	1.3M TEUs		647K TEUs	1.3M TEUs	1.7M TEUs
	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
CO	49.7	42.4	20.6	39.2	52.6	26.5	37.4	42.5	29.5
NO_2	254.5	180.9	115.1	161.1	156.7	93.3	154.6	117.6	82.2
$PM_{2.5}$	7.0	6.0	2.6	4.8	5.9	2.9	4.5	4.0	2.8
PM_{10}	7.4	6.3	2.8	5.2	6.4	3.3	4.8	4.4	3.2
SO_2	8.0	4.3	3.5	8.0	5.1	4.0	8.0	3.6	3.4

Note: The shaded cells indicate scenarios that were not considered with air quality modeling but that are expected to comply with the NAAQSs because, for the same alternative, the emissions decreased from the prior decade and no operational or configuration changes occurred between the two decades.

K = thousand
M = million
TEU = twenty-foot equivalent unit

INTRA-YEAR COMPARISONS

Table 3.2-2 indicates nearly all criteria pollutant emissions would decrease with modernization and upgrades of the Terminal 5 facility. The exception to the emission reduction trend is the expected change in emissions between Alternative 1 and Alternative 2 in 2030 for PM and CO, and in 2040 for CO. These increases are attributable to the increased activities required to accommodate a 1.3 million-TEU throughput with Alternative 2. Additionally, the larger potential vessel sizes expected with the action alternatives also contribute to these exceptions in the emission reduction trend.

MODELED SCENARIOS

For the scenarios that were considered with air quality modeling shown in Table 3.2-2 (i.e., the non-shaded cells), emission decreases between Alternatives 1 and 2 in 2020 are attributable to (1) fewer vessels calling on the Port due to increased vessel TEU capacity and (2) a projected 30 percent use rate of shorepower (there is no shorepower available for the no-build scenario).

The decreases in emissions from Alternative 2 to Alternative 3 in 2020 are largely due to the electrification of the majority of container-handling equipment activities. As Alternative 2 and Alternative 3 progress into years beyond 2020, their respective activity levels increase with throughput, but they benefit from increasingly greater use of shorepower and vehicle fleet turnover, which result in reduced overall emissions, except for CO and sulfur dioxide (SO_2). The estimates for CO and SO_2 increase with activity and do not have the same pronounced reductions in

future years as the other pollutants. For Alternatives 2 and 3, the anticipated emissions reductions expected to result from use of shorepower are shown in Table 3.2-3. The emissions reductions due to use of shorepower are higher with Alternative 2, 2040 than Alternative 3, 2040 because the expected numbers of hours spent at berth are higher in Alternative 2 due to more cargo handling equipment electrification, resulting in increased efficiency, but the total ship emissions are lower with Alternative 3.

Table 3.2-3: Reduction in Annual Emissions with Shorepower (tons per year)

Pollutant	Alternative 2			Alternative 3		
	2020	**2030**	**2040**	**2020**	**2030**	**2040**
Shorepower Efficacy:	30%	50%	70%	30%	50%	70%
CO	3.9	9.3	13.0	3.1	7.8	12.3
NO_2	34.3	56.4	79.0	27.2	47.5	74.4
PM_{10}	0.6	1.5	2.1	0.5	1.3	2.0
$PM_{2.5}$	0.6	1.4	2.0	0.5	1.2	1.9
SO_2	1.5	3.5	5.0	1.2	3.0	4.7

OPERATIONAL OFF-SITE CONCENTRATIONS

With no physical changes to Terminal 5, operations would be consistent with those that have occurred in the past. Potential emissions would be lower than in the past because engine emissions are generally decreasing over time with fleet turnover and because equipment are increasingly required to use ultra-low sulfur distillate fuel.

As noted above, pollutant concentrations were calculated at more than 7,000 locations in the vicinity of Terminal 5. Of all those receptors, the highest model-predicted concentrations of criteria air pollutants attributable to capacity operation of Terminal 5 in 2020 are presented in Table 3.2-4 indicates the maximum predicted concentrations of all pollutants comply with ambient air quality standards.

Table 3.2-4: Alternative 1 Modeling Results: Maximum Criteria Pollutant Concentrations (µg/m^3)

Criteria Air Pollutant	Averaging Time	Background Concentration [(a)]	Project-Related Concentration [(b)(c)]	Project Concentration with Background	Ambient Standard [(d)]
			2020 647K TEUs	2020 647K TEUs	
CO	1-hour	3,779	72.1	3,850.6	40,000
	8-hour	1,947	48.3	1,994.8	10,000
NO_2	1-hour	Varies [(e)]	N/A	183.7	188
	Annual	26.3	50.2	76.5	100
$PM_{2.5}$	24-hour	21	4.4	25.4	35
	Annual	8.1	1.3	9.4	12
PM_{10}	24-hour	48	5.9	53.9	150
SO_2	1-hour	68.1	20.2	88.3	196
	3-hour	52.4	17.0	69.4	1,310
	24-hour	21.5	13.2	34.7	365 [(f)]
	Annual	3.7	1.7	5.4	52 [(f)]

Note:

(a) Background concentrations (expressed as micrograms per cubic meter [µg/m3]) based on the higher of nearby monitor design values (identified as complete by EPA) or values provided by Northwest Airquest 2009–2011 design values specific to the Terminal 5 location, except for 1-hour NO_2.

(b) Reported pollutant concentrations are those occurring at the maximum impact location for each pollutant. Concentrations at all other locations are less than those reported here.

(c) Except as noted below, all short-term concentrations are based on modeling that considered maximum hourly activity during every hour of the 5-year meteorological data set, which is not a possible actual level of activity. These results therefore represent intentionally conservative conditions. Note that consistent with EPA guidance, the annual modeling results are based on 5-year averages from the 5-year meteorological data set instead of 3-year, as per the NAAQSs.

(d) All ambient concentrations are expressed in terms of µg/m3; importantly, other sources may report the ambient air quality standard concentrations in parts per million (ppm) or parts per billion (ppb).

(e) Hourly and seasonal variation were assessed at Beacon Hill and incorporated into the dispersion model. The use of this form of background concentrations is consistent with EPA guidance.

(f) Denotes Washington State ambient air quality standard only (i.e., no federal standard).

3.2.3.2 ALTERNATIVE 2

CONSTRUCTION

The Terminal 5 wharf rehabilitation, berth deepening, and other improvements associated with Alternatives 2 and 3 would include construction of new on-site buildings and other substantial infrastructure improvements. Such activities could result in temporary, localized increases in

particulate concentrations due to emissions from construction-related sources. For example, dust from construction activities such as excavation, grading, sloping, and filling would contribute to ambient concentrations of suspended particulate matter. Construction contractor(s) would be required to comply with PSCAA regulations requiring that reasonable precautions be taken to minimize dust emissions. Further consideration of construction activities is described in Volume II, Appendix A.

With implementation of the controls required for the various aspects of construction activities and consistent use of best management practices (BMPs) to minimize on-site emissions, construction of the proposed Project would not be expected to significantly affect air quality. The construction-related emissions are described in Section 3.2.2.5.

OPERATIONAL EMISSIONS

Total Project emissions of criteria air pollutants for Alternative 2 operation in 2020 and 2030 are presented in Table 3.2-2. Detailed emission factors and source-specific annual emission totals are provided as attachments in Volume II, Appendix A of this DEIS. Emission factors are, in many cases, lower in 2030 than 2020 because engine emissions are generally decreasing over time with fleet turnover, increased use of ultra-low sulfur distillate fuel, and use of shorepower. However, in some instances, total emissions are higher in 2030 due to the increased intermodal activity anticipated in 2030. The trends in emissions across alternatives and throughputs are described in more detail in Section 3.2.3.1.

OPERATIONAL OFF-SITE CONCENTRATIONS

The physical and operational changes associated with Alternative 2 would enable an increase in container throughput capacity. Model-predicted concentrations of criteria air pollutants attributable to capacity operation in 2020 and 2030 are presented in Table 3.2-5. As shown in Table 3.2-5, the maximum model-predicted concentrations of all pollutants comply with ambient air quality standards.

Table 3.2-5: Alternative 2 Modeling Results: Maximum Criteria Pollutant Concentrations (µg/m^3)

Criteria Air Pollutant	Averaging Time	Background Concentration [a]	Project-Related Concentration [b][c]		Project-Related Concentration with Background		Ambient Standard [d]
			2020 647K TEU	2030 1.27M TEU	2020 647K TEU	2030 1.27M TEU	
CO	1-hour	3,779	102.4	102.3	3,880.9	3,880.8	40,000
	8-hour	1,947	67.8	67.8	2,014.3	2,014.3	10,000
NO_2	1-hour	Varies [e]	N/A	N/A	179.6	163.3	188
	Annual	26.3	48.7	34.5	75.0	60.8	100
$PM_{2.5}$	24-hour	21	6.4	6.2	27.4	27.2	35
	Annual	8.1	1.5	1.2	9.6	9.3	12
PM_{10}	24-hour	48	8.7	8.5	56.7	56.5	150
SO_2	1-hour	68.1	30.1	30.1	98.2	98.2	196
	3-hour	52.4	25.2	25.3	77.6	77.7	1,310
	24-hour	21.5	19.7	19.7	41.2	41.2	365 [f]
	Annual	3.7	1.7	1.7	5.4	5.4	52 [f]

Note:

(a) Background concentrations (expressed as micrograms per cubic meter[µg/m^3]) based on the higher of nearby monitor design values (identified as complete by EPA) or values provided by Northwest Airquest 2009–2011 design values specific to the Terminal 5 location, except for 1-hour NO_2.

(b) Reported pollutant concentrations are those occurring at the maximum impact location for each pollutant. Concentrations at all other locations are less than those reported here.

(c) Except as noted below, all short-term concentrations are based on modeling that considered maximum hourly activity during every hour of the 5-year meteorological data set, which is not a possible actual level of activity. These results therefore represent intentionally conservative conditions. Note that consistent with EPA guidance, the annual modeling results are based on 5-year averages from the 5-year meteorological data set instead of 3-year as per the NAAQSs.

(d) All ambient concentrations are expressed in terms of µg/m^3; importantly, other sources may report the ambient air quality standard concentrations in parts per million (ppm) or parts per billion (ppb).

(e) Hourly and seasonal variation were assessed at Beacon Hill and incorporated into the dispersion model. The use of this form of background concentrations is consistent with EPA guidance.

(f) Denote Washington State ambient air quality standard only (i.e., no federal standard).

3.2.3.3 ALTERNATIVE 3

CONSTRUCTION

As described in Section 3.2.2.2, Alternatives 2 and 3 have the same construction-related improvements, despite the distinct differences in operations. The construction-related emissions associated with Alternatives 2 and 3 are described in Section 3.2.2.2.

OPERATIONAL EMISSIONS

Total Project emissions for Alternative 3 operation in 2020, 2030, and 2040 are presented in Table 3.2-2. Detailed emission factors and source-specific annual emission totals are provided as attachments in Volume II, Appendix A of this DEIS. Emission factors are, in many cases, lower in successive years because engine emissions are generally decreasing over time and because vehicles are increasingly required to use ultra-low sulfur distillate fuel. However, Project-specific total emissions, in some cases, rise due to the increased intermodal activity. The trends in emissions across alternatives and throughputs are described in more detail in Section 3.2.2.1.

OPERATIONAL OFF-SITE CONCENTRATIONS

The physical and operational changes associated with Alternative 3 would enable an increase in container throughput capacity. The maximum model-predicted concentrations of criteria air pollutants attributable to capacity operation in 2020, 2030, and 2040 are presented in Table 3.2-6. As shown in Table 3.2-6**,** the maximum model-predicted concentrations of all pollutants comply with ambient air quality standards. Increased electrification and lower engine emissions offset the increase in container throughput capacity to result in lower future concentrations.

3.2.3.4 HUMAN HEALTH

Potential health risks resulting from emissions of diesel exhaust particulate matter (DPM) and $PM_{2.5}$ associated with the proposed Project were evaluated for nearby residences and the communities of Georgetown and South Park. Future ambient air concentrations of DPM and $PM_{2.5}$ were modeled to establish baseline (Alternative 1) air quality and the implications for air quality with Alternatives 2 and Alternative 3. Health risks were modeled for both cancer and noncancer health endpoints. Changes in air quality resulting from Alternatives 2 and 3 were small, and the resulting changes in health risks relative to baseline were correspondingly small. The maximum modeled DPM and $PM_{2.5}$ concentrations are associated with Alternative 2 (year 2020) and are similar to the No-Action Alternative 1. Thus, there is no anticipated change in health impacts associated with the Project when considering the alternative and time-frame when air concentrations are expected to be greatest. While Alternative 3 (year 2040) is expected to result in the largest decrease in concentrations from baseline, the corresponding observed improvement in the health outcomes relative to baseline is negligible. A detailed report describing the methods and results for the health risk characterization is provided in Volume II, Appendix A of this DEIS.

Table 3.2-6: Alternative 3 Modeling Results: Maximum Criteria Pollutant Concentrations (µg/m^3)

Criteria Air Pollutant	Averaging Time	Back-ground Concentration [(a)]	Project-Related Concentration [(b)(c)]			Project-Related Concentration with Background			Ambient Standard [(d)]
			2020 647K TEU	2030 1.27M TEU	2040 1.70M TEU	2020 647K TEU	2030 1.27M TEU	2040 1.70M TEU	
CO	1-hour	3,779	94.7	94.7	94.8	3,873.2	3,873.2	3,873.3	40,000
	8-hour	1,947	62.8	62.7	63.1	2,009.3	2,009.2	2,009.6	10,000
NO_2	1-hour	Varies [(e)]	148.3	139.5	139.1	148.3	139.5	139.1	188
	Annual	26.3	33.0	23.3	17.7	59.3	49.6	44.0	100
$PM_{2.5}$	24-hour	21	5.9	5.8	5.8	26.9	26.8	26.8	35
	Annual	8.1	0.7	0.7	0.5	8.8	8.8	8.6	12
PM_{10}	24-hour	48	8.2	8.2	8.2	56.2	56.2	56.2	150
SO_2	1-hour	68.1	30.0	30.0	30.0	98.1	98.1	98.1	196
	3-hour	52.4	25.2	25.2	25.2	77.6	77.6	77.6	1,310
	24-hour	21.5	19.6	19.6	19.6	41.1	41.1	41.1	365 [(f)]
	Annual	3.7	1.3	1.4	1.0	5.0	5.1	4.7	52 [(f)]

Note:

(a) Background concentrations (expressed as micrograms per cubic meter [µg/m^3]) based on the higher of nearby monitor design values (identified as complete by EPA) or values provided by Northwest Airquest 2009-2011 design values specific to the Terminal 5 location, except for 1-hour NO_2.

(b) Reported pollutant concentrations are those occurring at the maximum impact location for each pollutant. Concentrations at all other locations are less than those reported here.

(c) Except as noted below, all short-term concentrations are based on modeling that considered maximum hourly activity during every hour of the 5-year meteorological data set, which is not a possible actual level of activity. These results therefore represent intentionally conservative conditions. Note that consistent with EPA guidance, the annual modeling results are based on 5-year averages from the 5-year meteorological data set instead of 3-year as per the NAAQSs.

(d) All ambient concentrations are expressed in terms of µg/m^3; importantly, other sources may report the ambient air quality standard concentrations in parts per million (ppm) or parts per billion (ppb).

(e) Hourly and seasonal variation were assessed at Beacon Hill and incorporated into the dispersion model. The use of this form of background concentrations is consistent with EPA guidance.

(f) Denote Washington State ambient air quality standard only (i.e., no federal standard).

3.2.3.5 DIESEL PARTICULATE MATTER

Potential off-site concentrations of DPM associated with Project emission sources were evaluated using $PM_{2.5}$ emissions as a surrogate for DPM emissions. $PM_{2.5}$ concentrations across the entire modeling domain receptor grid were predicted using AERMOD. The results were used to produce isopleths of estimated annual average DPM concentrations.

Predicted concentrations can be compared to a range of DPM unit risk factors to assess potential health implications. Ecology has adopted a DPM Acceptable Source Impact Level (ASIL) for use in the permit process for industrial facilities. However, the basis of Washington's ASIL value has been questioned by numerous recent studies. The inadequacy of the DPM ASIL is discussed at length in Volume II, Appendix A, Attachment C of this DEIS.

The EPA has not adopted a cancer risk factor for DPM because of uncertainties in the underlying health risk data. However, in 2002 the EPA suggested a range of values for assessing DPM risk: 1 x 10^{-5} – 1 x 10^{-3} micrograms per cubic meter ($\mu g/m^3$). In practical terms, this means the increased risk of cancer after a 70-year exposure to 1 $\mu g/m^3$ DPM is between 1 in 100,000 and 1 in 1,000. Figure 3.2.2 and Figure 3.2.3 indicate predicted DPM concentrations in neighborhoods west and south of the site are about 0.1 $\mu g/m^3$ with No Action and approximately 0.01 $\mu g/m^3$ with Alternative 3 in 2040, a 10-fold improvement. The model-predicted concentrations of DPM associated with Alternative 2 were within the bounds of the DPM results identified for Alternatives 1 and 3. Consequently, the isopleths and maximum concentrations were not provided in the figure section of Volume II, Appendix A of this DEIS , but instead are provided in Volume II, Appendix A, Attachment C of this DEIS.

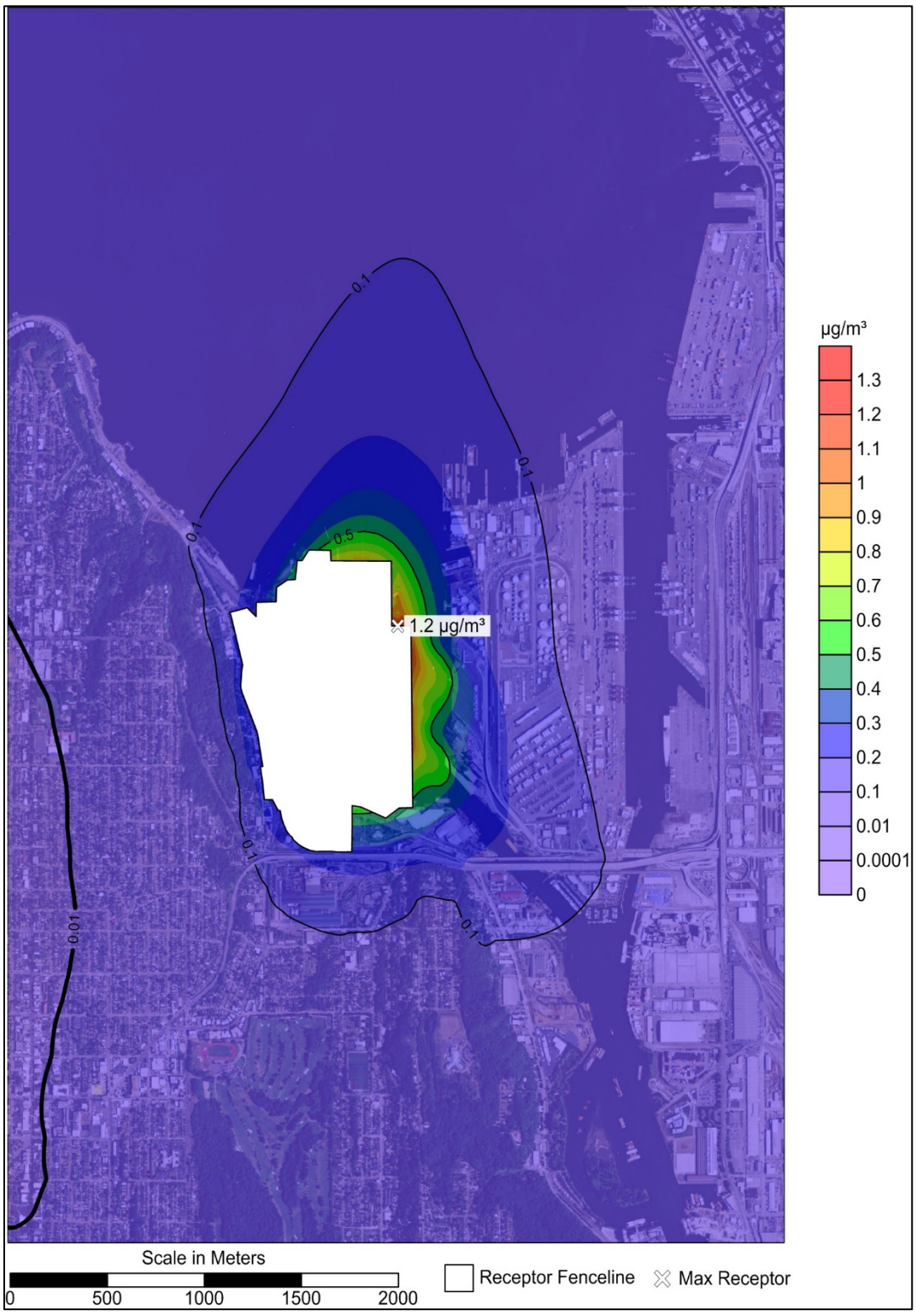

Figure 3.2.2: Alternative 1 (2020): Model-Calculated Diesel Particulate Concentrations

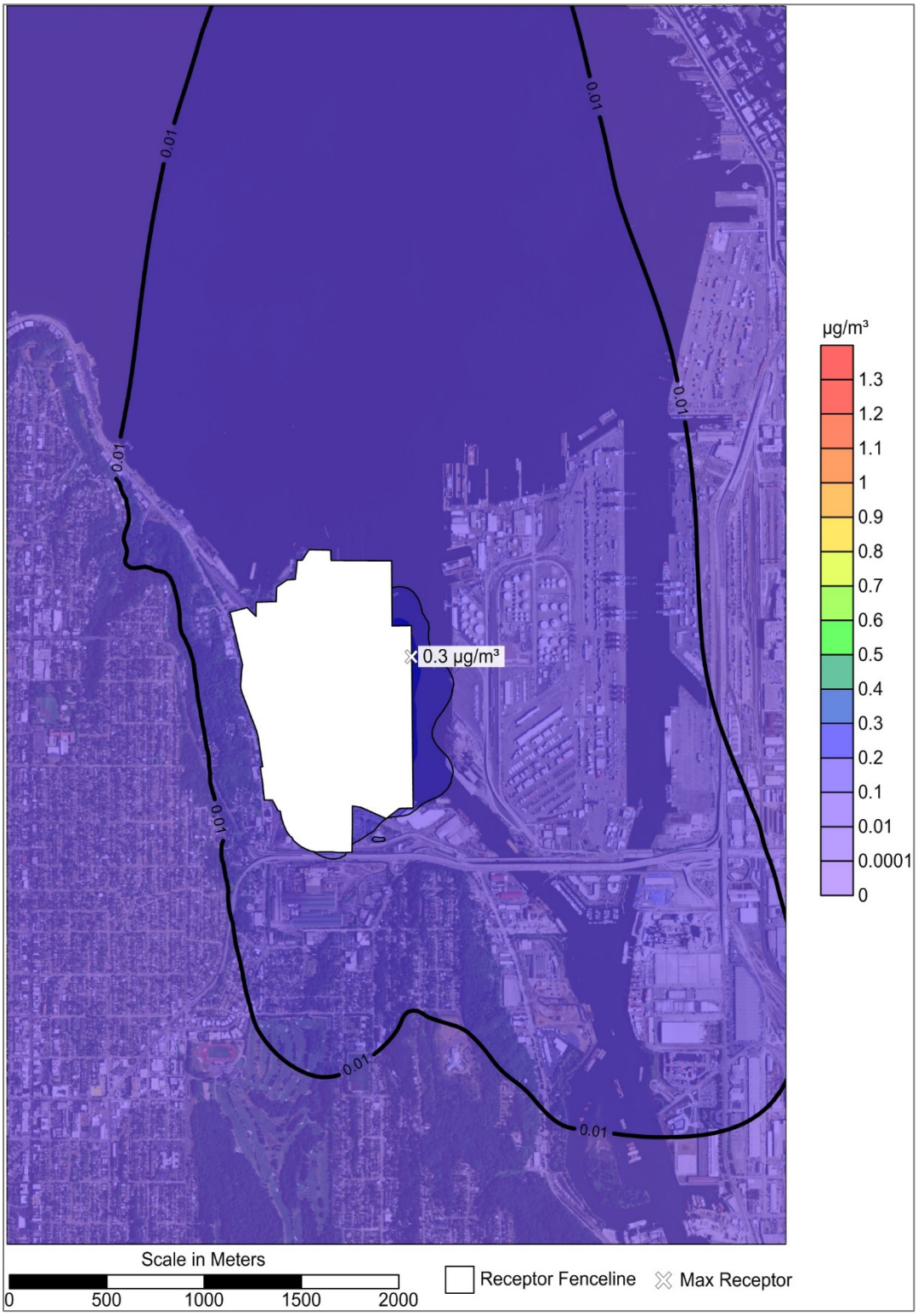

Figure 3.2.3: Alternative 3 (2030): Model-Calculated Diesel Particulate Concentrations

3.2.3.6 GREENHOUSE GAS EMISSIONS

In order to evaluate the potential for climate change due to the Terminal 5 action alternatives, direct GHG emissions associated with implementation of the Project were calculated based on fuel combustion related to construction of the facility, operation of the facility, indirect activities associated with Project actions, and purchased electricity.

CONSTRUCTION-RELATED GREENHOUSE GAS EMISSIONS

The construction-related GHG assessment was based on estimates of emissions from facility construction using expected construction equipment (specified by Source Category Code and horsepower) and the time all such equipment is expected to be active. Each phase of construction was considered separately and in detail. GHG emissions were tabulated based on emission rates estimated using the EPA NONROAD emissions model and the specific equipment population in King County, Washington. The emissions estimates considered both landside and in-water equipment.

In total, the estimated lifespan emissions attributable to the Project are about 12,000 million metric tons of carbon dioxide equivalent ($MTCO_2e$) over the three-season construction period.[12] A summary of the GHG emissions calculations is presented in Table 3.2-7. As shown, direct annual GHG emissions are less than 6,000 $MTCO_2e$ during each of the first two years of construction and even less in the final year. No additional analysis is required of projects that are expected to produce an average of less than 10,000 metrics tons of CO_2e per year.[13]

Table 3.2-7: Construction-Related GHG Emissions (tonnes)

Construction Phase	CO_2	N_2O	CH_4	CO_2e
Phase I (year 1)	1,679	11.90	26.78	5,896
Phase II (year 2)	1,529	10.83	24.38	5,367
Phase III (year 3)	206.7	1.46	3.29	725.1
Total	**3,415**	**24.20**	**54.45**	**11,987**

Note:
CO_2 = carbon dioxide
N_2O = nitrous oxide
CH_4 = methane
CO_2e = carbon dioxide equivalent

[12] $MTCO_2e$ is defined as Metric Ton Carbon Dioxide Equivalent; equates to 2,204.62 pounds of CO_2. This is a standard measure of amount of $C0_2$.

[13] *Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews*. June 2011.

OPERATIONAL GREENHOUSE GAS EMISSIONS

Long-term (operational) GHG emissions were estimated for on-site sources as well as limited off-site locomotive, vessel, and truck emissions. The operational GHG emissions were quantified within the immediate vicinity of Terminal 5 and were based on Project-specific operations. Statewide, off-site emissions from locomotives, vessels, and on-road trucks were not quantified because they are expected to improve under either action alternative. By leasing Terminal 5, business entities would be seeking to improve their transportation efficiency and cutting associated costs. The Terminal 5 action alternatives would enable larger vessels to serve Seattle and the surrounding region. These larger vessels are more fuel efficient and therefore produce less GHGs per unit of cargo. The improvement in transportation efficiency would be concurrent with improvements in environmental efficiency. Table 3.2-8 identifies the total estimates annual Terminal 5 GHG emissions.

Table 3.2-8: Operational Greenhouse Gas Emissions

Operational Emissions	Annual Emissions CO_2e - Metric Tons					
	Alt 1 647K TEUs 2020	**Alt 2 647K TEUs 2020**	**Alt 2 1.3M TEUs 2030**	**Alt 3 647K TEUs 2020**	**Alt 3 1.3M TEUs 2030**	**Alt 3 1.7M TEUs 2040**
Direct Emissions						
On-Site Cargo-Handling Equipment	36,176	33,419	82,229	10,754	20,742	27,578
Indirect Emissions						
Purchased Energy [(a)]	0	0	0	0	0	0
Employee Commute[(b)]	--	--	--	--	--	--
Rail Product Delivery [(c)]	2,914	2,914	5,733	2,888	5,733	7,620
On-road Truck Delivery [(d)]	2,164	2,164	2,108	2,164	2,108	1,746
Vessel Product Delivery [(e)]						
Transiting	13,884	9,076	16,625	9,076	16,625	16,144
Hoteling	53,669	31,639	26,872	25,503	22,121	15,271
Annual Facility-Related GHG Emissions	108,808	79,211	133,568	50,385	67,329	68,359

Note:

(a) Seattle City Light operates as a "Zero-net Carbon" entity. Their fuel mix is heavily dependent on hydroelectric power and other fuels that produce carbon are offset. Because of these offsets, the purchased energy CO_2e emissions are zero. (http://www.seattle.gov/light/enviro/).

(b) Construction employee data were not available at the time of this analysis.

(c) ”Rail Product Delivery" refers to locomotive operations to and from E Marginal Way S and operation on-site. Note that these projected emissions do not consider the GHG emission reductions that would result from the use of automatic enginer start/stop (AESS) to shut down unneeded locomotives because AESS is not used all the time (i.e., when temperature are less than about 40°Fahrenheit). Since temperatures exceed 40°Fahrenheit about 85 percent of the time, the locomotive AESS would reduce GHG to less than represented in this tabulation.

(d) “On-road Truck Delivery” refers to truck movements to and from E Marginal Way, but does not consider on-site truck queue idling or movements. On-site truck activity is captured as direct emissions.

(e) "Vessel Product Delivery" Transiting emissions represent engine and boiler combustion emissions associated with transiting activities during the arrival and departure of vessels and assist tugs. Hoteling emissions are vessel-related combustion emissions from the auxiliary engines and boilers while the vessels are docked at the wharf.

(f) Seattle City Light operates as a "Zero-net Carbon" entity. Their fuel mix is heavily dependent on hydroelectric power and other fuels that produce carbon are offset. Because of these offsets, the purchased energy CO_2e emissions are zero. (http://www.seattle.gov/light/enviro/).

(g) Construction employee data were not available at the time of this analysis.

(h) ”Rail Product Delivery" refers to locomotive operations to and from East Marginal Way S and operation on-site. Note that these projected emissions do not consider the GHG emission reductions that would result from the use of automatic enginer start/stop (AESS) to shut down unneeded locomotives because AESS is not used all the time (i.e., when temperature are less than about 40°Fahrenheit). Since temperatures exceed 40°Fahrenheit about 85 percent of the time, the locomotive AESS would reduce GHG to less than represented in this tabulation.

(i) “On-road Truck Delivery” refers to truck movements to and from East Marginal Way, but does not consider on-site truck queue idling or movements. On-site truck activity is captured as direct emissions.

(j) "Vessel Product Delivery" Transiting emissions represent engine and boiler combustion emissions associated with transiting activities during the arrival and departure of vessels and assist tugs. Hoteling emissions are vessel-related combustion emissions from the auxiliary engines and boilers while the vessels are docked at the wharf.

As mentioned in section 3.2.2, no specific federal, state, or local emission reduction requirements or targets are applicable to the proposed Project, and there are no generally accepted emission level thresholds against which to assess potential localized or global consequences of GHG emissions. The relatively small contribution from this terminal facility would not result in significant impacts from GHGs. The Project would reduce world-wide emissions of GHGs due to improved efficiencies in commodity deliveries compared with existing transport systems – and due to improving emission controls in future years.

3.2.3.7 TRANSPORTATION CONFORMITY REVIEW

The results of the CO "hot-spot" modeling, provided in Table 3.2-9, represents the maximum concentration among the receptors included in the CAL3QHC dispersion model. Based on projected future traffic conditions in 2020, 2030, and 2040, and assuming a background CO concentration of 5 parts per million, model-calculated concentrations are less than the ambient air quality standards for CO. The results of the "hot-spot" modeling indicate additional traffic due to Alternatives 2 and 3 would not increase concentrations compared to the Alternative 1 scenario during the PM peak period to the extent of causing an air quality impact.

Due to the poor performance of the single most affected intersection (Table 3.2-9); the traffic study assessed a mitigated Alternative 3 scenario. Under the mitigated Alternative 3 scenario, the northwest leg of this intersection would be closed permanently, reducing delays from trains and trucks accessing Terminal 5 through this intersection. The results of the hot-spot modelling for this alternative also indicate there would be no change in the maximum Project-related CO concentration because the intersection would continue to perform at LOS F due to local traffic conditions not related to Terminal 5. Although Project-related traffic delays almost double in 2040 over those in 2020, maximum predicted CO concentrations decrease in 2040 due to vehicle emissions reduction measures implemented by federal and state regulatory requirements in future years. Based on this finding, the proposed plan would not be expected to result in any significant air quality impacts due to its effect on the surface roadways in the area.

Table 3.2-9: "Hot-Spot" Intersection Modeling Results: Maximum CO Concentrations (parts per million)

Intersection	Averaging Period	Ambient Standard [a]	Modeled Concentration [b]					
			Alt 1 (No Action)			Alt 2	Alt 3	Alt 3 Mit. [c]
			2020 647K TEU	2030 647K TEU	2040 647K TEU	2030 1.27M TEU	2040 1.70M TEU	2040 1.70M TEU
SW Spokane St / W Marginal Way SW / Chelan Ave SW	1-Hour	35	5.7	5.5	5.2	5.5	5.2	5.2
	8-Hour	9	5.5	5.4	5.1	5.4	5.1	5.1

Note:
(a) Ambient concentrations are expressed in terms of parts per million (ppm).
(b) 1-hour and 8-hour modeled concentrations include 5 ppm CO background. 8-hour concentrations assume a 0.7 persistence factor
(c) Under the Alt 3 Mitigated scenario, the northwest leg of the intersection would be closed, removing access to Terminal 5.

3.2.3.8 GENERAL CONFORMITY REVIEW

The proposed Project would result in air pollutant emissions related to demolition of portions of the existing wharf structure, reconstruction of the wharf, and related activities to deepen the adjacent waterway and to stabilize the underwater slope abutting the wharf structure. Because the facility is located in air quality maintenance areas for PM_{10}, ozone, and carbon monoxide, and because portions of the facility construction are subject to approval by the U.S. Army Corps of Engineers, facility construction emissions are subject to consideration under the federal air quality General Conformity rules. Consequently, construction-related emissions were quantified as required under the General Conformity rules for comparison with the General Conformity *de minimis* levels. This tabulation is summarized in Table 3.2-10.

The General Conformity *de minimis* levels are based on annual tons of pollutant emissions, and because each construction phase of the Project is more or less representative of a single year, the emissions associated with each construction phase may be compared with the *de minimis* levels. Although total construction-related emissions are not typically used in General Conformity assessments, the total Project-related construction emissions are listed in Table 3.2-10 to illustrate the relatively minor nature of this Project. As shown, the estimates of Project construction-related emissions are far less than the respective General Conformity *de minimis* levels, and as a result, these emissions would not be expected to significantly affect air quality.

Alternative 1 does not require a General Conformity review because no in-water work with federal oversight would occur. The emissions and comparison against *de minimis* thresholds are relevant to Alternatives 2 and 3, which have identical construction emissions.

Table 3.2-10: Project Construction-Relates Air Pollutant Emissions (tons)

Construction Phase	VOC	CO	NO_x	CO_2	SO_2	PM
Phase I	0.92	3.96	13.41	1,851	0.06	0.53
Phase II	0.82	3.58	11.82	1,685	0.06	0.47
Phase III	0.13	0.58	1.63	228	0.02	0.08
Total Construction-Related Emissions	**1.87**	**8.12**	**26.86**	**3,764**	**0.15**	**1.08**
General Conformity *De Minimis* Levels	**100**	**100**	**100**	**N/A**	**100**	**100**

Note: CO_2 emissions are not considered under General Conformity rules but are included here for completeness. Likewise, total construction emissions are not used for comparison with the annual-oriented de minimis levels, but are included for completeness.
VOC = volatile organic compound

3.2.4 MITIGATION MEASURES

Construction BMPs would be required during minor repair and maintenance for the No-Action Alternative. No other mitigation is proposed.

3.2.4.1 CONSTRUCTION – ALL ALTERNATIVES

Although proposed construction at Terminal 5 is not expected to significantly affect air quality, construction contractors would be required to comply with all relevant federal, state, and local air quality rules. In addition, implementation of BMPs would reduce emissions related to the construction phase of the Project. Management practices for reducing the potential for air quality impacts during construction include measures for reducing both exhaust emissions and fugitive dust. The Washington Associated General Contractors brochure *Guide to Handling Fugitive Dust from Construction Projects* and PSCAA suggest a number of methods for controlling dust and reducing the potential exposure of people to emissions from diesel equipment.

Some of the control measures that could be implemented during construction include:

- Use only equipment and trucks that are maintained in optimal operational condition.
- Require all off-road equipment to have emission reduction equipment (e.g., require participation in Puget Sound Region Diesel Solutions, a program designed to reduce air pollution from diesel, by Project sponsors and contractors).
- Use car-pooling or other trip-reduction strategies for construction workers.
- Implement restrictions on construction truck and other vehicle idling (e.g., limit idling to a maximum of 5 minutes).
- Spray exposed soil with water or other suppressant to reduce emissions of PM and deposition of particulate matter.
- Pave or use gravel on staging areas and roads that would be exposed for long periods.
- Cover all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck bed), to reduce PM emissions and deposition during transport.
- Provide wheel washers to remove particulate matter that would otherwise be carried off site by vehicles to decrease deposition of particulate matter on area roadways.
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris.
- Stage construction to minimize overall transportation system congestion and delays to reduce regional emissions of pollutants during construction.

3.2.4.2 OPERATIONS – ALTERNATIVES 2 AND 3

A number of measures intended to reduce operational emissions, including GHG Emissions, would be implemented for Alternatives 2 and 3. No additional mitigation measures are proposed or warranted. Examples of emission-reducing components would include:

- Reduction of at-berth emissions from ocean-going vessels through the use of shore power.
- Use of newer, cleaner trucks required by the Northwest Ports Clean Air Strategy's Clean Truck Program.
- Development of a facility with an electrical power supplier that obtains >90% of their power from non-fossil fuel sources.
- Truck gate management system to help spread truck traffic more evenly throughout the day and evening hours.

- Alternative 3 maximizes approach by electrifying most cargo handling moves. The decrease in emissions from Alternative 2 to Alternative 3 is largely due to electrification of the majority of container-handling equipment activities even as activity levels increase beyond 2030. Therefore, an additional emission-reducing component of Alternative 3 would be the conversion of diesel engine-powered container handling equipment to electrically powered equipment would avoid, minimize and reduce exhaust emissions.

Together, these and other features included in the proposed Project represent substantial Project-related GHG emission reductions.

3.2.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

NO-ACTION ALTERNATIVE

No significant unavoidable adverse impacts would occur with the No-Action Alternative since only minor repairs and upgrades are proposed under this alternative.

ALTERNATIVES 2 AND 3

No significant unavoidable adverse impacts would occur with Alternatives 2 and 3 if the proposed mitigation is implemented.

3.3 WATER

This section evaluates the potential impacts of the proposed Project alternatives on water resources. The analyses and evaluation area for water resources potentially affected by the alternatives includes surface water, groundwater, and marine water within and adjacent to the Terminal 5 marine cargo site.

Terminal 5 is located on the west shoreline of the West Waterway. Potential impacts to these water resources are discussed under Alternative 1 No-Action, Alternative 2, and Alternative 3. Detailed technical reports or memos were prepared to evaluate the Terminal 5 Improvements Project impacts to water resources at the site and are presented in Volume II, Appendix D, Appendix J, and Appendix K of this DEIS. The technical reports or memos summarized in this section are:

- *Industrial Stormwater Treatment Planning Study for Terminal 5*. Prepared for the Port of Seattle. Prepared by Aspect Consulting. April 30, 2015
- *Stormwater Technical Memorandum for Terminal 5 EIS, Seattle, Washington*. Prepared for the Port of Seattle. Prepared by Aspect Consulting. May 6, 2016 (Appendix D)
- *Water Quality Monitoring Plan, Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening, Seattle, Washington*. Prepared for the Port of Seattle. Prepared by Hart Crowser. May 6, 2016 (Appendix H)
- *Southwest Harbor Terminal 5 Groundwater Quality Monitoring Evaluation Report, Seattle, Washington*. Prepared for the Port of Seattle. Prepared by Hart Crowser. July 8, 2014 (Appendix K)
- *Preliminary Geotechnical Engineering Design Study, Terminal 5 Deepening and Crane Rail Upgrade, Seattle, Washington*. Prepared for the Port of Seattle. Prepared by Hart Crowser. May 30, 2014 (Appendix J)
- *T-5 Vessel Traffic and Navigation, Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements Project*. Draft Memorandum prepared for the Port of Seattle. Prepared by Moffatt & Nichol. April 20, 2016.
- *Biological Assessment, Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening, Seattle, Washington*. Prepared for the Port of Seattle. Prepared by Hart Crowser. May 6, 2016 (Appendix E)
- *Thruster Impact Analysis. Terminal 5, Port of Seattle, Washington*. Prepared for the Port of Seattle. Prepared by Moffatt & Nichol. June 10, 2015
- *Lower Duwamish Waterway Sediment Transport Modeling Report, Final*. Prepared for the EPA, Region 10, and Ecology. Prepared by Quantitative Environmental Analysis, LLC. October 2008

3.3.1 REGULATORY CONTEXT

As described in this section, surface water, groundwater, and marine water quality are regulated at federal, state, and local levels.

3.3.1.1 CLEAN WATER ACT

The Clean Water Act (CWA) is the primary federal law governing water pollution. The CWA is intended to restore and maintain the integrity of "waters of the United States," which comprise most surface waters.

3.3.1.2 SECTION 401, WATER QUALITY CERTIFICATION AND STANDARDS

A federally issued license or permit for an activity that involves a discharge of fill material to waters of the United States may not be issued without a state certification pursuant to Section 401 of the CWA that the discharge would meet applicable water quality standards and certain other CWA requirements. In Washington, the Washington State Department of Ecology (Ecology) is the agency authorized to issue Section 401 certifications.

3.3.1.3 SECTION 402, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

U.S. Environmental Protection Agency (EPA) has delegated authority to Ecology in Washington to issue CWA Section 402 (National Pollutant Discharge Elimination System [NPDES]) permits for point source discharges to waters of the United States. Details on surface water mitigation are provided in the Stormwater Technical Memo located in Volume II, Appendix D of this DEIS. See this appendix for detailed information on best management practices (BMPs).

Container terminals are required to obtain coverage under the NPDES Industrial Stormwater General Permit (ISGP), which authorizes discharge of stormwater associated with industrial activity. Terminal 5 is covered under ISGP number WAR-000464. The ISGP stipulates requirements for management and control of stormwater collected at Terminal 5 and conveyed to onsite outfalls to the West Waterway and southwest Elliott Bay. Regardless of the alternative, Terminal 5 operations would be required to adhere to the ISGP General Requirements. Information on ISGP General Requirements is included below. The ISGP authorizes stormwater discharges from certain industrial facilities as long as the discharges are consistent with the 13 special conditions and 25 general conditions of the permit. Ecology recently reissued the ISGP with an effective date of January 2, 2015. The reissued permit expires on December 31, 2019.

In addition to the standard ISGP benchmarks, two effluent limits apply to Terminal 5 based on its location. Terminal 5 discharges stormwater to the West Waterway of the Duwamish River, which is identified as an impaired water body on the 2012 Washington State 303(d) list. Therefore, sampling for total suspended solids (TSS) and fecal coliform bacteria is required and included in a table reference in Volume II, Appendix D of this DEIS.

3.3.1.4 SECTION 404, DISCHARGE OF DREDGE OR FILL MATERIAL

Section 404 of the CWA governs the discharge of dredged or fill material into waters of the United States and a 404 permit is required prior to discharging unless the activity falls under an exemption. The U.S. Army Corps of Engineers (USACE), the Section 404 co-implementing agency along with the EPA, evaluates 404 permit applications, including public and environmental review. Under Section 404 guidelines, proposed discharges shall not result in significant degradation of the aquatic ecosystem and all practicable means must be used to minimize adverse impacts.

3.3.1.5 RIVERS AND HARBORS APPROPRIATION ACT OF 1899

Section 10 of the Rivers and Harbors Appropriation Act of 1899 requires authorization from the USACE for the construction of any structure in or over any navigable water of the United States. Section 10 approval applies to all structures, including associated excavation, filling, rechannelization, or any other modification affecting a navigable water of the United States. The proposed Project would trigger this law owing to the rehabilitation of structures and dredging within the West Waterway, a navigable waterway.

3.3.1.6 CITY OF SEATTLE STORMWATER CODE; SEATTLE MUNICIPAL CODE, CHAPTERS 22.800–22.808

The City of Seattle Stormwater Code (Stormwater Code) contains regulatory requirements that provide for and promote the health, safety, and welfare of the general public. Specific technical requirements, criteria, guidelines, and additional information are provided in the five-volume City of Seattle Stormwater Manual. Volume 2 of the manual, Construction Stormwater Control, provides guidance and requirements for project construction and applies to projects within City limits.

3.3.1.7 CITY OF SEATTLE ENVIRONMENTALLY CRITICAL AREAS ORDINANCE

On March 27, 2006, the City of Seattle completed the first major update to environmentally critical areas (ECAs) regulations and policies first adopted in 1990. These regulations address how development on and adjacent to Seattle's ECAs should be regulated. The new ordinance went into effect on May 9, 2006. Regulations governing ECAs in the City of Seattle are contained within Chapter 25.09 of the Seattle Municipal Code (SMC). ECAs include steep slope, landslide-prone, and liquefaction-prone areas; abandoned landfills; flood-prone areas; riparian corridors; wetlands; and fish and wildlife habitat areas.

Grading in environmentally critical areas must be completed or stabilized by October 31 of each year unless an exception is permitted by the Director (SMC 25.09.060). Soils engineering studies are required for development in areas subject to liquefaction, and appropriate mitigation measures must be implemented through the requirements of SMC Title 22, Subtitle VIII, Grading and Drainage Control, SMC Title 22, Subtitle I, Building Code and other applicable regulations (SMC 25.09.100).

3.3.2 AFFECTED ENVIRONMENT

Terminal 5 is located in the Duwamish estuary where the mouth of the Duwamish River flows into Elliott Bay and Puget Sound. It is located on historical fill in the southwest portion of Elliott Bay, west of the West Waterway of the Duwamish River. The Duwamish River originates in the Cascade Mountains and drains to Elliott Bay in the Puget Sound. The large river, 65 miles in length, is called the Green River upstream of Tukwila (River Mile 12) and the Duwamish River downstream to Elliott Bay. The West Waterway and the East Waterway comprise the principal deep draft cargo vessel navigational access areas in south Elliott Bay and are separated by Harbor Island. Vessels use the West Waterway for cargo transport, fishing, and recreational boating.

The West Waterway is primarily saltwater at depth, but it receives freshwater flows from the Duwamish River that create lower salinity conditions near the surface. Dredging and development

since the early 1900s have substantially altered nearshore environments in the West Waterway. The original aquatic area habitat in the Project area has been either filled or dredged, and the entire area is highly modified from original delta conditions. There is no remaining historic/native tidal marsh, mudflat, emergent vegetation, or riparian vegetation within the West Waterway.

Existing shoreline conditions in the West Waterway consist of overwater pile-supported wharves, fenders, riprap slopes, seawalls, and bulkheads associated with marine industrial and commercial use. Approximately 62 percent of the West Waterway shoreline contains overwater wharves located above riprap slopes. The eastern margin of the West Waterway directly across from Terminal 5 includes a constructed sediment contamination cap, with intertidal and subtidal areas composed of imported clean aggregate and sand, with slopes between approximately 3:1H and 6:1V (Horizontal: Vertical), approximately 1,450 feet long.

Before the 1900s, much of the West Waterway upland property consisted of tide flats, which were filled to create usable land for commerce and industrial activities, including railroad yards, rail transfer, wood treatment facilities, steel scrap storage, shipbuilding facilities, and a municipal and wood waste landfill. As a consequence, the fill activities and former industrial activities resulted in the release of hazardous substances at several locations at or near Terminal 5 and impact the adjacent water bodies including the West Waterway.

3.3.2.1 SURFACE WATER

The West Waterway is included in the Washington State Department of Ecology's 303 (d) Water Quality Assessment for the following Category 5 parameters: cadmium and mercury in sediment; polychlorinated biphenyls (PCBs) in tissue samples; and dissolved oxygen and bacteria in the water column Potential sources of the listed West Waterway Category 5 parameters include urban and industrial stormwater, Duwamish Waterway discharge, Elliott Bay aquatic area conditions, legacy contamination from past industrial uses and activities, and discharges from commercial and recreational vessels. This assessment results in an "impaired waters" designation and requires additional monitoring and actions under the Industrial Stormwater General Permit (ISGP). These requirements include "effluent limits" and sediment sampling.

Stormwater drainage at Terminal 5 includes an on-site system of below grade collection treatment, and discharge utilities, comprised of 11 drainage basins, each discharging the West Waterway and Elliott Bay as Terminal 5 site conveyances, separate from adjacent urban and industrial uses and activities. The location of the drainage basins and outfalls are shown in Figure 1, which also indicates stormwater structure types and stormwater pipe types. The drainage system at Terminal 5 primarily consists of gradually sloped (one to two percent) impervious pavement directing stormwater to a network of catch basins and lateral collectors (referred to as "trench drains") connecting to a sub-grade network of aggregating conveyance pipes, and discharging via outfalls to the West Waterway and southwest Elliott Bay. The Terminal 5 marine cargo facility includes approximately 650 offset, gravity separation catch basins, connecting to approximately 18.5 miles of pipe network conveyed to 11 outfalls. Six oil/water and coalescing plate separators are present in addition to the gravity separation catch basins. The separators serve specially designed, confined drainage areas at the site, including all maintenance and repair areas, cargo handling equipment parking areas, container and equipment wash areas, the site's fueling location.

The Terminal 5 marine cargo area includes approximately 197 acres. The entire publicly-owned Terminal 5 site upland area, including the Terminal 5 marine cargo facility, includes approximately 290 acres. The northwest portion of Terminal 5, area not committed to marine cargo use, receives limited stormwater run-off from impervious pavement at the CEM and Pier Two open storage use area, and from the public shoreline access area at the north margin of the combined Terminal 5 site.

In addition, substantial stormwater drainage from the Longfellow Creek is conveyed in sub-grade pipe systems through the Terminal 5 site to discharge in the southwest corner of the West Waterway, at the southeast margin of the Terminal 5 marine cargo site, and to the southwest Elliott Bay, at the northwest margin of Terminal 5 site. Longfellow creek, an urban stream that is piped under the industrial properties in its lowest reaches, drains approximately 3,000 acres of the Delridge valley in West Seattle and crosses the southeast corner of Terminal 5 before discharging to the West Waterway. This primary pipeline for Longfellow Creek has inadequate capacity to convey peak flows and a secondary outlet named the Longfellow Creek Overflow Line (LFOL) was completed in 1999. The LFOL is located entirely underground. A weir installed in the creek north of the SW Spokane Street corridor diverts high flows into the LFOL. The LFOL passes the western edge of Terminal 5 to discharge to Elliott Bay in subtidal aquatic area at the northwest margin of port-owned Terminal 5 property. Portions of Terminal 5 drain to Longfellow Creek and the LFOL, but the majority of Terminal 5 drains directly to the West Waterway through nine active stormwater outfalls.

3.3.2.2 GROUNDWATER

Groundwater in the Project area is generally found between 6 to 9 feet below ground surface (bgs) and is tidally influenced. Contaminated groundwater may be present beneath the proposed Project area. The presence and source for any contaminants are likely associated with the placement of fill materials during the filling of aquatic lands in past decades to construct the present upland area at the Project site; spills or releases from previous operations at the facility; and migration of contaminated groundwater from upgradient sources. Groundwater monitoring data obtained from the area south of W Marginal Way SW indicated the potential presence of low concentrations of arsenic and several volatile organic compounds. The Project area is used for industrial purposes and groundwater is not withdrawn for domestic or industrial uses.

3.3.2.3 MARINE WATER QUALITY

The West Waterway is primarily saltwater but receives freshwater flows from the Duwamish River. Dredging and development since the early 1900s have substantially altered nearshore environments in the West Waterway. Water depths in the West Waterway are principally deep subtidal, approximately 40 to 60 feet below MLLW. Salinities are estuarine to marine, generally ranging from 12 to 28 parts per thousand (ppt), depending on freshwater inputs from the Duwamish River and seasonal vertical mixing.

FISHING VESSEL USE

The aquatic area in Elliott Bay and the Duwamish Waterway consists of a treaty-protected “usual and accustomed” fishing area. Fishing activity in this area is managed by the Muckleshoot Indian Tribe, together with the Washington Department of Fish & Wildlife. Fishing by tribal members in this

area is consistent with past federal government treaties and subsequent court decisions. Treaty fishing is an ongoing activity, and thus, a baseline condition within this area. Members of the Muckleshoot Indian Tribe and Suquamish Indian Tribe harvest chinook, coho, chum, and steelhead salmon in south Elliott Bay, the East and West Waterways, and the Duwamish Waterway during summer, fall, and winter of each year, generally from August through February. The aquatic area adjacent to Terminal 5 is an active set net fishing area. Fishing by recreational fishermen in the West Waterway is limited to salmon fishing in season.

CARGO VESSEL OPERATIONS

Terminal 5 operates as a cargo transshipment facility. Fueling facilities at the terminal are in compliance with current policies and regulations. BMPs are required by NPDES permits and are followed in accordance with regulations.

RECREATIONAL BOATING

The West Waterway is used by recreational boaters traveling between Elliott Bay and the Duwamish River.

3.3.2.4 DREDGING

Dredging necessary for navigational access to vessel berths adjacent to the rehabilitated wharf would include excavation of deep subtidal sediments, beneath previously dredged and maintained vessel berth areas. Approximately 235,400 square feet of area (5.38 acres) adjacent to Terminal 5 would be dredged to a Project depth of –55 feet mean lower low water (MLLW). An additional 1 foot of advanced maintenance dredge would be completed beyond the Project depth in critical and shoaling areas to avoid frequent redredging. The required Project depth would be to –56 feet MLLW. Between 44,000 to 48,000 cubic yards of sediment would be removed from the Project area.

The berth area sediments at Terminal 5 have been tested per the Dredged Material Management Program (DMMP) requirements prior to proposed maintenance dredging in 1991, 1996, 2008, 2009, 2013, and most recently in 2014. Historically, the sediments tested in 1991, 1996, and 2009 were found to be suitable for open-water disposal. Some of the sediments from 2008 and all of the sediments from 2013 were dredged and disposed of at an upland facility because they were determined to be unsuitable. The sediment surface exposed by dredging (known as the Z-layer), did not meet the antidegradation policy in 2009 or 2013, and was capped with a 6-inch layer of clean sand.

In 2014, sediments within the proposed berth deepening dredge footprint at Terminal 5 were sampled and tested per the DMMP to assess the materials' suitability for open-water disposal. The results showed that the only exceedances of DMMP criteria were in two surface samples, which slightly exceeded the dioxins/furans low end criterion of 4 nanograms per kilogram (ng/kg toxicity equivalent; Puget Sound background) but were below the high end of 10 ng/kg toxicity equivalent. These sediments were deemed still eligible for open-water disposal since the volume weighted average of material to be dredged was less than 4.0 ng/kg. Therefore, all proposed dredged sediments are eligible for open-water disposal. The Z-layer samples were tested and did not exceed

the DMMP screening levels (USACE 2015). Therefore, the new sediment surface is expected to comply with the antidegradation policy.

3.3.3 IMPACTS

3.3.3.1 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, surface water, groundwater, and marine water quality at Terminal 5 would likely remain at existing levels. Cargo vessels would continue to operate at the facility and only minor alterations, including routine maintenance and repair work, would be conducted as necessary. The site would continue to meet existing regulatory requirements and BMPs would continue to be followed in accordance with regulations.

The site would see continued improvements to water quality as the requirements of the ISGP are implemented. However, by not removing the creosote-treated timber piles, creosote from those piles would remain in the environment.

3.3.3.2 ALTERNATIVE 2

Alternative 2 proposes modification of existing container facilities, including cargo wharf rehabilitation, berth deepening, and water/stormwater and electrical utility capacity improvements. The cargo marshalling yard area, upland of the rehabilitated cargo wharf, would be redesigned and reorganized to provide economies in cargo operations and on-site cargo flow and movement. Changes to existing Terminal 5 facilities would accommodate increased annual container cargo transshipment capability at the site to approximately 1.3 million twenty-foot equivalent units (TEUs). Refer to Chapter 2, for a detailed description of work proposed for Alternative 2.

CONSTRUCTION

The proposed Project would require work over, in, and adjacent to the West Waterway, and has the potential to affect water quality. The proposed Project includes rehabilitation of the existing wharf and dredging of sediments in the West Waterway to increase berthing depths adjacent to the wharf. The proposed Project does not include discharge of waste materials to marine waters in the adjacent West Waterway.

Potential water-related impacts resulting from the proposed Project also include control and management of dewatering effluent that might result from excavations extending into groundwater, control and management of stormwater runoff during construction activities and control of any releases of debris or sediments into the West Waterway during dredging and wharf rehabilitation activities. Potential impacts from construction are described in more detail below.

SURFACE WATER

Potential water-related impacts resulting from the proposed upland Project elements include dewatering effluent that might result from excavations extending into groundwater, stormwater

runoff during construction activities, and releases of debris or sediments into the West Waterway during upland construction and wharf rehabilitation activities.

Upland redevelopment can expose soils that can be carried by water or wind into adjacent stormwater drains or surface water and increase turbidity. Storage of extracted piles on uplands (until disposal) can lead to release of sediment-laden water to surface waters. Spills of materials during construction, such as petroleum fluids, might occur and negatively impact water quality.

The proposed Project does not require surface water withdrawals or diversions. The Project does not include discharge of waste materials to the aquatic area in the West Waterway.

If not properly controlled through the use of BMPs, pollutants that might be expected in discharge from the site include sediment increases or decreases, pH, and petroleum products. Soil erosion or sheet erosion can cause turbid (muddy) stormwater when the sediment contacts rainwater; this is the most common and visible form of construction stormwater pollution. If not properly controlled with BMPs, soil erosion and the resulting sedimentation produced by construction activities can impact the environment, damaging aquatic and recreational resources, as well as aesthetic qualities. Common examples of the impacts of erosion and sedimentation include the following:

- Silt fills culverts and storm drains, decreasing capacities and increasing flooding and maintenance frequency.
- Sediment causes obstructions to surface water bodies requiring dredging to restore navigability.
- Nutrient loading from phosphorus and nitrogen attached to soil particles and transported to surface water bodies can cause a change in the water pH, algal blooms, and oxygen depletion, leading to eutrophication and fish kills.
- Turbid water replaces aesthetically pleasing, clear, clean water in surface water.
- Eroded soil particles decrease the viability of macroinvertebrates and food chain organisms, impair the feeding ability of aquatic animals, clog gills of fish, and reduce photosynthetic potential.
- Sediment-clogged gravel diminishes fish spawning and can smother eggs or young fry.

The sources of other commonly encountered construction stormwater pollutants include materials and chemicals used during day-to-day construction activities, such as concrete pouring, paving, truck and heavy equipment operation, and maintenance activities.

GROUNDWATER

The proposed Project would not require groundwater to be withdrawn from water wells used for drinking water or other purposes. Water from demolition and construction activities would not be directly discharged to groundwater. The proposed Project does not include any discharge of waste material to groundwater at the site. The Terminal 5 upland is completed covered with asphalt. Removal of asphalt for pile installation on the uplands, pavement repair, or utility construction could lead to hazardous material spills entering the soil and reach groundwater (see Section 3.5). BMPs would be followed to minimize that possibility.

IN-WATER ENVIRONMENT (MARINE)

There would be potential temporary short-term impacts due to an increase in small vessels in the waterway that would carry material and equipment to the construction Project site. Vessels would be used for dredging, transportation of Project debris, dredged material, and equipment. The movement of these additional vessels could potentially result in debris or fuel leakage in the waterway.

It is the policy of agencies to require replacement of creosote-treated wood pilings with steel or concrete pilings, where possible, because creosote contains polycyclic aromatic hydrocarbons (PAHs), which include carcinogens. The removal of creosote-treated wood piles would decrease the amount of creosote in the environment, and is a beneficial impact. However, it is reasonable to assume that PAH concentrations in the water column would be elevated for a short period of time throughout the duration of the wood piling removal. The elevated PAH concentrations would likely be greatly reduced within a few tidal cycles. The long-term consequence is likely to be beneficial because of improved water quality.

Temporary increases in turbidity would be caused by suspended sediments during pile removal and pile driving activities, cutting of concrete piles, toe-wall installation, and deposition of clean sand fill following removal of the treated wood fender pilings. Turbidity impacts would be monitored and minimized using BMPs and the net effect would be short-term (minutes to an hour or two) and localized.

DREDGING

Dredging activities have the potential to affect water quality in the West Waterway. Dredging of the sediment can increase turbidity, and temporarily release sediments and chemicals to the water. Although the sediment exposed by dredging could briefly release chemicals into the water column, sediments in the dredge prism, once completed, meet the Sediment Quality Standards (SQS).

Dredging and pile driving would produce localized impacts on water quality in the form of elevated turbidity plumes that would last from a few minutes to several hours. Elevated turbidity plumes from dredging are likely to occur in the immediate vicinity of Terminal 5 and may extend throughout the outer portions of the West Waterway. Turbidity that results from dredging activities is typically of much less magnitude than increases caused by natural storm events (Nightingale and Simenstad 2001). Dredging activities would be controlled by BMPs intended to minimize releases from entrained sediment in the dredging bucket to the marine environment.

Disposal of all dredged sediments removed as part of the Project would be consistent with the requirements of DMMP, Washington State Department of Natural Resources (DNR), Ecology, USACE, EPA, and other agencies with jurisdiction.

OPERATIONS

SURFACE WATER

Yard improvements considered in Alternative 2 include predominantly electrical, stormwater, and potable water utility new installations, as well as repair and maintenance of existing systems. Ground repairs and maintenance activities involving deep cold grinding and asphalt concrete overlays would occur over a portion of the facility on areas in poor pavement condition from previous work. Approximately 20 acres of storage yard would be converted to a higher density grounded container storage serviced by diesel rubber-tired gantry (RTG) cranes to move cargo. Up to 11,000 linear feet of concrete runways for the RTG cranes would be added to modernize cargo handling equipment in a portion of the storage stacks.

Vehicles and equipment used for facility operations would entail the use of fuels, oils, lubricants, and other petroleum-related products within the proposed Project area. These potentially hazardous materials would be subject to applicable local, state, and federal regulations and guidance pertaining to use, handling, and storage, including BMPs and monitoring under the ISGP. No increase in exposure of the materials or risks of fire or explosion is anticipated. Management of toxic and hazardous substances would be consistent with rules and regulations, and operations would not cause the release of toxic or hazardous substances.

GROUNDWATER

Alternative 2 operations do not propose to inject any water or waste materials directly into groundwater. The existing pavement provides a working surface of sufficient strength for cargo handling equipment, trucks and container box stacked storage, and other cargo. Parts of the impervious surface also serve as cap over contaminated sediments that prevent negative environmental impacts due to resuspension, transport, and redeposition, and isolate the contaminated sediment from the surrounding environment. Monitoring of the pavement cap areas is required.

IN-WATER ENVIRONMENT (MARINE)

The number of vessels using the terminal would decrease compared to the No-Action Alternative. However, there would be long-term operational impacts due to larger commercial vessels in the waterway, which could impact access and navigation. Impacts may include the following:

Vessel Maneuvering. Vessels maneuvering near the terminal may generate waves that could churn and locally mobilize sediment. The movement of water from vessel propellers and assist tugs could also move sediment from the bottom of the waterway (known as scour). A Thruster Impact Analysis (Moffatt & Nichol 2015) found that the potential scour risk is up to four feet of scour for berthing and unberthing operations for the larger vessels. This activity would increase turbidity and release sediment and chemicals to the water column. Sediments, both pre- and post-dredging, meet the SQS, and resuspension and movement of material in the area of the berth should not impact sediment chemistry.

Fueling. The existing fueling facilities would continue to be used in accordance with current policies and regulations. BMPs would continue to be followed in accordance with regulations.

3.3.3.3 ALTERNATIVE 3

CONSTRUCTION

The potential construction impacts to water in Alternative 3 would be similar to Alternative 2.

OPERATIONS

The potential operational impacts to water in Alternative 3 would be similar to Alternative 2, except it is more likely that higher container throughput may require more aggressive operational treatment BMP approaches.

3.3.4 MITIGATION MEASURES

3.3.4.1 NO-ACTION ALTERNATIVE

CONSTRUCTION

Surface Water

Under the No-Action Alternative, the proposed Project would not be constructed. However, it is anticipated that in the future, the Port would pursue marine terminal development at the site consistent with the Port's comprehensive scheme. At this time, no construction is proposed other than minor maintenance and repair and stormwater upgrades.

Operations

Terminal 5 would continue to have coverage under and comply with the ISGP. The ISGP authorizes stormwater discharges from Terminal 5 that are consistent with the thirteen special conditions and twenty-five general conditions, and ISGP compliance involves several key actions, including developing an operational Stormwater Pollution Prevention Plan and implementing mandatory operational source controls, structural source controls, operational mitigation measures, and treatment BMPs. The Stormwater Technical Memorandum (Volume II, Appendix D) describes the requirements of the ISGP. Some level of stormwater treatment would be required. Project design and operation would further evaluate and incorporate, as appropriate, the information provided in the Stormwater Technical Memorandum.

3.3.4.2 ALTERNATIVE 2

The design features and BMPs proposed are intended to avoid or minimize environmental impacts during construction and operations, and those required by agency standards or permits are assumed to be part of the proposal and have been considered in assessing the environmental impacts to water resources.

CONSTRUCTION

Surface Water

An NPDES construction permit would likely be required and standard construction BMPs would be used to control and manage stormwater runoff during Project construction activities. The BMPs would be implemented in general accordance with Ecology's *2012 Stormwater Management Manual for Western Washington* (Ecology 2012), and would also be consistent with the City of Seattle Stormwater, Grading, and Drainage Code requirements. BMP implementation, a spill prevention, control, and countermeasures plan (SPCC plan), and other additional requirements included as part of the Port's stormwater permit would mitigate any potential adverse impacts on stormwater runoff quality and control.

General BMPs may include those listed below:

- In-water work would be conducted only during the in-water work window that is ultimately approved for this Project.
- Project construction would be completed in compliance with Washington State Water Quality Standards (Washington Administrative Code [WAC] 173-201A), including those listed below:
- Petroleum products, fresh cement, lime, concrete, chemicals, or other toxic or deleterious materials would not be allowed to enter surface waters.
- There would be no discharge of oil, fuels, or chemicals to surface waters, or onto land where there is a potential for reentry into surface waters.
- A SPCC plan would be prepared by the contractor and used during all construction operations. A copy of the plan with any updates would be maintained at the work site.
- The SPCC would outline BMPs, responsive actions in the event of a spill or release, and notification and reporting responsibilities, Project site security, site inspections, and training.
- The SPCC would outline the measures to prevent the release or spread of hazardous materials found on site or encountered during construction but not identified in contract documents including any hazardous materials that are stored, used, or generated on site during construction activities. These items include, but are not limited to, gasoline, diesel fuel, oils, and chemicals.
- Applicable spill response equipment and material designated in the SPCC would be maintained at the job site.

Groundwater

If groundwater dewatering is needed for construction, the control and management of the resulting water would be implemented in general accordance with the procedures described in the document *Soil and Groundwater Management and Restoration of Engineered Environmental Controls – Terminal 5 Remediation Areas, Seattle, Washington*, dated April 27, 2011 (Windward 2011), and in applicable regulatory requirements and approved BMPs. Implementing these procedures would mitigate any potential adverse impacts resulting from construction dewatering that might be needed.

In-Water Environment (Marine)

Potential mitigation measures for scour included monitoring, creating a mitigation plan if scour was observed, and/or covering the scour area with cobbles to protect the sediments. At a minimum, the Port may implement a scour monitoring program to observe and track any scour trends.

Vessels would be required to follow all appropriate regulations for fueling, ballast water, and sewage disposal.

Over-water work BMPs include typical construction BMPs for working in, over, and near water, and these would be applied, including activities such as the following:

- Checking equipment for leaks and other problems that could result in the discharge of petroleum-based products or other material into waters of the West Waterway.
- Corrective actions taken in the event of any discharge of oil, fuel, or chemicals into the water. These actions would include the following:
- Beginning containment and cleanup efforts immediately upon discovery of the spill and completing them in an expeditious manner, in accordance with all applicable local, state, and federal regulations. Spill response would take precedence over normal work. Cleanup would include proper disposal of any spilled material and used cleanup material.
- Ascertaining the cause of the spill and taking appropriate actions to prevent further incidents and environmental damage.
- Reporting spills to Ecology's Northwest Regional Spill Response Office at (425)649-7000.

Dredging BMPs

Dredging activities would be controlled by BMPs intended to avoid and minimize potential releases of fugitive materials to the marine environment. More detail on BMPs is provided in the Biological Assessment provided in Volume II, Appendix E of this DEIS.

Dredging BMPs would be conducted during the in-water work window that is ultimately approved for this Project. Construction activities would be conducted in compliance with Surface Water Quality Standards for Washington (WAC 173-201A) or other conditions as specified in the water quality certification.

Disposal of all dredged sediments removed as part of the Project would be consistent with the requirements of the DMMP agencies, which include DNR, Ecology, USACE, and EPA, as well as other agencies with jurisdiction. The results of the 2014 sediment sampling completed for DMMP characterization indicated that all of the sediments in the proposed dredge prism are suitable for DMMP open-water disposal. These dredged sediments would be placed into a bottom-dump barge or split-hull barge for transport and placement into the Elliott Bay non-dispersive Open-Water Disposal Site.

OPERATIONS

Surface Water

The Port has plans in place for measures to protect the environment and water quality. These plans would be modified as needed to address the increased capacity and throughput at the Port. Personnel would be trained for general environmental awareness, spill management, hazardous waste management, and stormwater inspections in accordance with permits and regulations.

All operating equipment at the site would be subject to NPDES BMPs and SPCC plans implemented to avoid and minimize potential releases to fresh and marine waters of fuel and petroleum products used by construction equipment, both on the upland side and on barges.

Stormwater treatment and improvements would be installed, as needed, to support the operations of the new facility. Final development of the proposed Project would utilize existing stormwater collection, conveyance, treatment, and discharge infrastructure as much as practicable. Similar to current conditions, the proposed Project would convey and treat stormwater runoff for discharge into the West Waterway as currently designed and permitted. Rates of stormwater runoff would be similar to the existing condition.

Any container cargo operation or cargo transportation facility is required to be covered under the ISGP. The Washington State ISGP has benchmarks for effluent leaving the site that are some of the strictest in the nation. Prior to reestablishing container cargo terminal operations, the facility would be reevaluated for the appropriate Level 3 Corrective Actions, requiring a new engineering report. The new engineering report would define treatment options and detailed construction plans for Ecology's review and approval. Upon approval, the stormwater system would be constructed prior to beginning of operations.

In-Water Environment (Marine)

Vessel Maneuvering. Monitoring and maintenance, which may include a localized rock layer in any areas of unacceptable scour, may be necessary.

Fueling. BMPs would continue to be followed in accordance with regulations.

Ballast Water Management. Ballast water would continue to be managed in accordance with current policies and regulations.

Vessel Sewage Management. Ecology is considering establishment of a No Discharge Zone for vessel sewage in all parts of Puget Sound. Cargo ships and tankers using the Port would follow current regulations.

3.3.4.3 ALTERNATIVE 3

The construction and operational mitigation measures would be similar to Alternative 2, except that higher container throughput may require more aggressive operational treatment BMP approaches.

3.3.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.3.5.1 NO-ACTION ALTERNATIVE

Because of the extensive regulations container vessels must comply with and because Port leases require its tenants to comply with all applicable laws, the Port concludes that there would be no probable, significant unavoidable adverse effects to marine water quality related to the No-Action Alternative.

Implementation and compliance with the requirements specified in the City of Seattle Stormwater Manual and the ISGP would result in the mitigation of any potentially significant adverse impacts to stormwater runoff. Therefore, no significant adverse impacts or cumulative impacts are anticipated from the No-Action Alternative.

3.3.5.2 ALTERNATIVES 2 AND 3

Because of the extensive regulations container vessels must comply with and because Port leases require its tenants to comply with all applicable laws, the Port concludes that there would be no probable, significant unavoidable adverse effects to marine water quality related to the proposed Project.

The mitigation measures described above for water quality would ensure that no unavoidable adverse long-term impacts to water quality from construction or operations from either Alternative 2 or Alternative 3 would occur. Therefore, no significant adverse impacts or cumulative impacts are anticipated.

3.4 PLANTS AND ANIMALS

The purpose of this chapter is to evaluate the potential impacts of the proposed Project alternatives on plant and animals, including fisheries and aquatic wildlife resources. This section describes the plant and animal resources at the Project site and assesses potential impacts to plant and animal resources that could occur because of the construction and operation of the proposed alternatives. Most potential impacts on biological resources would result from proposed in-water work needed for wharf strengthening beneath the wharf and from dredging adjacent to the wharf in ship berthing areas. This assessment also describes and accounts for the best management practices (BMPs) and mitigation proposed as part of the Project.

Detailed analyses on plant and animal impacts were performed for the Terminal 5 Improvements Project and are presented in the Biological Assessment in Volume II, Appendix E of this DEIS. This document is titled: *Biological Assessment, Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening, Seattle, Washington, May 6, 2016,* and is available separately for detailed review (Hart Crowser 2016).

3.4.1 REGULATORY CONTEXT

Local, state, and federal agencies regulate developments within aquatic habitats, which would include in-water construction activities at the Terminal 5 area. Numerous permits and authorizations are required; the regulatory framework and processes relevant to the Terminal 5 Improvements Project are summarized below.

3.4.1.1 FEDERAL

Under Section 10 of the Rivers and Harbors Act, the U.S. Army Corps of Engineers (USACE) regulates navigable waters of the United States, which includes all waters within the Duwamish River and Elliott Bay below mean higher high water. Construction of structures and activities that affect the course, conditions, location, or navigable capacity of the river and waterway would require a Section 10 Permit.

Under Section 404 of the Clean Water Act (CWA), the USACE is responsible for maintaining the chemical, physical, and biological integrity of the Nation's waters. Any discharge of dredged or fill materials into jurisdictional waters of the United States may require a Section 404 Permit. This would include dredging and open-water disposal of sediments.

Under Section 7 of the Endangered Species Act (ESA), National Oceanic and Atmospheric Administration (NOAA) Fisheries, and U.S. Fish & Wildlife Service (USFWS) are responsible for providing for the conservation of species that are endangered or threatened and the conservation of the ecosystems upon which they depend. Section 7 consultations are designed to assist federal agencies in fulfilling their duty to ensure that federal actions (such as issuance of Section 10 and 404 permits) do not jeopardize the continued existence of a species or destroy or adversely modify their critical habitat.

NOAA Fisheries is responsible for protecting habitats important to federally managed marine species, including Pacific salmon. Federal agencies must consult with NOAA Fisheries concerning any action that may adversely affect essential fish habitat (EFH) under the Magnuson-Stevens Act. EFH includes habitats necessary for spawning, breeding, feeding, or growth to maturity, which includes migratory corridors and rearing areas of salmon.

NOAA Fisheries is also responsible for protecting all marine mammals that fall under the Marine Mammal Protection Act (MMPA), which includes those animals listed under ESA and others common inhabitants of Puget Sound such as harbor seal and California sea lions.

The U.S. Environmental Protection Agency has review and oversight authority over Section 404 Permit decisions under the CWA and the Spill Prevention, Control, and Countermeasure (SPCC) Plan required for oil storage. Facilities with aboveground and underground storage facilities with capacities that would exceed a specific threshold are required to develop and implement an SPCC Plan.

3.4.1.2 STATE

The Washington Department of Fish & Wildlife (WDFW) administers the Hydraulic Project Approval (HPA) program designed to protect fish life and habitat and to ensure projects meet state conservation standards for finfish, shellfish, and their aquatic environment (Chapter 220-110 of the Washington Administrative Code). Rules specify the establishment of a baseline requirement for "no-net-loss" of productive capacity of fish and shellfish habitat in order for a project to be approved.

The Washington State Department of Ecology (Ecology) administers the 401 Water Quality Certification Program under the CWA allowing the state to approve, condition, or deny projects that may result in a discharge to waters of the United States. Issuance of a 401 Certification means that Ecology has reasonable assurance that the applicant's project would comply with state water quality standards and other aquatic resources protection requirements under Ecology's authority.

3.4.1.3 LOCAL

At the local level, the Shoreline Master Program regulates development on City of Seattle shorelines. Regulations include those that protect shoreline ecosystems, respond to pollutant discharges into bodies of water, and encourage water-dependent uses. The ordinance requires the issuance of a Shoreline Substantial Development Permit for any substantial development in the Shoreline District; also, an applicant must obtain a Master Use Permit for any use or change of use in the Shoreline District.

The City of Seattle, Department of Construction and Inspections governs development within environmentally critical areas (ECAs), which include wetlands, riparian corridors, shoreline habitat, fish and wildlife habitat conservation areas, flood-prone areas, abandoned landfills, steep slopes, and other geologic hazard areas. (Seattle Municipal Code section 25.09). The goal of ECA regulations is to effectively protect these areas and to protect public safety, while allowing reasonable development within the city.

3.4.2 AFFECTED ENVIRONMENT

This section describes the general habitat types and characteristics of the Project site. The affected environment description for the Project site applies to all of the alternatives.

3.4.2.1 HABITATS

Habitats within the West Waterway and the Duwamish estuary have been substantially altered by more than a century of urban and industrial development. Between the late 1800s and the mid-1900s, the Duwamish estuary and south Elliott Bay were modified by excavation of intertidal and shallow subtidal areas and adjacent upland fill for the purpose of industrial development. Filled areas were stabilized and protected with dikes, levees, bulkheads, armor/riprap, and other structures. This development replaced approximately 17.6 miles of former shallow river channel, impassible to commercial vessels during low water periods, with approximately 5.2 miles of straightened, deep navigation channel. More than 99 percent of the historic intertidal mud/sand flats, marsh, and forested wetland areas of the Duwamish estuary—downstream of present-day River Mile 5.2— have been removed (King County 2001).

Terrestrial areas are dominated by the flat and nearly 100 percent impervious surface of the Terminal 5 wharf and cargo handling area. This area provides virtually no terrestrial habitat or vegetation. West of Terminal 5 and Harbor Avenue SW is a relatively continuous greenbelt of deciduous and conifer forest occupying approximately 140 acres, separating the terminal from urban residential areas of West Seattle. Industrial uses and warehouses continue along the Duwamish for several miles south of Terminal 5 before transitioning to urban residential areas.

The built and committed marine cargo use area in existing upland, shoreland, and aquatic areas at Terminal 5 includes active cargo, warehouse, and marine industrial operations and does not include significant upland habitat for birds or mammals. Aquatic areas in the adjacent West Waterway provides habitat important to numerous species of resident and migratory fish and wildlife. In recent years, development and construction activities in marine and estuarine locations in Puget Sound have been the subject of increased scrutiny as a result of ESA listings, with particular concern for the life cycle and aquatic habitat requirements of Chinook salmon, steelhead trout, and bull trout.

The terrestrial and marine habitat Project footprint is described in more detail in the Biological Assessment presented in Volume II, Appendix E of this DEIS.

3.4.2.2 WEST WATERWAY

The West Waterway is primarily saltwater at depth, but it receives freshwater flows from the Duwamish River that create lower salinity conditions near the surface. Dredging and development since the early 1900s have substantially altered nearshore environments in the West Waterway. The original aquatic area habitat in the Project area has been either filled or dredged, and the entire area is highly modified from original delta conditions. There is no remaining historic/native tidal marsh, mudflat, emergent vegetation, or riparian vegetation within the West Waterway.

Existing shoreline conditions in the West Waterway consist of overwater pile-supported wharves, fenders, riprap slopes, seawalls, and bulkheads associated with marine industrial and commercial use. Approximately 62 percent of the West Waterway shoreline contains overwater wharves located above riprap slopes. The eastern margin of the West Waterway directly across from Terminal 5 includes a constructed sediment contamination cap, with intertidal and subtidal areas composed of imported clean aggregate and sand, with slopes between approximately 3:1H and 6:1V (Horizontal: Vertical), approximately 1,450 feet long.

The riprap slopes, structural piling, subtidal and intertidal retaining walls, and fender systems provide substrate for algae and sessile invertebrates, though at substantially lower levels of abundance and diversity beneath Terminal 5 because of a lack of light penetration. Bottom sediments in the waterway, pilings, riprap on the slopes, and in the interstices of the riprap revetment provide habitat for benthic invertebrates. Some estuarine and marine fish and subtidal marine invertebrates inhabit and feed at deeper subtidal elevations within the waterway. These are generally more mobile species, capable of avoidance behavior and, therefore, not subject to entrainment in large numbers during dredging operations.

No eelgrass has been observed nor have suitable aquatic area elevations or substrate appropriate for eelgrass growth been documented in the vicinity of Terminal 5 or the West Waterway.

3.4.2.3 ANIMAL SPECIES

SALMONID USE

Eight species of anadromous salmonids use the Duwamish Estuary primarily as a migratory corridor: chinook, coho, chum, pink, and sockeye salmon; steelhead trout; sea-run cutthroat trout; and bull trout. Of these species, chinook and coho salmon and steelhead trout are common in the Duwamish basin, while pink and sockeye salmon, sea-run cutthroat trout, and bull trout are rare.

OTHER AQUATIC FISH SPECIES

Non-anadromous fish species documented within the Duwamish Estuary and West Waterway are dominated by estuarine and marine species, with few freshwater species. In surveys conducted by Warner and Fritz, shiner perch were the most abundant species collected in the West Waterway, but their presence is seasonal—appearing in early May, peaking during the summer, declining by fall, and nearly absent by November (Warner and Fritz 1995). Pacific staghorn sculpin, snake prickleback, starry flounder, and Pacific sand lance were also observed at abundances approaching those of juvenile salmonids during their outmigration. Upwards of 33 different species of fish have been documented in the lower estuary, but the above four species, along with shiner perch and juvenile salmonids, comprised over 99 percent of fish collected in the estuary (Warner and Fritz 1995, Stober and Pierson 1984).

BIRDS AND MAMMALS

As reported, very little natural terrestrial habitat is present at Terminal 5 and few animal species outside of several passerine birds have been observed. European starling, song sparrow, house

finch, house sparrow, American robin, and American crow were documented in the southwest portion of inner Elliott Bay (USACE 1994). Overwintering bald eagles may fly over the general area during the winter. Bald eagle presence and behavior was documented from four locations located immediately northwest of Terminal 5 within inner Elliott Bay. No nests are located within the West Waterway, but birds have been documented to perch on mature trees south of the Duwamish Head and on dolphins and moored barges in inner Elliott Bay (USACE 1994). The WDFW Priority Habitats and Species (PHS) database has documented bald eagle nests within the Duwamish Head green belt located approximately 1.3 miles northwest of the center of the Terminal 5 cargo marshalling area (WDFW PHS 2014).

The present Terminal 5 facility also includes constructed, artificial nesting opportunities for two bird species, installed at the site to encourage bird use, not for the purpose of fish and wildlife compensation or mitigation. A single osprey nest box has been present at the top of a cargo marshalling yard light pole for more than 15 years. The nest box is occupied seasonally by migratory osprey. The Terminal 5 north shoreline includes elevated nest sites, pole-mounted "nest gourds," installed by volunteers and the Port, used by migratory purple martins, during the past decade.

Documented seabird use includes alcids (pigeon guillemot and rhinoceros auklet) and several species of diving ducks (common loon, horned grebe, eared grebe, western grebe, surf scoter, and Barrow's goldeneye), cormorants, and gulls. Marbled murrelet have not been documented within the West Waterway (WDFW PHS 2014).

PHS has also documented California sea lions and harbor seals throughout the West and East Waterways (WDFW PHS 2014). Both species were observed in the West Waterway during the Test Pile Program during the winter of 2016. Southern resident killer whales have not been documented within West Waterway and are not expected to traverse this highly developed area, but occasionally occupy outer Elliott Bay.

THREATENED AND ENDANGERED SPECIES

The ESA-listed species that may occur in the proposed Project area include:

- Three listed salmonid species (Puget Sound chinook salmon, coastal-Puget Sound bull trout, and Puget Sound steelhead)
- Three listed rockfish species (Georgia Basin bocaccio, canary rockfish, and yelloweye rockfish
- Two additional fish (green sturgeon and eulachon)
- Southern resident killer whale
- One seabird species (marbled murrelet)

The ESA status of each of these species, as well as an analysis of potential aquatic effects of the proposed wharf rehabilitation and berth deepening, are included in the Biological Assessment, available for review in Volume II, Appendix E of this DEIS. In addition, within the Biological Assessment, an evaluation of the effects of the proposed Project on essential fish habitat has also been prepared, pursuant to the Magnuson-Stevens Act.

3.4.3 IMPACTS

The potential impacts of the No-Action Alternative and Alternatives 2 and 3 on plants, animals, and their habitats are described in the sections below. Potential impacts are discussed in terms of short-term and long-term direct and indirect effects of Project activities in the Project area, as well as the net effects of those activities. Net effect is considered to be the overall effect on the species and habitat in the long term.

Impacts that are considered insignificant relate to the size of the impact and include those effects that are undetectable, not measurable, or cannot be evaluated. Impacts that are considered discountable effects are those that are extremely unlikely to occur. Significant effects are those that are likely to occur and can be documented; they may encompass impacts to individual plants or animals or larger population level impacts.

3.4.3.1 NO-ACTION ALTERNATIVE

CONSTRUCTION AND OPERATIONS IMPACTS

Under the No-Action Alternative, no improvements would be made to the existing site other than minor alterations, routine maintenance, and repair work, none of which would increase container cargo capacity. Consequently, Project-related impacts on fish and aquatic resources, wildlife, and plant communities, whether adverse or beneficial, would not occur. Fish and aquatic biota that may be at risk on the basis of existing conditions within the affected watersheds would continue to be at risk subject to other programs and management measures or future developments that may be implemented independent of the proposed Project.

3.4.3.2 ALTERNATIVE 2

CONSTRUCTION IMPACTS

Several construction impacts are expected to result from Alternative 2, but these would be temporary in nature and would not progress beyond the construction periods. Potential construction-related impacts include noise (both airborne and waterborne), minor impacts on water quality, and habitat modifications. Specific construction-related impacts are presented below.

CONSTRUCTION-RELATED WATER QUALITY IMPACTS ON PLANTS AND ANIMALS

Dredging and, to a lesser extent, pile driving would produce localized impacts on water quality in the form of elevated turbidity plumes that would last from a few minutes to a several hours. Elevated turbidity plumes from dredging are likely to occur in the immediate vicinity of Terminal 5 and may extend throughout the outer portions of the West Waterway. Generalized turbidity effects on fish depend on the amount and timing of exposure (NMFS 2004). Because fish present in the Project area have evolved in Pacific Northwest systems that are glacial, or periodically experience short-term pulses of high suspended sediment, they are adapted to such exposures. Increases in turbidity that result from dredging activities are typically of much less magnitude than increases caused by natural storm events (Nightingale and Simenstad 2001).

Temporary turbidity impacts on juvenile salmonids would be highly unlikely and discountable because work would occur during the approved in-water work window for the area when juvenile salmonids are not expected to be present (August 16 through February 15). Adult salmonids could be present year-round in low numbers; however, the extent of turbidity would not be expected to reach levels higher than natural storm events and impacts can thus be labeled as insignificant. Adult and juvenile rockfish are not expected in the Project area, and impacts would be discountable.

During dredging, suspension of anoxic sediment may result in reduced dissolved oxygen (DO) in the water column as the sediments oxidize, but any reduction in DO above background would be expected to be limited in extent and temporary in nature. Based on a review of four studies on the effects of dredging on DO levels, LaSalle (1988) showed little or no measurable reduction in DO around dredging operations. In addition, impacts on listed fish due to any potential DO depletion around dredging activities would be expected to be minimal (LaSalle 1988, Simenstad 1988).

No impacts on marbled murrelet, other seabirds, or marine mammals would be expected from the short-term, localized turbidity that may occur within the West Waterway.

There is a chance that other short-term water quality impacts could occur related to fuel, contaminant, or debris spills; however, BMPs would be in place to minimize the potential for these to occur and to minimize the effect to listed salmonids and other species if they do occur. These effects are therefore expected to be insignificant.

Long-term impacts from stormwater discharges are expected to be insignificant. The entire Project site as well as the adjoining upland acreage devoted to cargo movement and storage is paved with concrete or asphalt. The proposed Project would not alter or affect drainage patterns in the vicinity of the site. The existing stormwater collection and conveyance system is designed and maintained to minimize discharge of stormwater pollutants generated from impervious surface runoff in accordance with BMPs and regulatory criteria. Stormwater treatment and improvements would be installed as needed to support the operations of the new facility and in compliance of stormwater permits. Rates of stormwater runoff would be similar to the existing condition.

Any container cargo operation or cargo transportation facility is required to be covered under the Industrial Stormwater General Permit (ISGP). The Washington State ISGP benchmarks for effluent leaving the site are comparatively one of the strictest in the nation. Prior to reestablishing container cargo terminal operations, the facility would be reevaluated for the appropriate corrective actions, requiring a new engineering report. The new engineering report would define treatment options and detailed construction plans for Ecology's review and approval. Upon approval, the stormwater system would be constructed prior to beginning of operations.

Physical resuspension of the sediments during dredging would occur during the dredging component of the Project. The resuspension of contaminated sediments has the potential to release these contaminants into the water column and cause acute or chronic toxicological effects on fish species that may be present during dredge activities. Sediments within the proposed dredge footprint at Terminal 5 have been recently sampled and tested for contaminants per the Dredged Material Management Program (DMMP) protocols to assess the materials' suitability for open-water

disposal. After testing, analysis, and evaluation, the DMMP Office recently released its determination that all proposed dredged sediments were sufficiently low in contamination that they would be eligible for open water disposal (DMMP 2015). Potential impacts of sediment resuspension to fish, seabirds, or marine mammals from resuspended sediments would be discountable. With the removal of any contaminated sediments, long-term effects on sediment and water quality would be expected to be positive.

UNDERWATER NOISE IMPACTS ON ANIMALS

Increased noise from pile driving and construction may result in avoidance of the Project area by ESA-listed salmonids and other fish species, seabirds, and marine mammals during Terminal 5 construction activities. Of these activities, pile driving is expected to result in the greatest waterborne noise levels. The waterborne sound pressure levels (SPLs) released by impact pile driving have been shown to cause injuries to fish in the immediate vicinity of such activities, with possible behavior-altering sound levels emanating for hundreds of meters. Because of the potential for waterborne noise to cause injuries and behavioral disturbances to fish, seabirds, and marine mammals, federal agencies have adopted Interim Criteria for injury and disturbance thresholds (Stadler and Woodbury 2009).

Proposed impact pile driving at Terminal 5 would include concrete piles, H-piles, and timber pinch piles; these activities would result in waterborne noise. An in depth analysis of the potential effects of waterborne noise on fish, seabirds, and marine mammals was conducted in the Biological Assessment in Volume II, Appendix E of this DEIS. These results are summarized in the following sections.

FISH

Underwater noise monitoring during the 2016 Test Pile Program at Terminal 5 (Robert Miner 2016) and the use of other agency-approved underwater noise datasets (ICF Jones and Stokes and Illingworth and Rodkin 2009) were modeled using an agency-approved noise attenuation model (NOAA Fisheries Practical Spreading Loss Model). This analysis was then compared to the federal underwater Interim Noise Criteria (Stadler and Woodbury 2009) to predict the potential zones of injury and disturbance to fish. This analysis has shown that potential injury to fish may occur from 46 to 127 meters from driven piles, depending upon the pile type. The largest of these injury zones extends approximately halfway across the West Waterway, potentially exposing fish to levels of noise that may cause injury. However, fish also have enough available aquatic habitat beyond the potential injury zones to avoid exposure to these levels of noise. No blockage of either juvenile or adult salmonid migratory corridors would occur as a result of pile driving (see Volume II, Appendix E, Biological Assessment; Hart Crowser 2016).

To minimize the potential affects of pile driving on ESA-listed salmonid species within the Project area, all in-water activities, including pile driving, would occur during agency-approved work windows (August 16 through February 15), when few juvenile salmonids are expected to occur in the nearshore.

SEABIRDS

Proposed impact pile driving may exceed underwater SPLs considered injurious to ESA-listed marbled murrelet and other seabirds for short distances beyond the pile. Using an approved underwater sound attenuation model, existing pile driving acoustic data, and the estimated number of pile strikes, the distance between pile driving activities and injury thresholds were calculated to occur between 5 and 15 meters from impact driven piles. In addition, the concrete piles that create the largest potential injury zone would be driven approximately 7 meters beneath the wharf (landward of the wharf face), resulting in an underwater noise threshold exceedance within about 8 meters of the face of the wharf. Marbled murrelet typically loaf and feed in quiet offshore areas of Puget Sound. It is unlikely that they would occupy areas of the West Waterway, much less feed and dive within 8 meters of the face of Terminal 5 during a major construction project. In addition, no marbled murrelet have been reported in the West Waterway.

During the Terminal 5 Test Pile Program, small numbers of several other diving seabird species were observed (pigeon guillemot, horned grebe, double-crested cormorant, Barrow's goldeneye), but none came within 50 meters of the pile during active test pile driving operations (Starkes, J., Biologist, Hart Crowser, personal communication, January 2016).

MARINE MAMMALS

Proposed pile driving may create SPLs that exceed behavioral disturbance thresholds for marine mammals at distances between 46 and 1,000 meters from the driven pile. Injury thresholds are not predicted to be exceeded. No southern resident killer whales have been documented within the waterway; therefore, it is highly unlikely that the species would be exposed to waterborne noises that exceed the thresholds for disturbance from pile driving.

Two other species of marine mammal—harbor seal and California sea lions—have been documented within the West Waterway. To further minimize the potential for disturbance impacts on these marine mammals from pile driving, an agency-approved marine mammal monitoring program would be implemented during all periods of impact and vibratory pile driving. If marine mammals are observed to approach underwater injury or disturbance zones, pile driving would cease until the animal has left the zone. This type of monitoring program was successfully implemented during the recent Test Pile Program during the winter 2016. No marine mammals were exposed to the modeled impact zones.

No noise-related adverse effects on fish, seabirds, and marine mammals are anticipated from other construction activities in the West Waterway. Underwater dredging noise has been found to be well below effects thresholds (Hart Crowser 2010), and most other construction noises would be airborne.

AIRBORNE NOISE IMPACTS ON ANIMALS

Upland construction activities are expected to have low to minimal impacts on plant and animal communities. All construction would occur on the existing paved wharf and there would be no effects on the existing sparse vegetation. Pile-driving activities would produce airborne noise that may temporarily disturb passerine, seabird, and any birds of prey species in the area during the

construction period. It would not likely reach known bald eagle perch trees and nests farther to the northwest along Fairmount Avenue SW in West Seattle (USACE 1994, WDFW PHS 2014).

The USFWS has recently determined that impact pile driving of large diameter steel piles may cause the in-air masking of marbled murrelet calls which the birds use to locate one another. Masking these calls may disrupt the cooperative feeding efforts of birds, reducing their feeding efficiency. No in-air-related adverse effects are anticipated from the upland impact pile driving of 24-inch-diameter steel piles. According to the USFWS, the in-air masking zone for 24-inch-diameter steel piles is 42 meters from the driven pile, but all upland pile driving would occur 38 meters (125 feet) landward from the face of the wharf. Birds would have to occupy areas within 4 meters of the face of the wharf in order to be exposed to in-air masking. It is highly unlikely that listed marbled murrelets or other seabirds would occupy areas this close to the wharf.

SUMMARY OF CONSTRUCTION-RELATED NOISE IMPACTS

In summary, the following conclusions can be drawn from the above analyses and studies:

- The impact driving of concrete, wooden pinch, and steel H-piles beneath the existing wharf would not exceed peak SPLs for injury to fish.
- The more conservative accumulated sound criteria may be exceeded within the West Waterway. Since potentially injurious noise levels would not cross the entire waterway, fish that are present would have avenues to avoid the noise and the migratory corridor would not be completely blocked, allowing fish passage through the waterway.
- It is not likely that significant rockfish habitat or use occurs in the waterway.
- Adherence to approved work windows would minimize the number of juvenile salmonids present during active pile-driving operations.
- Pile-driving noise impacts on seabirds and marine mammals would be minimal because impact zones are relatively close to the terminal and animals are not likely to occupy these zones during active construction activities.
- Pile-driving noise effects on installed nest sites are expected to be minimal. Ospreys using the single Terminal 5 nest box are acclimated to marine cargo activity, including cargo cranes and cargo handling equipment. Purple martin swallow nest sites are approximately 3,000 feet distant from pile driving areas; therefore, the nest locations are not expected to adversely be affected by construction noise.

These conclusions indicate that the impact pile driving of piles beneath the existing Terminal 5 wharf may result in low but potentially significant effects on the few ESA-listed and other juvenile salmonids that may be present during the in-water work window. Similar low but significant impacts may occur to other estuarine/marine species that may be present. These would include shiner perch, Pacific staghorn sculpin, starry flounder, and snake prickleback, which comprise the great majority of fish found in the West Waterway. Small numbers of other fish species could also be exposed (Warner and Fritz 1995). These potential impacts would be temporary, limited to periods of pile driving during the construction period.

The lack of suitable habitat for either juvenile or adult ESA-listed or other rockfish species would result in insignificant effects on these species. ESA-listed green sturgeon and eulachon are not

present in the Duwamish Estuary; therefore, no impacts would occur to these species. Impacts on animal species would be insignificant.

CONSTRUCTION-RELATED IMPACTS ON HABITATS

Direct and indirect impacts on aquatic habitats would primarily involve proposed dredging activities in deep water from the face of the Terminal 5 Wharf waterward for approximately 150 feet. Dredging would remove benthic organisms over approximately 235,000 square feet (5.4 acres) of deep subtidal habitat adjacent to Terminal 5. However, the existing substrate has been dredged previously, exists in deep-water locations, is subject to propeller scour, and is below the depth that juvenile salmonids would be expected to feed. Adult salmonids are not expected to feed on benthic prey. Forage fish do not spawn in the West Waterway because suitable substrates are lacking and eelgrass is not present. Adult rockfish are not expected to be present in the area, and juvenile rockfish would likely be feeding in shallower waters associated with marine macrovegetation. Thus, while disturbances to benthic habitat would occur as a result of Project activities, due to existing habitat conditions and feeding habits, it is expected that impacts on fish via disturbance of the benthic prey community would be insignificant.

Perturbation of the benthic community would likely be short-term in duration because the community is expected to recover rapidly after dredging, based on the results of numerous studies in Elliott Bay and Puget Sound (McCauley et al. 1977, Swartz et al. 1980, Albright and Borithilette 1981, Romberg et al. 1995, Wilson and Romberg 1999). It should also be noted that at Terminal 5, full colonization of the benthic community would not likely occur because of the potential impacts of ship berthing adjacent to the terminal. Current bathymetric data show areas of propeller scour in the existing vessel berthing areas. Periodic scouring from prop wash may also occur with Alternatives 2 and 3 (Moffatt & Nichol 2015). This will be further discussed in the following section on Operational Impacts on Plants and Animals.

Dredging is not expected to entrain or kill fish. Pressure waves created as the dredge bucket descends would forewarn fish present within the area and would allow individuals time to avoid these mechanisms. In addition, during dredging the clamshell jaws would be open during descent, which should reduce the likelihood of entrapping or containing fish (NMFS 2003). The USACE conducted extensive sampling within the Columbia River over 4 years (Larson and Moehl 1990) and no juvenile salmon were entrained. McGraw and Armstrong (1988) examined fish entrainment rates over 11 years in Grays Harbor and found only one juvenile salmon was entrained.

Indirect short-term effects, such as a reduction of prey species for juvenile salmonids, are expected to be insignificant since recovery of the benthic community is expected to occur quickly. Short-term effects on the benthic community would also occur in waters deeper than –47 feet MLLW, which is deeper than juvenile salmonids feed while in the nearshore.

For these reasons, it is anticipated that both the impacts on the prey community as a result of proposed dredging and any subsequent effects on fish would be insignificant.

Long-term direct effects would be expected to be positive because construction activities would result in a net reduction of overwater structure. The Project proposes to remove approximately

8,500 square feet (0.20 acres) of overwater structure at the face of the terminal with the removal of the deck between the fender and bull rail (Table 3.4-1). This would provide additional unshaded aquatic habitat within the West Waterway, increasing aquatic productivity and removing migratory impediments for salmon.

In addition, the removal or cutting off at the mudline of over 200 treated timber piles (creosote or ACZA) would eliminate a potential contaminant source within the water column. The proposed addition of over 400 concrete structural piles and 500 composite sheet piles would provide a net gain of approximately 436 square feet of pile footprint beneath or at the face of the existing wharf, but this would be more than offset by the total reduction in overwater coverage (8,500 square feet; Table 3.4-1).

The pile driving of over 2,000 piles per year has the potential to eliminate benthic habitat or increase impediments to the juvenile salmon migratory corridor. These effects would be minimized given that all concrete and pinch piles would be driven beneath the existing wharf where little light penetration occurs. The scientific literature has consistently shown that juvenile salmon migrating along shorelines avoid areas of intense shading caused by overwater structures (Nightingale and Simenstad 2001), so it is highly unlikely that outmigrating juveniles would travel beneath the wharf. H- and sheet piles would be located at the face of the wharf, but driven to near the mudline in deep waters between –42 and –50 feet MLLW where juvenile salmonids are not likely to feed.

Table 3.4-1: Summary of In-water and Over-water Structures Removed and Added

Structure	Number	Diameter (Size)	Removal/ Installation Technique	In-Water Pile Footprint (Square Feet)	Over-Water Coverage (Square Feet)
STRUCTURES REMOVED					
Timber fender piling	227	15-inch (average)	Vibratory extraction	311	N/A
Timber/metal deck between fender and bull rail	N/A	2,900 lineal feet	Above-water demolition	N/A	8,500
Timber pinch Pile	57	15-inch (average)	Vibratory extraction	None, driven to mudline	N/A
Concrete Structural Pile	171	16.5-inch	Vibratory extraction	290	N/A
Concrete Structural Pile	74	20-inch	Cutoff at mudline	162	N/A
Steel Fender Pile	36	16.5-inch	Vibratory extraction	54	N/A
Steel Structural Pile	100	18-inch	Cutoff at mudline	213	N/A
Total Pile removal	**665**	N/A	N/A	N/A	N/A
Total In-water Footprint Removal	N/A	N/A	N/A	**1030**	N/A
Total Over-water Structure Removed	N/A	N/A	N/A	N/A	**8,500**
STRUCTURES ADDED					
Timber Pinch Piles	3,000	15-inch (average)	Vibratory and Impact	No in-water driven to mudline	N/A
Composite Sheet Piles (H pile and sheet pile)	500 H- piles; 500 sheet piles	Each H-pile estimated at 0.3 square feet	Vibratory and Impact	146	N/A
Concrete Structural Pile	420	24-inch	Impact	1,320	N/A
Total In-water footprint addition	N/A	N/A	N/A	**1,466**	N/A
NET CHANGES					
In-water Pile Footprint	N/A	N/A	N/A	**+436**	N/A
Over-water Structures	N/A	N/A	N/A	N/A	**-8,500**

OPERATIONAL IMPACTS ON PLANTS AND ANIMALS

Lighting

Lighting at Terminal 5 primarily consists of high-mast light poles and exterior building lights. Lighting along the wharf is primarily comprised of light poles and directional lighting mounted on ship-to-shore (STS) cranes associated with port operations at the site. For Alternative 2, lighting would be maintained throughout the terminal yard by preserving the existing light poles and building lights. Lighting along the wharf would maintain the same levels, but existing light poles that interfere with new STS crane operations would be removed and replaced with new lights installed landward along with directional lighting. The single osprey nest platform, located at the top of a high-mast at

southeast Terminal 5, may be affected by changes in a light pole location; however, the nest box would be reinstalled if any relocation of the particular light pole is required.

Though total light levels on the wharf would remain the same, moving some lights landward and installing additional directional lighting may decrease the amount of direct light that hits the water. Studies on Lake Union have found that juvenile salmon are attracted to direct nighttime light sources on the water and congregate around them. It is surmised that such behavior may make fish more vulnerable to predation; studies have recommended the reduction of direct lighting on the water (Celedonia et al. 2009). Since nighttime lighting conditions on aquatic habitats would be little changed to improved, impacts on juvenile salmon and other aquatic resources would be insignificant. Similarly, impacts of lighting on wildlife species would be the same as the No-Action Alternative.

Vessel Traffic

Existing vessel calls at Terminal 5 have averaged about 18 per month, approximately one call every two days, with a maximum capacity of 6 calls per week. For Alternatives 2 and 3, the number of vessel calls is anticipated to decrease to about 4 calls per week, representing a 20 percent reduction of large vessel traffic in and out of the terminal (Moffatt & Nichol 2016a).

The anticipated reduction in large vessels would likely improve habitats within the West Waterway by reducing migratory impediments to juvenile salmon. Juvenile salmon typically outmigrate along naturally lighted shorelines with low-gradient beaches, or in the surface layers mid-river (Simenstad et al. 1982). They typically avoid migrating under dark overwater structures (Nightingale and Simenstad 2001) such as the conditions found beneath the Terminal 5 wharf. These behavioral traits suggest that outmigrating juveniles would either travel along the shore opposite of Terminal 5, since this area provides a relatively low gradient shoreline, or mid-river waterward from the Terminal 5 face.

Bow/Stern Thruster and Prop Wash

Prop wash from propellers and bow thrusters have the potential to cause scour and erosion to existing bottom habitats within the dredge prism adjacent to the Terminal 5 wharf. Bow thrusters have the potential to cause scour in three areas: beneath the wharf along the existing slope, on the proposed new toe-wall at the face of the wharf, and along with propeller wash directly beneath the vessel (PIANC 2015).

Scour and erosion analyses indicate that scour would not occur beneath the wharf along the riprapped slope; the current rock is adequately sized for the larger vessels that may call at Terminal 5 after Project construction (Moffatt & Nichol 2016). Because of limited light penetration, the slope beneath the existing wharf would have a relatively small population density of benthic invertebrates and marine vegetation; therefore, impacts to this area of bottom habitat would be insignificant.

Toe-wall analyses indicate a moderate risk of bottom sediment scouring next to the wall. If scour is documented, bottom protection in the form of 6-inch-diameter quarry spalls (approximately 12 to 18 inches thick) would be recommended (Moffatt & Nichol 2016). This would displace the benthic community that typically resides in the sandy silt that currently exists. However, the new larger

substrates would not be subject to scour and therefore the invertebrate community, though a different species composition, would likely become more established. Potential impacts on the benthic community in the vicinity of the toe-wall would be considered discountable.

The initial assessment of main propeller flow velocities indicates that there is a high potential for significant scour under the vessel if the main propellers are used excessively. Potential scour is escalated when the main propeller(s) are used during low tides and deep draft vessels are at berth. The area potentially impacted is approximately 100 feet or greater waterward from the wharf face due to the main propeller location and probable jet flow direction. This distance away from the wharf is unlikely to impact wharf stability (Moffatt & Nichol 2016), but may provide a chronic level of scour that prevents full colonization of the benthic community within the dredge prism.

However, existing bathymetry adjacent to the terminal face indicates that there are localized scour pockets with existing vessel operations. The scour is offset from the wharf face approximately 120 feet indicating the vessel has pulled away from the wharf before using the main propellers (Moffatt & Nichol 2016). Because periodic scouring would occur in any vessel scenario, likely resulting in an abbreviated benthic community in bottom sediments, impacts of the proposed vessel berthing and dredge prism would be considered discountable.

All of these potential impacts would occur in deep water in excess of -56 feet MLLW. As reported, juvenile salmon are not expected to rear or feed in waters this deep; therefore, impacts on juvenile salmon would be discountable.

Vehicles and equipment used for facility operations would use fuels, oils, lubricants, and other petroleum-related products within the proposed Project area. These potentially hazardous materials would be subject to applicable local, state, and federal regulations and guidance pertaining to use, handling, and storage. Agency-required BMPs would also be in place to minimize spills and exposure of surface waters to hazardous materials. No increase in exposure of the materials or risks of fire or explosion is anticipated; therefore, potential impacts to water quality from hazardous substances would be discountable.

Though the volume of container traffic handled at Terminal 5 would increase, the amount of vessels berthing at the wharf would decrease (Moffatt & Nichol 2016). With the new deeper dredge depth to accommodate larger vessels and fewer vessel berths, it is anticipated that water quality impacts from turbidity caused by sediment resuspension would remain similar to the No-Action Alternative. Therefore, impacts to water quality from vessel operation would be insignificant.

Water Quality

Vehicles and equipment used for facility operations would use fuels, oils, lubricants, and other petroleum-related products within the proposed Project area. These potentially hazardous materials would be subject to applicable local, state, and federal regulations and guidance pertaining to use, handling, and storage. Agency-required BMPs would also be in place to minimize spills and exposure of surface waters to hazardous materials. No increase in exposure of the materials or risks of fire or explosion is anticipated; therefore, potential impacts to water quality from hazardous substances would be discountable.

Though the volume of container traffic handled at Terminal 5 would increase, the amount of vessels berthing at the wharf would decrease (Moffatt & Nichol 2016). With the new deeper dredge depth to accommodate larger vessels and fewer vessel berths, it is anticipated that water quality impacts from turbidity caused by sediment resuspension would remain similar to the No-Action Alternative. Therefore, impacts to water quality from vessel operation would be insignificant.

3.4.3.3 ALTERNATIVE 3

Alternative 3 consists of the same proposed work listed for Alternative 2 with the addition of further improvements within upland areas of Terminal 5. The existing container yard would be enlarged through relocation or demolition of operations buildings. The truck gate may be relocated and the existing intermodal rail yard reconfigured with additional rail lines. Further details are presented in Section 2. No additional in-water work or upland pile driving is proposed for this alternative. No expansion of the existing wharf terminal or cargo handling footprint would occur.

CONSTRUCTION IMPACTS

Since no additional in-water work is proposed for Alternative 3, impacts on aquatic resources would be the same as evaluated for Alternative 2. Demolition and relocation of buildings and the construction of additional rail lines within the existing cargo handling footprint would likely increase airborne noise during the construction period. However, noise generated by these activities would fall well below those of the proposed upland and in-water pile driving common to both alternatives. All upland work would occur within the existing Terminal 5 footprint, which has virtually no terrestrial habitat functions. Therefore, no additional impacts on aquatic and terrestrial biological resources would occur with upland activities proposed under Alternative 3.

OPERATIONAL IMPACTS

Lighting

Alternative 3 would remove the majority of, and possibly all, existing lighting throughout the terminal and install new lighting only on the exterior of buildings, in the truck turnaround areas, and along the wharf, landward of the STS cranes. No adverse effects relating to artificial nest sites at Terminal 5 are anticipated.

Similar to Alternative 2, landward movement of lighting may decrease the amount of direct light on the water, therefore possibly improving habitat conditions for juvenile salmon. Impacts on juvenile salmon and other aquatic resources would be insignificant. Impacts of lighting on wildlife species would be the same as with the No-Action Alternative.

Vessel Traffic

For Alternatives 2 and 3, the number of large vessel calls is anticipated to be reduced by 20 percent. (Moffatt & Nichol 2016a). This anticipated reduction would likely improve habitats within the West Waterway by reducing migratory impediments to juvenile salmon.

As with Alternative 2, because an abbreviated benthic community is likely present in sediments for any vessel scenario, impacts from the proposed berthing of larger vessels would be considered low.

Benthic impacts would occur in deep water in excess of -56 feet MLLW. Juvenile salmon are not expected to rear or feed in waters this deep; therefore, impacts on juvenile salmon or their prey resources would be discountable.

Bow/Stern Thruster Prop Wash

The number of vessel calls would be the same in Alternatives 2 and 3; however, a higher proportion of the largest vessels berthing at the terminal would occur with the Alternative 3 scenario. Bow thruster analyses showed that the flow velocities of the 14,000-twenty-foot-equivalent-unit (TEU) vessel are generally greater than equal to the larger 18,000 TEU vessel. This is because of the larger dimensions of the 18,000 TEU vessel; the geometry of the larger vessel provides a greater buffer between the thruster outlet and the toe-wall and mudline (Moffatt & Nichol 2015). These analyses indicate that there would likely be little difference in the amount of scour and erosion within bottom habitats for Alternative 3 relative to Alternative 2. As with Alternative 2, impacts on the benthic community would be insignificant because of the abbreviated invertebrate communities likely present adjacent to the terminal.

Water Quality

Impacts to water quality from wharf operations and vessel berthings would be the same in Alternatives 2 and 3. Under Alternative 3, a larger proportion of larger vessels would berth, likely increasing wharf operations, but the BMPs and applicable regulations would remain in place to minimize hazardous inputs to surface waters. Impacts to surface waters from Alternative 3 berthing and upland activities would be discountable to insignificant.

3.4.4 MITIGATION MEASURES

3.4.4.1 NO-ACTION ALTERNATIVE

No mitigation measures are proposed with the No-Action Alternative since the Terminal 5 Rehabilitation and Berth Deepening Project would not be constructed.

3.4.4.2 ALTERNATIVE 2

No mitigation measures are proposed for the Project. Proposed impacts would be associated with construction and limited to the construction period. Long-term impacts are likely to be beneficial, based on the smaller post-construction wharf footprint and fewer total vessels that would berth at Terminal 5. During the construction period, several conservation measures and BMPs would be employed to minimize or eliminate the potential for construction-related impacts. Conservation measures and BMPs are presented as follows.

CONSTRUCTION MITIGATION

Measures to avoid and minimize potential adverse effects on plant and animal communities and, as a result, function as conservation measures, may include a combination of the following:

- All in-water work would be limited to periods determined appropriate by participating state and federal agencies to avoid potential adverse effects on migratory salmon.

- The Project design includes no expansion of the existing cargo wharf and a modest reduction in "over-water footprint" (8,500 square feet) associated with removal of the existing treated wood fender system and installation of alternative above-water vessel/wharf fender equipment. This is expected to decrease shading within the West Waterway and increase algae and invertebrate production, as well as reduce migratory impediments to salmon.
- Over 200 treated wood piles would be removed, thus removing a potential source of contamination from the Project area. Nearly 400 additional concrete and steel piles would also be extracted or cut off at the mudline. Since these are located in existing intertidal and subtidal aquatic areas, this action would remove over 1,000 square feet of man-made structures from the West Waterway. Though an additional 1,466 square feet of piles would be added, this would be more than offset by the reduction in total overwater coverage Table 3.4-1).
- An agency-approved water quality monitoring plan has been developed and would be implemented during construction to verify compliance with water quality conditions of the Section 401 Water Quality Certificate, USACE Permit, and Hydraulic Project Approval.
- All equipment would be inspected daily to ensure that it is in proper working condition.
- The contractor would be responsible for the preparation and implementation of a SPCC Plan to be used for the duration of the Project. The SPCC Plan would be submitted to the Project engineer prior to the commencement of any construction activities. A copy of the plan with any updates would be maintained at the work site by the contractor. The contractor would also maintain at the job site the applicable equipment and materials designated in the SPCC Plan.
- Excess or waste materials, petroleum products, fresh cement, lime or concrete, chemicals, or other toxic or deleterious materials would not be allowed to enter the West Waterway.

OPERATIONS MITIGATION

Lighting

No mitigation measures are expected to be required since lighting levels between all alternatives, including the existing conditions of the No-Action Alternative, would be similar. For Alternative 2, light fixtures would use directional shields and internal louvers to minimize light reflection onto the waterway.

Water Quality

No mitigation measures are expected to be required since all Alternative 2 operational activities would occur in upland areas and fewer vessels would berth. Water quality would remain the same as the No-Action Alternative.

3.4.4.3 ALTERNATIVE 3

CONSTRUCTION MITIGATION

Construction-related mitigation measures would be the same as presented for Alternative 2, since the same level of in-water work is proposed.

OPERATIONS MITIGATION

No mitigation measures are expected to be required since lighting levels between all alternatives, including the existing conditions of the No-Action Alternative, would be similar. For Alternative 3, light fixtures would use directional shields and internal louvers to minimize light reflection onto the waterway.

3.4.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.4.5.1 NO-ACTION ALTERNATIVE

No significant unavoidable adverse impacts would occur with the No-Action Alternative since the Project would not be constructed under this alternative.

3.4.5.2 ALTERNATIVE 2

With the implementation of proposed conservation measures and BMPs, significant adverse impacts to aquatic habitats and species would be avoided. As presented in the Biological Assessment, in-water pile driving has the potential to expose a small number of juvenile salmonids and resident marine fish to noise at levels above underwater noise criteria for fish. To minimize these potential, in-water pile driving would be conducted during agency-approved work windows specifically timed to avoid the juvenile salmon outmigratory period. However, the few juvenile salmon that may be present, as well as marine species, would be exposed.

3.4.5.3 ALTERNATIVE 3

Similar to Alternative 2, with the implementation of proposed conservation measures and BMPs, significant adverse impacts to aquatic habitats and species would be avoided. As presented in the Biological Assessment, in-water pile driving has the potential to expose a small number of juvenile salmonids and resident marine fish to noise at levels above underwater noise criteria for fish (Volume II, Appendix E of this DEIS).

This assessment concludes that the proposed Project, with any alternative (accounting for mitigation), would not result in significant adverse impacts to plant and animal resources.

3.5 ENVIRONMENTAL HEALTH

This section evaluates the potential impacts of the Terminal 5 Improvements Project proposed alternatives on environmental health.

3.5.1 REGULATORY CONTEXT

Although not expected to be required, management or cleanup of industrial contamination at the proposed Project area would be conducted under the requirements of the Washington State Model Toxics Control Act (MTCA) regulations (Chapter 173-340 of the Washington Administrative Code [WAC]). Characterization of current site conditions and ongoing and future cleanup activities at the Terminal 5 site are, and would be, conducted under two overarching regulations: the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and MTCA. Implementation of these regulations is administered by the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology). The proposed Project area must comply with MTCA, but portions of the Terminal 5 Improvements Project area may also be required to comply with CERCLA.

SEPA also requires an evaluation of "releases or potential releases to the environment affecting public health such as toxic hazardous materials" associated with the proposed action.

3.5.2 AFFECTED ENVIRONMENT

Before the 1900s, much of Terminal 5 consisted of tide flats, which were filled to create usable land for commerce and industrial activities, including railroad yards, rail transfer, wood treatment facilities, steel scrap storage, shipbuilding facilities, and a municipal and wood waste landfill. The type of fill material used in the various fill activities is not completely known. The upland area has been used for various industrial purposes, including railroad yards, rail transfer, wood treatment facilities, steel scrap storage, a municipal and wood waste landfill, and shipbuilding facilities.

The fill activities and former industrial activities resulted in the release of hazardous substances at several locations at Terminal 5. The affected environment for environmental health is described in more detail below.

The Port of Seattle (the Port) redeveloped Terminal 5 (known as the Southwest Harbor Redevelopment Project) into a marine cargo terminal in 1999. As part of the redevelopment project, the Port completed extensive subsurface evaluations of soil and groundwater at Terminal 5 locations. These evaluations identified contaminants at concentrations above regulatory cleanup levels on the upland portions of the terminal. Contaminants included polychlorinated biphenyls, carcinogenic polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, and metals. The uplands of Terminal 5 were divided into the following five Remediation Areas (RAs; RA-1 through RA-5) in 1994 and 1995:

- Burlington Northern/Buckley Yard and Spokane Street Properties (RA-1)
- Salmon Bay Steel (RA-2)

- Seattle Steel Incorporated (SSI; RA-3)
- Pacific Sound Resources Superfund Site (RA-4)
- Lockheed West Shipyard No. 2 (RA-5)

Figure 3.5.1 shows the boundaries of each RA with respect to the proposed Project area. The cleanup actions for RA-2, RA-3, RA-5, and a portion of RA-1 (Burlington Northern/Buckley Yard) were conducted via consent decrees between Ecology and the Port. The consent decrees formalized the cleanup action process related to the releases of hazardous substances to soil at Terminal 5. The cleanup actions conducted on the remaining portion of RA-1 (Spokane Street Properties) were conducted as an independent remedial action in general accordance with MTCA.

Cleanup actions for RA-4 were conducted under the Superfund program with EPA oversight. The cleanup actions included removal of select locations of contaminated soil and capping remaining soil contamination that was found to be protective of human health and the environment. In addition, a slurry cut-off wall was constructed at RA-4 to minimize shallow groundwater flow. Institutional controls have been implemented in the RAs and include deed restrictions to limit public access, to prevent use of groundwater as a drinking water source, and to control any future excavation activity that might occur. A groundwater monitoring program was implemented at RA-1 through RA-3 and RA-5 to ensure compliance with applicable MTCA cleanup standards. In 2011, Ecology determined that groundwater data did not show any contaminants exceeding MTCA cleanup standards. Groundwater monitoring at RA-4 is being overseen by EPA. It is unlikely that the proposed Project would impact soil and groundwater in the RAs.

Soil and groundwater data used to characterize the Terminal 5 Improvements Project area indicate that there could be potential for encountering contaminants in soil and groundwater during construction activities. Groundwater monitoring data collected from the area south of W Marginal Way SW indicate the potential presence of arsenic and several volatile organic compounds in the vicinity of the proposed primary electrical substation. Soil data collected from the Project area during cleanup of the RAs indicate that there is potential to encounter petroleum-contaminated soil during construction of the primary electrical substation and associated underground utility lines.

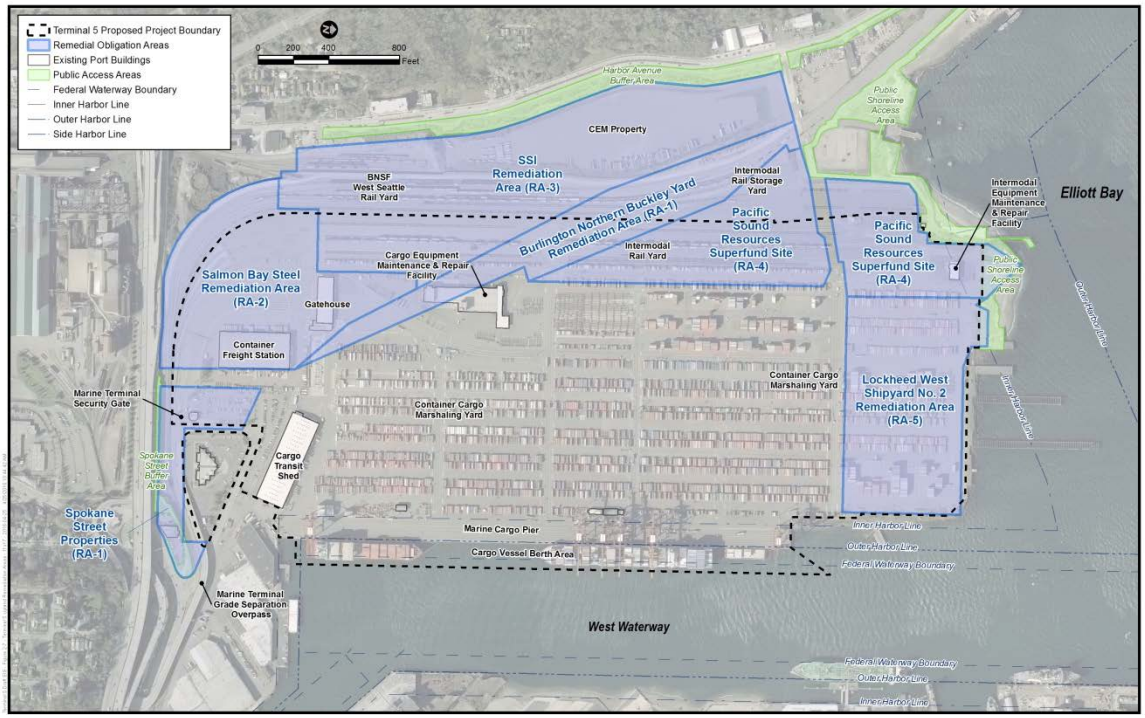

Figure 3.5.1: Terminal 5 Upland Remediation Areas

3.5.3 IMPACTS

3.5.3.1 NO-ACTION ALTERNATIVE

CONSTRUCTION AND OPERATIONS IMPACTS

Terminal 5 is currently paved or covered by impervious surfaces, which prevents direct contact with buried contaminants and minimizes infiltration of stormwater into contaminated soil and release of volatiles into air. Institutional and engineering controls assist with the long-term management of soil and groundwater with contaminants at concentrations greater than the cleanup levels. Under the No-Action Alternative, existing uses at Terminal 5 would continue under current conditions with only minor alterations and routine maintenance and repair work. No significant impacts are expected.

3.5.3.2 ALTERNATIVE 2

CONSTRUCTION IMPACTS

Excavation and dewatering activities associated with upland construction proposed for Alternative 2 have the potential for exposing and handling of contaminated soil and groundwater that might be present beneath some Terminal 5 Improvements Project areas.

Vehicles and equipment used for both construction activities and subsequent facility operations would include the use of fuels, oils, lubricants, and other petroleum-related products within the proposed Project area. These potentially hazardous materials would be subject to applicable local, state, and federal regulations and guidance pertaining to use, handling, and storage. No increase to exposure of the materials or risks of fire or explosion is anticipated.

Sediments within the proposed dredge footprint at Terminal 5 have been analyzed consistent with Washington Dredged Material Management Plan (DMMP) requirements. Preliminary results show that exceedances of DMMP criteria were limited to two locations in substrate newly exposed by the proposed berth-deepening dredging. Disposal of all dredged sediments removed as part of the Project would be consistent with the requirements of the DMMP, Washington State Department of Natural Resources, Ecology, U.S. Army Corps of Engineers, EPA, and other agencies with jurisdiction.

The current Project area is paved and existing environmental contamination is covered by impervious surfaces. Alternative 2 proposes to retain the surface covering that currently prevents direct contact with contaminants in soil or groundwater and reduces infiltration of stormwater through contaminated soil. Therefore, it is anticipated that most environmental health impacts associated with these Project elements would be minor.

Other elements of the proposal include the demolition of structures, grading, construction of lighting pole foundations, and installation and upgrades of utilities and stormwater conveyance piping. Such intrusive activities in some areas of the site have the potential to encounter, expose, or excavate buried contamination. In most cases, existing investigation data allow the Port and its contractors to avoid areas of buried contamination or to anticipate and effectively manage contaminated material. Potential intrusive activities include the following:

Removing pavement, demolishing structures, grading the site, and excavating or exposing contaminated soil containing volatile fuel constituents, if not managed correctly during construction, could increase leaching of contaminants by exposing contaminated soil to precipitation. These activities could also potentially contaminate stormwater and could require construction worker health and safety measures, such as those required by WAC 296-843.

Construction of elements requiring excavations, such as foundations or utilities, may require dewatering (drainage) of excavations. Alternative 2 may affect receiving waters if construction of below-grade structures and utilities require dewatering and if the groundwater is not managed appropriately. Monitoring, and potentially treatment, of dewatering discharges may be needed to address this impact. If contaminated groundwater is pumped, it must be managed in accordance with Ecology regulations and the City of Seattle's municipal wastewater discharge requirements.

Disposal of materials would require characterization to determine the potential presence of contaminated soil and/or asphalt concrete generated as part of site clearing, grading, or general excavating in order to select an appropriate off-site disposal facility.

Construction can also result in the release of hazardous materials to the environment if proper protective measures are not followed. Fuel spills can occur during mobile fueling of heavy

equipment. Hydraulic oil leaks are not uncommon on large construction sites, and a typical leak results in the release of 5 to 30 gallons of hydraulic oil to the ground, depending on the size of equipment. Spill prevention and response planning is typically conducted prior to the start of construction to prevent and, if needed, respond to such spills.

Alternative 2 may affect receiving waters if construction of below-grade structures and utilities requires dewatering and if the facility is located in an area where contaminants are present in groundwater. Monitoring and, potentially, treatment of dewatering discharge may be needed to address this impact.

OPERATIONS IMPACTS

Operation of the facilities is not expected to affect human health or the environment. No intrusive activities are expected to encounter soil or groundwater once construction has been completed for the Terminal 5 cargo facility. Focused remedial measures performed prior to or during construction are expected to mitigate potential adverse impacts associated with site development within contaminated areas, including exposure of future site users to hazardous substances in soil, groundwater, and air. Groundwater remediation using monitored natural attenuation, which includes institutional controls with compliance monitoring, is expected to continue without change under Alternative 2. Consumption of contaminated groundwater as drinking water is not considered a potential impact because wells are not used and would not be used under future development plans as a source of potable water.

Indirect impacts associated with Alternative 2 include the following:

- Focused cleanup activities within the development area would likely occur sooner than if development were not to take place, resulting in more rapid removal or control of some contaminant sources.
- Unknown contamination may be discovered and addressed during development activities that otherwise would have remained in place and potentially migrated.
- These are positive impacts and do not necessitate mitigation measures.

3.5.3.3 ALTERNATIVE 3

CONSTRUCTION AND OPERATIONS IMPACTS

The construction impacts would occur over a larger footprint over the Project area but would be similar to temporary impacts expected from Alternative 2. The operations impact would be similar to Alternative 2.

3.5.4 MITIGATION MEASURES

3.5.4.1 NO-ACTION ALTERNATIVE

CONSTRUCTION AND OPERATIONS MITIGATION

No construction or operations mitigation measures are expected to be required for the No-Action Alternative.

3.5.4.2 ALTERNATIVE 2

CONSTRUCTION MITIGATION

Most of the work is of a shallow nature on the uplands and away from existing RAs. There are no known impacts associated with hazardous materials located in the proposed Project location that cannot be mitigated.

Mitigation measures may be required if contamination is encountered at the site. Potential mitigation measures are discussed below.

CLEANUP OF KNOWN CONTAMINATED AREAS AND MANAGEMENT OF HAZARDOUS MATERIALS

Cleanup actions could be implemented under any of the four processes under the MTCA cleanup regulation to properly eliminate or control risks posed by hazardous materials known to be present at the site. Intrusive activities required for construction that encounter contaminated soil would trigger management practices to comply with the MTCA cleanup regulation (WAC 173-340), Dangerous Waste Regulation (WAC 173-303), Solid Waste Handling Standards (WAC 173-350), and water quality requirements such as those for Ecology's Construction Stormwater General Permit and Water Quality Standards for Surface Waters of Washington State (WAC 173-201A). Demolition of structures would include surveys to assess the need to mitigate and manage hazardous materials. Management of known contaminated areas would include preparation of a site-specific work plan that addresses applicable Ecology regulations and a health and safety plan that includes the safety requirements of WAC 296-843, Hazardous Waste Operations. The investigation information would be used to develop construction specifications to effectively manage contaminated soil and groundwater and to properly control risks posed by hazardous materials known to be present at the site. Where excavation for planned utilities may intersect areas of known contamination, the choice to avoid contamination at the design stage or to use cleaned corridors for multiple compatible utilities could reduce the environmental health impacts associated with excavation of contaminated soil.

Construction designs would identify the locations of known soil and groundwater contamination and provide specifications to guide management of contaminated soil and groundwater (testing, treatment, and disposal) to minimize inadvertent release of contaminants to the environment.

CLEANUP OF UNANTICIPATED CONTAMINATED AREAS

The Port would develop and implement plans to address unanticipated contamination discovered during construction. The Port routinely implements plans and specifications to deal with unanticipated contamination for its projects. Such plans may include notification requirements in the event suspicious conditions are encountered, safety procedures, and response actions. The plans and specifications would be designed to provide for worker health and safety and to minimize cost and schedule impacts. The plans would include the safety requirements of WAC 296-843, Hazardous Waste Operations, and response actions that remove, treat, or contain the contamination or, at a minimum, do not preclude future removal, treatment, or containment of the contamination. The plans would also include spill response measures to address construction-related releases (e.g., a hydraulic oil spill).

ACHIEVEMENT OF MTCA-CONSISTENT CLEANUPS

Cleanup action goals would be established and then achieved through removal, treatment, and containment of hazardous materials. MTCA includes provisions to evaluate the most appropriate cleanup method based on evaluation criteria contained in the MTCA regulation. Regardless of the MTCA process used to conduct the investigation and cleanup activities, cleanup actions would require establishing site-specific cleanup standards for mitigation of contaminated areas. As previously discussed, cleanup standards would include cleanup levels and points of compliance. Currently, the RAs at Terminal 5 use MTCA cleanup levels for industrial properties. The MTCA regulation requires that a restrictive covenant be placed on the property deed that restricts future use of the property to industrial uses if cleanup is limited to industrial cleanup levels. The restriction could be removed in the future if a future cleanup action is implemented that achieves unrestricted cleanup levels. For the type of development included in this Project, potential soil contamination could be limited; therefore, MTCA Method A or Method B cleanup levels for unrestricted land uses would likely apply to most cleanup actions undertaken.

USE OF ESTABLISHED REMEDIATION MEASURES

Cleanup actions to be applied may involve soil removal in limited areas of soil contamination where access to the soil is not restricted by structures or utilities. Soil would be disposed of at facilities permitted to manage the type of soil that is present at the site and in a manner consistent with the requirements of the Solid Waste Regulations (WAC 173-350) and Dangerous Waste Regulations (WAC 173-303). Soil may be treated in place if removal is not feasible. Containment of contaminated soil may be appropriate for large volumes of soil if it can be demonstrated that exposure to the soil can be effectively managed through capping and institutional controls (e.g., restrictive covenants on the property deed) and that hazardous materials in the soil do not constitute a source of contamination to surface water or indoor air.

CONTROL OF DEWATERING IMPACTS

Plans and specifications may require monitoring to assess the quality of dewatering discharges and would provide for treatment, if needed, for compliance with applicable discharge permits for short-term (i.e., construction dewatering) and any long-term (operational dewatering) discharges. If

necessary, an investigation would be performed to determine whether excavations which require dewatering would intercept groundwater contamination.

Alternative 2 may affect receiving waters if construction of below-grade structures and utilities requires dewatering and if the facility is located in an area where contaminants are present in groundwater. Monitoring and, potentially, treatment of dewatering discharge may be needed to address this impact.

USE OF DUST CONTROL MEASURES

Standard dust control measures (e.g., water application) may be used during construction to limit the generation of airborne dust which, if inhaled by site workers or the surrounding population, could potentially result in exposure of hazardous material.

OPERATIONS MITIGATION

No mitigation is expected to be required for Alternative 2.

3.5.4.3 ALTERNATIVE 3

CONSTRUCTION AND OPERATIONS MITIGATION

Mitigation would be the same as Alternative 2.

3.5.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts are identified for the No-Action Alternative or Alternatives 2 and 3 at the proposed Project site.

3.6 NOISE

A Noise Technical Report is provided with detailed information on the noise analysis. See the full report in Volume II, Appendix B of this DEIS (Ramboll Environ 2016b). An introduction to noise terminology and descriptors is included in the Noise Technical Report. The regulatory overview is provided below followed by a description of existing conditions.

3.6.1 REGULATORY CONTEXT

CITY OF SEATTLE NOISE REGULATIONS AND ZONING

The Project site and the surrounding communities are located within the City of Seattle, Washington, and the noise limits included in the Seattle noise ordinance (Seattle Municipal Code [SMC] Chapter 25.08) apply to noise related to this Project. The SMC sets noise limits based on sound levels and durations of allowable daytime/nighttime operational noise (upper portion of Table 3.6-1) and daytime construction noise (lower portion of Table 3.6-1). These limits are based on the zoning of the source and receiving properties.

The Project site is zoned for Industrial uses and potentially affected sensitive receivers in the Project vicinity are residences on the hillsides west and south of the site. Because this Project would involve construction-related activities only during daytime hours, only the daytime construction noise limits are pertinent to this analysis of the temporary construction noise related to this Project. Seattle's day and night operational noise limits apply to the operations of the facility as described below.

As indicated in Table 3.6-1, the Seattle noise limits are based on hourly sound-energy average equivalent sound levels (Leqs) in addition to not-to-be-exceeded maximum sound level (Lmax) that vary by zoning of the noise source and receiving properties. The Project site is zoned for Industrial uses and the nearby potentially affected sensitive receivers are in residentially zoned areas on the hillsides west and south of the site. As shown in the highlighted cell of Table 3.6-1, this establishes 1 hour Leq sound level limits for operational noise of 60 A-weighted decibels (dBA) during the day and 50 dBA at night, along with hourly Lmax limits of 75 dBA during the day and 65 dBA at night.

The Seattle noise code identifies a number of noise sources or activities that are exempt from the noise limits shown in Table 3.6-1**.** The following sources are among those specifically exempted:

> *"Sounds created by motor vehicles are exempt from the exterior sound level limits (Table 3.6-1), except that sounds created by any motor vehicle operated off highways shall be subject to the exterior sound level limits when the sounds are received within a residential district of the city (SMC 25.08.480), and*
>
> *Sounds created by warning devices or alarms (such as back-up alarms on vehicles) not operated continuously for more than 30 minutes per incident (SMC 25.08.530)".*

In addition, sounds from the operation of railroads engaged in interstate commerce are exempt from local noise control rules by virtue of a federal preemption of this issue.[14]

Table 3.6-1: Seattle Maximum Permissible Levels and Construction Noise Limits (dBA)

Zoning District of Noise Source [25.08.410 & 420 & 425]	Zoning District of Receiving Property[(b)]		
	Residential Day/Night	Commercial	Industrial
OPERATIONAL NOISE LIMITS[(A)]			
Residential	55/45	57	60
Commercial	57/47	60	65
Industrial	60/50	65	70
Daytime Construction Noise Limits[(b)]			
On-site sources like dozers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, and pneumatic equip (maximum+25) [25.08.425 A.1]			
Residential	80	82	85
Commercial	82	85	90
Industrial	85	90	95
Impact types of equipment like pavement breakers, pile drivers, jackhammers, sand-blasting tools, or other impulse noise sources - may exceed maximum permissible limits between 8 AM and 5 PM weekdays and 9 AM and 5 PM weekends, but may not exceed the following limits [25.08.425 B]: Leq (1 hour) 90 dBA Leq (30 minutes) 93 dBA Leq (15 minutes) 96 dBA Leq (7.5 minutes) 99 dBA			
Note: The above sound level limits are based on the measurement interval equivalent sound level (Leq) *and* a not-to-be-exceeded Lmax level 15 dBA higher than the indicated limits. The construction noise limits are based on an hourly Leq, unless noted otherwise for impact equipment. (a) The operational noise limits for residential receivers are reduced by 10 dBA during nighttime hours (i.e., 10 PM to 7 AM weekdays, 10 PM to 9 AM weekends) and are displayed for daytime/nighttime hours. (b) Construction noise limits apply at 50 feet or a real property line, whichever is greater. Construction noise is limited to the higher levels listed in the lower portion of the table during "daytime" hours only. For purposes of limiting construction noise received in certain zones, daytime hours are defined as 7 AM to 7 PM weekdays and 9 AM to 7 PM weekends for noise received in Lowrise, Midrise, Highrise, Residential-Commercial, or Neighborhood-Commercial zones. For construction projects in all other zones, and for public projects or locations where there are no residential uses within 100 feet, daytime construction hours are defined as 7 AM to 10 PM weekdays and 9 AM to 10 PM weekends. Source: Seattle Municipal Code 25.08 - Specific sections indicated.			

FEDERAL TRANSIT/FEDERAL RAILWAY ADMINISTRATIONS NOISE IMPACT CRITERIA

Sound level impact criteria applied by two federal agencies for transportation type projects and activities can be used to provide benchmarks for comparison with off-site sound levels. These noise criteria are discussed below.

[14] 42 United States Code. §4901 et seq. (1972).

The Federal Transit Administration (FTA) has defined noise impact criteria for transit and rail projects in the FTA manual entitled "Transit Noise and Vibration Impact Assessment" (FTA 2006).

The Federal Railroad Administration (FRA) applies the same noise impact assessment procedures and impact criteria employed by the FTA. And although the FTA/FRA noise impact criteria are not directly applicable to on-site and near-site rail activities related to the proposed Project, these criteria provide a useful and objective method for assessing potential noise impacts from increases in noise directly attributable to all sources associated with this Project.

The FTA/FRA noise impact criteria apply a sliding scale of impact levels (or thresholds) for project-related noise based on the existing sound levels and the amount of noise a project would contribute Figure 3.6.1. The criteria are based on the land use category of the receiving properties. For this Project, the receiving properties of concern are residences (shown as Category 2 in Figure 3.6.1), and the FRA criteria use the day-night sound level (Ldn) noise descriptor to include consideration of the potential for sleep disturbance.

Based on the FRA impact criteria for increases in sound levels, receiving locations with low existing sound levels can be exposed to greater increases in overall noise, after the addition of project noise, before an impact occurs. Conversely, locations with higher existing sound levels can be exposed to smaller increases in overall noise before an impact occurs.

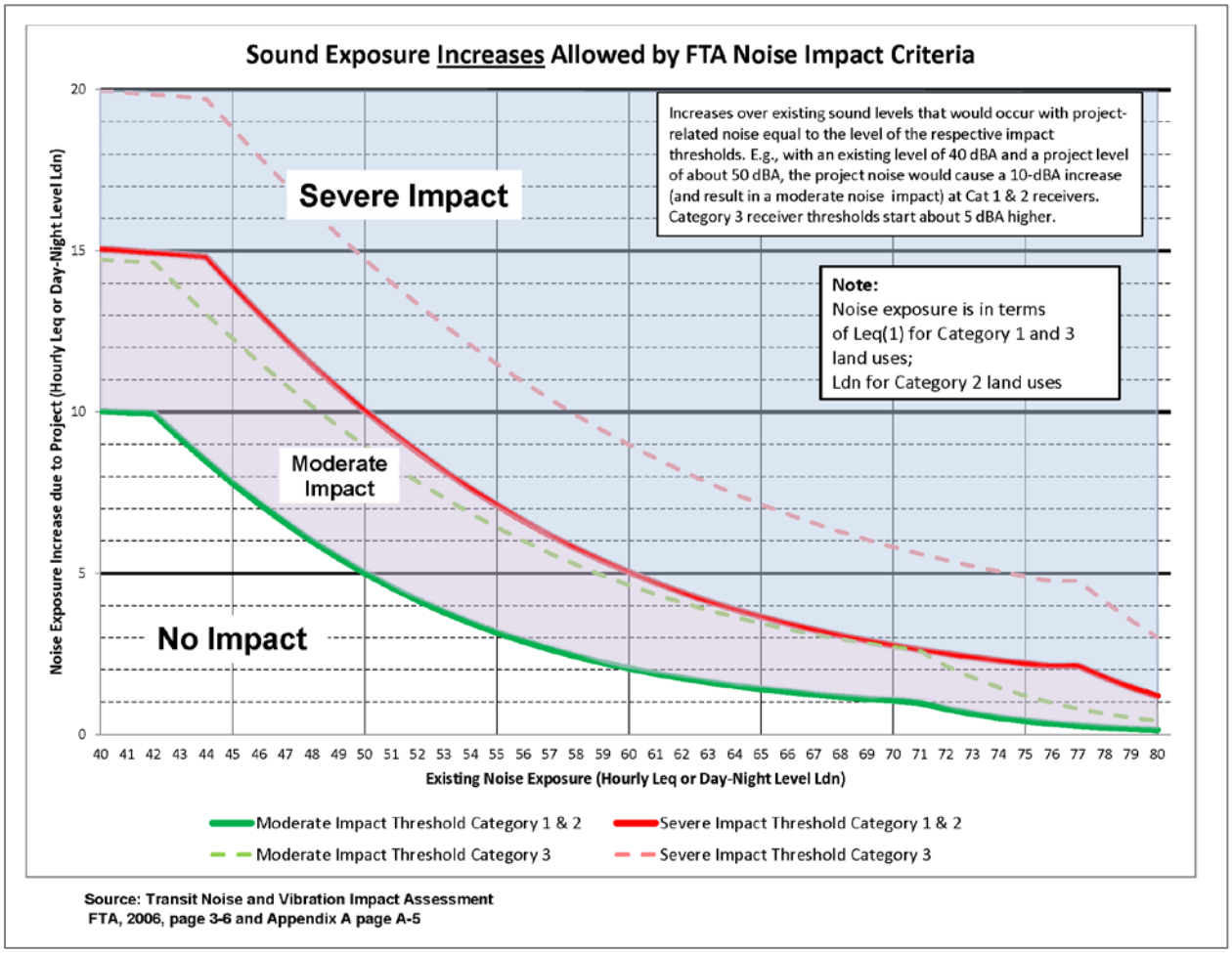

Figure 3.6.1: FTA/FRA Noise Impact Criteria

3.6.2 AFFECTED ENVIRONMENT

3.6.2.1 SOUND LEVELS

The Project site is overlooked by hillside residential communities to the southeast and west of the site. Existing acoustic environments at the residential locations nearest the Project site are dominated by roadway traffic noise from the West Seattle Freeway and from surface roads in the area and from a variety of existing industrial uses in the area. Existing industrial uses in the area include operation of a container terminal at the Project site and other heavy industrial uses to the east and west, along with commercial uses along surface streets to the south and west. Ongoing train traffic serving existing industrial facilities in the area also contributes to the existing acoustic environment.

Sound levels in the residential areas to the southeast and west of the Project site have been measured at a number of locations over the past 20+ years, dating back to the original siting of the Terminal 5 container terminal in the mid-1990s.[15] The measured sound levels are summarized in Table 3.6-2. Measurement locations are depicted in Figure 3.6.2. Measurement details are provided in the noise technical report found in Volume II, Appendix B of this DEIS.

Table 3.6-2: Range of Measured Sound Levels in Project Vicinity (dBA)

SLM Location	Date	Daytime Leqs	Nighttime Leqs	Ldn
SLM1: Hinds Street	2012–2016	62–63(a)	55–57(b)	64(c)
SLM2: 31st Avenue SW	Mid-1990s	58–64	55–60	64
SLM3: Fauntleroy Avenue SW	Mid-1990s	53–61	52–56	60
SLM4: City Light Condos	Mid-1990s	52–59	50–55	60
SLM5: Pigeon Point	1993	70–72	61–72	74

Note:
(a) Measured between 7 AM and noon.
(b) Measured between 11 PM and midnight.
(c) Measured daytime sound levels at the Hinds Street location are similar to levels measured at 31st Avenue SW, so the 31st Avenue SW Ldn is used here to represent the S Hinds Street location.

[15] Port of Seattle, Southwest Harbor Cleanup and Redevelopment Project - Draft Environmental Impact Statement, January 1994.

Figure 3.6.2: Sound Level Measurement (SLM) and Model Receptor Locations

3.6.3 IMPACTS

The noise impact and mitigation assessment conducted for this Project was based on noise modeling using the CadnaA noise model and source-specific sound level data, where possible, to estimate cumulative levels of facility operational noise. The noise analysis of the action alternatives evaluated both compliance with the Seattle noise limits and the potential for noise impacts based on the Project-related changes in the acoustic environment.

Project-related sound levels were predicted at numerous modeling "receptor" locations representing the residences nearest the Project site. The modeling receptors considered in the noise modeling are depicted in Figure 3.6.2 (above).

Terminal 5 operations would involve a variety of types of equipment, some of which would produce noise and some of which would not be expected to generate much noise. The expected equipment and the number of pieces involved with the alternative facility configurations are listed in Table 3.6-3. Detailed information about the equipment is provided in Volume II, Appendix B of this DEIS.

Table 3.6-3: Expected Operational Equipment

Scenario	Shift [(a)]	Facility Cargo Handling Equipment and Mobile Sources								
		Ship	STS Crane	TP	RTG	RMG	Transporter	Hostler	Truck	Train
Alt1 – 647K TEU	1st Shift	2	6	22	3	0	0	67	166/hr	1.3/ day
	2nd Shift	2	6	9	0	0	0	42	0	
Alt2 – 647K TEU	1st Shift	2	8	25	3	0	0	71	166/hr	1.3/ day
	2nd Shift	2	8	12	0	0	0	56	0	
Alt2 – 1.27M TEU	1st Shift	2	8	36	13	0	0	92	327/hr	2.6/ day
	2nd Shift	2	8	29	0	0	0	92	0	
Alt3 – 647K TEU	1st Shift	2	8	0	0	38	32	13	167/hr	1.3/ day
	2nd Shift	2	8	0	0	26	32	13	0	
Alt3 – 1.27M TEU	1st Shift	2	10	0	0	45	40	13	213/hr	2.6/ day
	2nd Shift	2	10	0	0	45	40	13	115/hr	
Alt3 – 1.7M TEU	1st Shift	2	12	0	0	58	48	18	286/hr	3.5/ day
	2nd Shift	2	12	0	0	58	48	18	154/hr	

Note:
(a) First shift is between 8 AM and 5 PM. Second shift is between 6 PM and 3 AM.
Alt = Alternative
hr = hour
RMG = rail-mounted gantry crane
RTG = rubber-tired gantry crane
STS = ship-to-shore
TEU = twenty-foot equivalent unit
TP = top-pick
Source: Moffatt & Nichol

The facility is expected to only operate one or two 9-hour shifts per day (each containing a 1-hour break). Regularly scheduled "hoot" shift work (i.e., between 3 AM and 8 AM) is not expected to be necessary for any of the alternatives, but hoot shift work could occur occasionally.

Hoot shift operations were not considered in the noise impact assessment, but any such operations would be required to comply with the City of Seattle night-time noise limits.

3.6.3.1 NO-ACTION ALTERNATIVE

CONSTRUCTION

The No-Action Alternative would not require more than a nominal amount of construction and maintenance of existing facilities. No construction noise impacts would be expected.

OPERATIONS

Operation of the terminal under the No-Action Alternative would continue in a fashion similar to the previous uses and activities at the terminal. Under the old permit, the facility was allowed a throughput of up to 647,000 twenty-foot equivalent units (TEUs) or equivalent, with requisite supporting vessels, container handling equipment (CHE), trains, and trucks.

The noise analysis considered whether noise generated by on-site equipment and activities currently allowed under the existing permit would comply with the City of Seattle noise limits Figure 3.6.2). For this evaluation, the analysis used noise modeling assuming full operation of equipment to estimate resulting sound levels at receptors representing the residences nearest the Project site. As identified in the equipment demand sheets for the No-Action Alternative, no intermodal rail yard or gate operations would be necessary during nighttime hours.[16] Results of the noise modeling, assuming the equipment usage identified in Table 3.6-3 and the timing assumptions in the equipment demand sheet, are presented in Table 3.6-4.

As shown in Table 3.6-4**,** model-calculated operational sound levels associated with the No-Action Alternative facility comply with daytime and nighttime noise limits. This analysis assumed the intermodal rail yard and gate would require only a single, daytime shift.

In the past, occasional nighttime intermodal activity has occurred but typically at lower levels of activity than with full daytime operations. Measured levels of nighttime activity collected at the S Hinds Street and 31st Avenue SW locations (Figure 3.6.2) during nighttime operations in the last several years have indicated that the facility was in compliance with the City of Seattle noise limits. It should be noted that background sound levels during these nighttime measurements were typically higher than sound levels from the facility, although some sources from the facility were audible.

16 Moffatt & Nichol, Equipment Calculations, 647,000 TEU Scenario, 02/13/15.

Table 3.6-4: Model-Calculated Sound Levels – No-Action Alternative (dBA, Leq)

Receiver	Model-Calculated Sound Level
First Shift (8AM to 5PM), Noise Limit = 60 dBA	
R1 – S Hinds Street	56
R2 - 31st Avenue SW	58
R3 – 30th Avenue SW	59
R4 – Fauntleroy Avenue SW	57
R5 – 33rd Avenue SW	57
R6 - City Light Condos	57
R7 - Pigeon Point	54
Second Shift (6PM to 3AM), Most Stringent Noise Limit = 50 dBA	
R1 – S Hinds Street	47
R2 - 31st Avenue SW	49
R3 – 30th Avenue SW	49
R4 – Fauntleroy Avenue SW	48
R5 – 33rd Avenue SW	48
R6 - City Light Condos	48
R7 - Pigeon Point	48
Source: Ramboll Environ 2016	

3.6.3.2 ALTERNATIVE 2

CONSTRUCTION

Construction activities associated with Alternative 2 would include cargo wharf improvements described in Chapter 2, Section 2.3.3 of this EIS. These activities are categorized here as "typical" construction activities, and pile driving. Noise from construction activities is subject to the City of Seattle noise limits (Table 3.6-1). Facility construction would be limited to daytime hours, and in general terms, the temporary nature of construction coupled with its restriction to daytime hours would reduce the potential for significant impacts from construction activities and equipment. More specifics are discussed below.

Typical Construction Activities. Table 3.6-5 shows the overall hourly noise levels (Leqs) from various "typical" construction activities (upper portion of table) and the range of sound levels (i.e., minimum to maximum levels) emitted by individual pieces of equipment (lower portion of table). These levels give an idea of the relative sound levels that can be expected from different kinds of equipment. Existing residences south of the Project site are more than 1,000 feet from the nearest proposed construction activities, and residences west of the site are more than 2,000 feet from the nearest proposed activities. In the absence of intervening terrain, structures, or dense vegetation, sounds from construction equipment and activities (usually point sources) decrease about 6 dBA for each doubling in distance from the source.

As shown in Table 3.6-5, the estimated hourly Leqs from even the nearest construction activities (more than 1,000 feet from the nearest residences) are mostly at or below the noise level limit of 60 dBA that would apply to long-term operational noise. Added to the fact that construction would be temporary and limited to daytime hours, there would be little if any potential for significant noise impacts from "typical" on-site construction activities.

Table 3.6-5: Noise Levels from Typical Construction Activities and Equipment (dBA)

Activity	Range of Hourly Leqs		
	At 1000'	At 2000'	At 4000'
1. Clearing	2. 57	3. 51	4. 51
5. Grading	6. 50-62	7. 43-56	8. 37-50
9. Paving	10. 47-62	11. 40-56	12. 34-50
13. Erection	14. 47-58	15. 40-52	16. 34-46
Types of Equipment	**Range of Noise Levels**		
	At 1000'	**At 2000'**	**At 4000'**
17. Bulldozer	18. 51-70	19. 45-64	20. 39-58
21. Dump Truck	22. 56-68	23. 50-62	24. 44-56
25. Scraper	26. 54-67	27. 48-61	28. 42-55
29. Paver	30. 60-62	31. 54-56	32. 48-50
33. Generators	34. 45-56	35. 39-50	36. 33-44
37. Compressors	38. 48-55	39. 42-49	40. 36-43
Source: U.S. Environmental Protection Agency 1971			

PILE DRIVING

The proposed Project would require pile driving during construction of the wharf and portions of the trestle. Pile driving would occur over 2,500 feet from the nearest residences west of the site and from 1,000 to 4,000 feet from the nearest residences south of the site. Archived sound level measurement data of pile driving activities indicate that the hourly sound level (Leq) of pile driving at a distance of 100 feet is approximately 86 dBA.[17] The Lmax of pile driving is estimated to be 104 dBA at a distance of 100 feet.

The extent and numbers of piles needed as part of the upgrade of the facility wharf were assessed as part of a specialized pile driving testing program called rapid load testing (RLT). The RLT program was subject to a separate environmental review, and the RLT was completed prior to the conclusion of this EIS process. The findings of the RLT program could ultimately lead to reductions in the lengths or numbers of piles needed and to possible reductions in the number hammer pile strikes that would be required using standard pile driving testing methods during the wharf improvements.

[17] From Ramboll Environ archive of pile driving sound level measurements. The hourly Leq included the placement and driving of two piles in a 1-hour period.

While results were generally positive, the outcome of the RLT program has not been finalized and has therefore not affected the assessment documented here.

Pile driving sound levels that would be received at residences nearest the site were estimated using the CadnaA noise model. As a worst case scenario, the model assumed three pile driving rigs would operate concurrently, two in water and one on the upland. The resulting sound levels were hourly Leqs in the low 50s to mid-60s dBA and Lmaxs in the mid-60s to upper-70s dBA at the nearest residences. Because of the large intervening distances, estimated pile driving sound levels are greatly reduced at the nearest residences. As with "typical" construction, the model-calculated pile driving sound levels at most locations are below the limits the City of Seattle applies to long-term operational noise and well below the limits applied to impact (e.g., pile driving) sources. Therefore, no significant noise impacts would be expected during construction.

However, even with fairly low levels of pile driving noise, the unique nature of impact pile driving noise can result in the loudest sounds being audible at the residences nearest this activity. This noise could be perceived by some people as intrusive and possibly annoying, but the low overall levels would minimize the potential for impacts.

OPERATIONS

Under Alternative 2, operation of the terminal would be similar to the previous operation of the facility relative to the type of cargo handling equipment. The primary difference would be the accommodation of larger ships for loading and unloading using larger and up to 8 ship-to-shore cranes, densification of the operation by stacking more containers instead of placing containers on truck chassis, and increased number and diversity of cargo handling equipment as throughput increased.

At the projected facility opening in 2020, the terminal throughput would be expected to be approximately 647,000 TEUs. At this level of throughput, intermodal rail yard and gate operations are not expected to be necessary at night.[18]

With an expected annual compounded growth rate of 4 percent, the terminal capacity under the Alternative 2 configuration would reach maximum capacity throughput of approximately 1.27 million TEUs in 2030. At this capacity, intermodal rail yard operations would be required at night to accommodate the throughput, but no nighttime gate operations would be expected.

Compliance

The noise assessment used the assumptions and the equipment usage levels identified in Table 3.6-3 to evaluate whether noise generated by on-site equipment and activities would comply with the City of Seattle noise limits (Table 3.6-1). As discussed in Section 3.6.1 noise from trains is exempt

[18] Moffatt & Nichol, Equipment Calculations, 647,000 TEU Scenario, 02/13/15.

from the limits and was not included in this portion of the analysis. Results of the compliance assessment are presented in Table 3.6-6**.**

As shown in Table 3.6-6, model-calculated sound levels with the equipment required to handle a throughput of 647,000 TEUs comply with both City of Seattle's 60-dBA daytime limit and 50-dBA nighttime noise limit at residences nearest the site.

Working at a capacity of 1.27 million TEUs, model-calculated sound levels continue to comply with the daytime noise limit of 60 dBA. However, at this throughput, nighttime intermodal rail yard operations would be required, and noise from CHE operating in the intermodal rail yard results in model-calculated sound levels exceeding the 50-dBA nighttime noise limit.

Because model-calculated sound levels with a throughput of 1.27 million TEUs exceed the nighttime noise limits, the analysis went on to consider the following several potential noise mitigation measures in addition to equipment changes:

- Using top-picks with a sound level equivalent to 72 dBA at a distance of 100 feet.
- Constructing a 20-foot-high noise wall along the west side of the entrance and gate area.
- Ultimately, noise modeling indicated the noise barrier would be ineffectual given the topography of the surrounding receivers above the terminal, and using quieter equipment was the only mitigation measure determined to be sufficiently effective to warrant further consideration.
- Although the mitigation using quieter top-picks reduced the model-calculated sound levels somewhat (see the "With Mitigation" column in Table 3.6-6), the model-calculated sound levels continue to exceed the City of Seattle noise limits.

Table 3.6-6: Model-Calculated Sound Levels - Alternative 2 (dBA, Leq)

Receiver	Model-Calculated Sound Level		
	647K TEU (~2020)	1.27M TEU (~2030)	
	No Mitigation	No Mitigation	With Mitigation
First Shift (8AM to 5PM), Noise Limit = 60 dBA			
R1 – S Hinds Street	55	57	56
R2 - 31st Avenue SW	58	59	58
R3 – 30th Avenue SW	59	60	59
R4 – Fauntleroy Avenue SW	56	57	56
R5 – 33rd Avenue SW	57	58	57
R6 - City Light Condos	56	57	56
R7 - Pigeon Point	54	56	55
Second Shift (6PM to 3AM), Most Stringent Noise Limit = 50 dBA			
R1 – S Hinds Street	47	54	52
R2 - 31st Avenue SW	49	56	54
R3 – 30th Avenue SW	50	57	55
R4 – Fauntleroy Avenue SW	49	54	52
R5 – 33rd Avenue SW	49	54	52
R6 - City Light Condos	49	55	53
R7 - Pigeon Point	48	52	50

Note: Shaded cells identify model-calculated sound levels exceeding the applicable noise limit.

Source: Ramboll Environ 2016

Noise Impact Due to Sound Level Increases.

In addition to considering the potential compliance of the facility with the City of Seattle noise limits, the noise analysis also assessed the potential for noise impacts due to Project-related sources (including trains arriving and locomotives departing from the site) increasing the sound levels in the vicinity of the site.

As part of calculating the night sound level (Ldn), the analysis assumed first shift equipment would operate between 8 AM and 5 PM with a 1-hour break, and second shift equipment would operate between 6 PM and 3 AM with a 1-hour break. In addition, the average 1.3 and 2.6 daily train arrivals and departures for throughputs of 647,000 TEUs and 1.27 million TEUs, respectively, were assumed to be split evenly over the first and second shifts.

In the absence of applicable standards or criteria for assessing impacts due to sound level increases, the noise impact assessment applied the FTA/FRA review methodology and noise impact criteria based on the 24-hour day Ldn (see discussion in Section 3.6-1).

The calculated cumulative sound levels, sound level increases, and determinations of the potential for noise impacts (under FTA criteria) are displayed in Table 3.6-7. As shown in Table 3.6-7,

Alternative 2 would not result in noise impacts at the beginning of operations when throughput is at or near 647,000 TEUs. By 2030, when the facility would be at or near its capacity of 1.27 million TEUs, all of the receptor locations could experience moderate noise impacts from the Project, but none of the impacts would be classified as severe. With mitigation, the moderate noise impacts at two receptor locations would be reduced to no impact.

It should be noted that the predicted increases over existing sound levels are based on conservative representations of existing sound levels. Most of these sound levels are from measurements taken in 1993 or 1999. Therefore, most of the background levels used for this assessment did not include sounds from operation of the terminal between 1999 and 2014. Therefore, this can be considered a conservative assessment of impacts due to increases.

Regardless, even using conservative baseline sound levels, no severe noise impacts are anticipated based on application of the FTA noise impact criteria.

Table 3.6-7: Estimated Impacts due to Increases with Alternative 2 using FTA Impact Criteria (Ldn)

Model Receptor Locations	Existing Ldn	Increase for FTA Impact			Alt2 - 647k			Alt2 - 1.27M No Mitigation		Alt2 - 1.27M With Mitigation		
		Moderate	Severe	Project Ldn	Cumulative	Increase	Project Ldn	Cumulative	Increase	Project Ldn	Cumulative	Increase
41. R1 – S Hinds Street	42. 64	43. 1.5	44. 3.9	45. 55	46. 65	47. 0.5	48. 60	49. 65	50. 1.4	51. 58	52. 65	53. 1.0
54. R2 - 31st Avenue SW	55. 64	56. 1.5	57. 3.9	58. 57	59. 65	60. 0.7	61. 61	62. 66	63. 1.8	64. 60	65. 65	66. 1.4
67. R3 – 30th Avenue SW	68. 64	69. 1.5	70. 3.9	71. 57	72. 65	73. 0.8	74. 62	75. 66	76. 2.3	77. 61	78. 66	79. 1.7
80. R4 – Fauntleroy Avenue SW	81. 60	82. 2.0	83. 5.0	84. 55	85. 61	86. 1.3	87. 60	88. 63	89. 2.8	90. 58	91. 62	92. 2.1
93. R5 – 33rd Avenue SW	94. 60	95. 2.0	96. 5.0	97. 56	98. 61	99. 1.3	100.60	101.63	102.2.8	103.58	104.62	105.2.1
106.R6 - City Light Condos	107.60	108.2.0	109.5.0	110.55	111.61	112.1.3	113.60	114.63	115.3.1	116.58	117.62	118.2.1
119.R7 - Pigeon Point	120.74	121.0.5	122.2.3	123.63	124.74	125.0.3	126.66	127.75	128.0.6	129.66	130.75	131.0.6

Note: Shaded values identify potential moderate noise impacts under FTA criteria. No severe noise impacts were identified.

Source: Ramboll Environ 2016.

3.6.3.3 ALTERNATIVE 3

CONSTRUCTION

Construction activities associated with Alternative 3 were described in Chapter 2, Section 2.3.5. Construction activities required for modernization of the wharf to accommodate larger cranes would be similar to these activities with Alternative 2, and noise impacts from the associated pile driving activities would be the same under Alternative 3 as discussed previously for Alternative 2.

Upland "typical" construction activities would be more extensive under Alternative 3 than Alternative 2, particularly the modifications to the intermodal rail yard, but the worst-case upland

activities would remain similar to those discussed in Chapter 2, Section 2.3.3. Because construction would be limited to daytime hours, no significant noise impacts would be expected.

OPERATIONS

Under Alternative 3, major upgrades to the facility would occur and much of the equipment would be electrically powered and may be automated. The diesel top-picks (TPs) and rubber-tired gantry cranes would be replaced with electric rail-mounted gantry (RMG) cranes, substantially reducing noise from CHE.

Even with major upgrades of the facility, the terminal throughput would still be expected to start at approximately 647,000 TEUs in 2020 due to market conditions. At this level of throughput, gate operations are not expected to be necessary at night. [19]

With an expected annual growth rate of 4 percent, the terminal throughput would increase to 1.27 million TEUs in 2030 and reach its capacity of 1.7 million TEUs in 2040. With both these more distant future year throughput scenarios, gate operations would be required at night.

Compliance

Using the assumptions above and the equipment usage levels identified in Table 3.6-3, the modeling analysis considered whether noise generated by on-site equipment and activities would comply with the City of Seattle noise limits (Table 3.6-1). As discussed in Section 3.6.1, noise from trains is exempt from the limits and was not included in this portion of the analysis. Results of the compliance assessment are presented in Table 3.6-8.

As shown in Table 3.6-8, model-calculated sound levels with the equipment required to handle a throughput of 647,000 TEUs comply with both City of Seattle's 60-dBA daytime limit and 50-dBA nighttime noise limit at residences nearest the site.

With a throughput of 1.27 to 1.7 million TEUs, model-calculated sound levels continue to comply with the daytime noise limit of 60 dBA. However, nighttime gate operations would be required with these levels of throughput, and model-calculated sound levels exceed the 50-dBA nighttime noise limit due primarily to truck noise.

Because model-calculated sound levels with a throughput of 1.27 to 1.7 million TEUs exceed the nighttime noise limits, the analysis considered the following possible noise mitigation measures:

- Installing noise barriers to the height of the reefer stacks, on the west sides of the reefer support structures.
- Constructing 20-foot-high noise walls along the west side of the entrance and gate areas.

[19] Moffatt & Nichol, Equipment Calculations, 647,000 TEU Scenario, 02/29/16.

- Constructing 20-foot-high noise walls on the east sides of the proposed substation yards (to obstruct mobile source noise transmission).

All of these potential mitigation measurements were determined to be ineffectual for providing cost effective noise reductions. Due to the physical configuration of the gate and on-site roads, it was not possible to substantially reduce on-site truck noise with noise walls. And because the nighttime noise levels are dominated by on-site trucks, using noise barriers to reduce reefer noise also resulted in minimal reduction in overall sound levels. As a result, the model-calculated levels continue to exceed the City of Seattle noise limits. Some versions of these potential noise reduction elements are likely to be considered in later reviews based on more Project-specific facility configuration.

Table 3.6-8: Model-Calculated Sound Levels - Alternative 3 (dBA, Leq)

Model Receptor Locations	647K TEU (~2020)	1.27M TEU (~2030)	1.7M TEU (~2040)
	No Mitigation	**No Mitigation**	**No Mitigation**
First Shift (8AM to 5PM), Noise Limit = 60 dBA			
R1 – S Hinds Street	53	54	56
R2 - 31st Avenue SW	56	57	59
R3 – 30th Avenue SW	56	57	60
R4 – Fauntleroy Avenue SW	55	56	58
R5 – 33rd Avenue SW	57	59	60
R6 - City Light Condos	54	56	58
R7 - Pigeon Point	51	52	56
Second Shift (6PM to 3AM), Most Stringent Noise Limit = 50 dBA			
R1 – S Hinds Street	47	52	54
R2 - 31st Avenue SW	49	55	57
R3 – 30th Avenue SW	49	55	58
R4 – Fauntleroy Avenue SW	48	54	56
R5 – 33rd Avenue SW	48	56	58
R6 - City Light Condos	49	54	56
R7 - Pigeon Point	48	51	54

Note: Shaded cells identify model-calculated sound levels exceeding the applicable noise limit.
Source: Ramboll Environ 2016

Noise Impact Due to Sound Level Increases

In addition to considering compliance, the analysis also assessed the potential for noise impacts with Alternative 3 due to Project-related sources increasing the sound levels in the vicinity of the site. For this portion of the assessment, the analysis used FTA/FRA noise impact criteria based on the 24-hour day Ldn.

As part of calculating the Ldn, this analysis assumed first shift equipment would operate between 8 AM and 5 PM and that second shift equipment would operate between 6 PM and 3 AM, with both shifts having 1-hour breaks. In addition, the average 1.3, 2.6, and 3.5 daily train arrivals and departures for throughputs of 647,000, 1.27 million, and 1.7 million TEUs, respectively, were assumed to be split evenly over the first and second shifts.

The calculated cumulative sound levels, sound level increases, and determinations of the potential for noise impacts (under FTA criteria) are displayed in Table 3.6-9. As shown, Alternative 3 would not result in noise impacts at the beginning of its operation in 2020 when throughput is at or near 647,000 TEUs. By 2030, when the facility is expected to be at or near an operational throughput of 1.27 million TEUs, many of the receptor locations would experience moderate impacts from the Project, but none of the impacts would be classified as severe under FTA criteria. With mitigation, the moderate noise impacts would be reduced. By 2040, when the facility could be at or near its capacity of 1.7 million TEUs, most of the receptor locations would experience moderate impacts from the Project, but none of the impacts would be classified as severe. The mitigation results in minimal change in the overall sound levels.

It should be noted, again, that the predicted increases over existing levels are based on conservative estimates of existing sound levels. Most of these levels are fairly old, taken in either 1993 or 1999 and do not include sounds from existing operations at the site. Therefore, this can be considered a conservative assessment of impacts due to increases.

Again, even using conservative baseline sound levels, no severe noise impacts are anticipated, using the FTA noise impact criteria.

Table 3.6-9: Estimated Impacts due to Increases with Alternative 3 using FTA Impact Criteria (Ldn)

Model Receptor Locations	Existing Ldn	Increase for FTA Impact		Alt3 – 647K			Alt3 - 1.27M			Alt3 - 1.7M		
		Moderate	Severe	Project Ldn	Cumulative	Increase	Project Ldn	Cumulative	Increase	Project Ldn	Cumulative	Increase

R1 – S Hinds Street	64	1.5	3.9	54	64	0.4	58	65	0.9	60	65	1.3
R2 - 31st Avenue SW	64	1.5	3.9	56	65	0.6	60	66	1.5	62	66	2.2
R3 – 30th Avenue SW	64	1.5	3.9	56	65	0.6	60	65	1.5	63	66	2.4
R4 – Fauntleroy Avenue SW	60	2.0	5.0	55	61	1.1	59	63	2.7	61	64	3.6
R5 – 33rd Ave SW	60	2.0	5.0	55	61	1.3	61	63	3.5	63	64	4.5
R6 - City Light Condos	60	2.0	5.0	55	61	1.1	59	62	2.3	60	63	3.2
R7 - Pigeon Point	74	0.5	2.3	63	74	0.3	65	75	0.6	67	75	0.8

3.6.4 MITIGATION MEASURES

3.6.4.1 NO-ACTION ALTERNATIVE

No noise impacts were identified with the No-Action Alternative, and no noise mitigation measures are required.

3.6.4.2 ALTERNATIVE 2

CONSTRUCTION

Although no significant noise impacts were identified due to construction of Alternative 2, some relatively simple and inexpensive practices are identified here which can reduce the extent to which people are affected by construction noise. Examples include using properly sized and maintained mufflers, engine intake silencers, and engine enclosures, and turning off idle equipment. Construction contracts can specify that mufflers be in good working order and that engine enclosures be used on equipment when the engine is the dominant source of noise.

Substituting hydraulic or electric models for impact tools such as jack hammers, rock drills, and pavement breakers could reduce construction and demolition noise. Electric pumps could be specified if pumps are required.

Although as safety warning devices (e.g., back-up alarms) are exempt from noise ordinances, these devices emit some of the most annoying sounds from a construction site. One potential mitigation measure would be to ensure that all equipment required to use backup alarms utilize ambient-sensing alarms that broadcast a warning sound loud enough to be heard over background noise but without having to use a preset, maximum volume. A better alternative would be to use broadband backup alarms instead of typical pure tone alarms. Such devices have been found to be very effective in reducing annoying noise from construction sites.

Operations

The model-calculated sound levels of Alternative 2 with a throughput of 1.27 million TEUs do not indicate compliance with the more stringent nighttime noise limit of 50 dBA. Therefore, the following mitigation measure was considered and found to be effective:

- Require the use of TPs that are at least 2 dBA quieter than the Taylor TPs used by the previous tenant (e.g., use Fantuzzi or other equipment).

With the above mitigation, the model-predicted sound levels are reduced but continue to exceed City of Seattle's nighttime noise limits. However, no severe noise impacts due to increases over existing levels would be expected.

3.6.5 ALTERNATIVE 2—TEST CASE NOISE MITIGATION ANALYSIS

As part of the mitigation review, a test case assessment based on a version of the Alternative 2 facility operation was evaluated with noise modeling to consider what steps might work to reduce noise sufficiently to ensure compliance with the nighttime noise limits. This test case assumed an electrified configuration of the intermodal rail yard similar to that proposed under Alternative 3, but with the rest of the container yard the same as under Alternative 2 and at a maximum capacity of 1.27 million TEUs.

The test case scenario assumed the following components:

- The intermodal rail yard would be serviced by four electric RMG cranes instead of five TPs.
- Conveyance to the intermodal rail yard would continue to be provided by five TPs in the stacks and 12 yard tractors.
- No nighttime gate operations.
- Other equipment on the wharf and in the container storage yard would remain the same as with Alternative 2.
- Previously described Alternative 2 noise mitigation measure would also be in place (i.e., use of quieter TPs).

Note that this test case was undertaken for study purposes only with the knowledge that it did **not** represent a feasible facility configuration because of the exorbitant cost of providing the electrical systems for only partial electrification. This test case, therefore, represents an evaluation of potential noise mitigation for assessing potential effectiveness of various approaches to noise control, and not an actual alternative action.

Noise modeling based on these test-case measures indicated total facility noise levels would be less than 50 dBA, and thus comply with the City of Seattle noise limits. In addition, no severe noise impacts would be expected due to increases over existing levels.

3.6.6 ALTERNATIVE 3

CONSTRUCTION

Construction noise levels with Alternative 3 are expected to be similar to levels identified for Alternative 2, but the upland activities would be more extensive with Alternative 3. Noise mitigation measures for Alternative 3 would be the same as identified for Alternative 2.

OPERATIONS

Because model-calculated sound levels with a throughput of 1.27 to 1.7 million TEUs exceed the nighttime noise limits, noise mitigation measures using a variety of noise barriers were evaluated with modeling and dismissed from further consideration due to lack of effectiveness.) Without effective mitigation, model-predicted sound levels continue to exceed City of Seattle's nighttime noise limits. However, no severe noise impacts due to increases over existing levels would be expected.

3.6.6.1 ANNOYANCE NOISE CONTROL MEASURES—ALTERNATIVES 2 AND 3

If the proposed Project proceeds it would include several measures intended to reduce generation of what might be perceived as annoying noise by Project-related sources, including backup alarms, train horn noise, and vessel noise while hoteling at berth. The noise control measures that would be implemented as part of the proposed Project include the following:

Use of ambient-sensing broadband back-up alarms on all mobile equipment instead of using standard pure tone alarms. This would remove one of the most potentially annoying noise sources from the facility.

Addition of safety measures to the rail corridor between the bridge across the Duwamish and the terminal. Adding safety measures to the corridor, such as chain link fence and installation of crossing gates and wayside horns at suitable at-grade crossings in all four quadrants of each driveway, would substantially improve the safe operation of trains. As a result, the need to sound audible alarms should be reduced. These measures could also be used as a basis to begin the process of requesting the corridor be converted into a railroad quiet zone.

Reduction in noise from on-vessel power generators used for hoteling due to the provision of shorepower for moored vessels. This change has the potential to reduce or eliminate low frequency noise from moored that has in the past been reported by some people as intrusive by some residents on the hill west of the facility. [20]

These noise control measures have the potential to reduce or eliminate what have been identified as some of the most annoying facility related noise sources.

FACILITY OPERATIONS NOISE MANAGEMENT PLAN/SYSTEM—ALTERNATIVES 2 AND 3

Noise modeling for the proposed Project included numerous assumptions regarding the potential modes of operations, equipment involved, locations of equipment being used, and amounts of cargo being handled. The noise modeling represents worst case, peak operations of the expected alternatives based on maximum throughputs of the alternatives, but actual operational levels would likely increase gradually year to year. This analytical process is a reasonable way to estimate possible future activities in lieu of specific information that is not available at this time. Modeling based on these assumptions indicated a *potential* issue for compliance with the City of Seattle noise limits—at some point in the future.

The Port of Seattle (the Port) is committed to minimizing or preventing such noise problems using a robust, dynamic noise management system designed to track noise being emitted by the facility over time and taking steps as necessary to address any problems identified. Use of a noise management plan would provide a process and a set of tools to identify reasonable and feasible best practices to comply with applicable noise limits. While the specifics of this program would be

[20] Anecdotal evidence indicates a few discrete ships that have moored at Terminal 5 have emitted low frequency sound that can be heard by some people on the hillside to the west. Such low frequency noise is less affected by obstructions and can travel longer distances than higher frequency sounds. There are no data documenting the phenomenon of low frequency noise being received on the hillside, but such noise may be generally restricted to older ships or ships where the boiler room and/or power generators are higher in the ship than is typical.

developed later in discussions with the Seattle Department of Construction & Inspections (DCI), some of the potential components of such a program are presented briefly below.

The noise management as currently envisioned would be expected to include some form(s) of the following components:

- Noise complaint system for receiving and addressing noise complaints from nearby communities.
- Off-site compliance noise measurements (e.g., possibly over a 1-week to 1-month period each year during peak operations). If this monitoring identifies noise compliance issues, the responsible equipment/operations could be identified and replaced, modified, or its operations restricted. Note that it is unlikely that unstaffed, continuous monitoring would provide useful information because background sound levels from non-Port sources are relatively high in the Project area and any compliance measurement would require identification of Port-specific sounds and removal of extraneous background sound levels. This is not feasible with unstaffed monitors.
- Facility noise generation tracking system (possibly based on facility zones and the equipment used in them in conjunction with occasional sound level measurements at property lines or elsewhere to indicate noise levels being produced during known levels of on-site activities).
- Enforcement/dispute resolution mechanisms.

Specifics of the facility operations noise management plan are expected to be developed in discussions with Seattle DCI during the interval after publication of the DEIS and in time for inclusion in the Final EIS for the Project.

3.6.7 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.6.7.1 NO-ACTION ALTERNATIVE

With the No-Action Alternative, no significant noise impacts are identified.

3.6.7.2 ALTERNATIVE 2

With Alternative 2, model-calculated sound levels comply with the City of Seattle's daytime noise limit but exceed the nighttime noise limit. However, no significant noise impacts would be expected based on FTA criteria due to Project-related increases over the existing sound levels. With the implementation of a robust and dynamic noise management plan for the Project, it is expected that compliance with the City of Seattle nighttime noise limit could be achieved and future noise complaints minimized or eliminated.

3.6.7.3 ALTERNATIVE 3

With Alternative 3, model-calculated sound levels comply with the City of Seattle's daytime noise limit but exceed the nighttime noise limit. However, no significant noise impacts would be expected based on FTA criteria due to Project-related increases over the existing sound levels. With the

implementation of a robust and dynamic noise management plan for the Project, it is expected that compliance with the City of Seattle nighttime noise limit could be achieved and future noise complaints minimized or eliminated.

3.7 LAND USE

This section of the DEIS for the Terminal 5 Improvements Project discusses the pattern of land uses on the site and in the vicinity of Terminal 5, and evaluates how the alternatives would affect these land and shoreline uses and zoning regulations, either directly or indirectly. Section 3.8, which follows, compares consistency of the alternatives with relevant plans and policies.

3.7.1 REGULATORY CONTEXT

3.7.1.1 SEATTLE LAND USE CODE

All of the Terminal 5 property and the properties surrounding it are zoned General Industrial 1 (IG1). The General Industrial zones were established to promote the full range of industrial activities and related support uses. They include those areas most suited to industrial activity, where the separation from residential and pedestrian-oriented commercial areas is sufficient to reasonably mitigate the impacts associated with industrial uses. The designation as General Industrial recognizes the goal of protecting healthy, established marine and rail-related industrial area from the intrusion of substantial amounts of unrelated retail and commercial uses. For example, the City of Seattle Land Use Code restricts the size of certain non-industrial uses in the IG-1 zone (see next paragraph).

The IG1 zone is the most intensive industrial zone in Seattle and is intended to accommodate uses classified as "heavy manufacturing." Among the uses permitted outright in the IG1 zone are manufacturing, passenger terminal, cargo terminal, marine retail sales and service, non-household sales and services, principal use parking (in IG1 in general, but not in the Duwamish M/I Center), office, warehouse, outdoor storage, utility services, eating and drinking establishments, and open space (Seattle Municipal Code [SMC] 23.50.012, Chart A). Certain non-industrial uses, such as retail and office, are allowed, but are restricted in the amount of permitted building area and building height. Retail service use is limited to 10,000 square feet per lot in the IG1 zone. Office use is limited to 10,000 square feet per lot in the IG1 zone.

Terminal 5 lies within the Airport Height Overlay District for King County International Airport (Boeing Field) in the Inner Approach Area (as defined in SMC 23.64). However, due to the sloping angle of the inner approach area, it is less restrictive over the location than the restrictions of the shoreline overlay zone, which are discussed later.

Table 3.7-1: Land Use Code Requirements for Development in IG1 Zones

Section	Summary of Code
23.50.022	There is no maximum height limit in the IG1 zone for industrial structures, except under certain circumstances. Under the IG1/85 zoning on Terminals 25/28/30, the height limit is 85 feet for any portion of a structure that contains the following uses: retail sales and services; nonhousehold sales and services; offices; entertainment uses; research and development laboratories; and institutions. Under the IG1/45 zoning on TERMINAL 5, the height limit of those uses is 45 feet.
23.50.028	The total maximum floor area ratio (ratio of building floor area to lot area) for IG1 is 2.5.
23.50.029 & 23.53.020	Setbacks may be required in IG1 zones for certain street improvements, as per SMC 23.53.020.
23.50.034	Screening and landscaping requirements pertain to Industrial Buffer zones and Industrial Commercial zones, not to General Industrial zones like IG1. Therefore, they are not applicable to TERMINAL 5, which is zoned IG1. (There are other screening requirements that apply to parking areas and development along street lot lines, as noted below.)
23.50.042	Venting standards for all Industrial zones—The venting of odors, vapors, smoke, cinders, dust, gas, and fumes shall be at least 10 feet above finished grade, and directed away from residential uses within 50 feet of the vent.
23.50.050	Proposed uses in industrial zones shall meet the transportation concurrency level-of-service standards prescribed in Chapter 23.52 (a proposed project must demonstrate that the traffic it will generate will not cause Level of Service to deteriorate at certain specified locations in the City).
23.50.016A & B	Uses located on streets that are designated on the Industrial Streets Landscaping Plan are to provide street trees in the planting strip unless certain exceptions apply.
23.50.16C	Screening: All outdoor storage, including off-street parking for two or more fleet vehicles…shall provide view-obscuring screening along street lot lines…
23.50.018	View corridors: On lots which are partially within the Shoreline District, except those on the Duwamish Waterway, a view corridor shall be required for the non-shoreline portion, if the portion of the lot in the Shoreline District is required to provide a view corridor under the Seattle Shoreline Master Program.
23.54.015	The minimum number of off-street parking spaces required for specific uses is based upon gross floor area, as set forth in SMC 23.54.015, Chart A.
Source: Seattle Land Use and Zoning Code 2016	

3.7.1.2 SHORELINE MANAGEMENT ACT

Summary. The Shoreline Management Act (SMA) of 1971, Chapter 90.58 Revised Code of Washington [RCW]) is intended to protect the public interest associated with shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. The primary implementing tool of the SMA is the adoption by local jurisdictions of the City of Seattle Shoreline Master Program (SMP), which must also be approved by the

Washington State Department of Ecology. The SMA establishes two basic categories of shoreline: "Shorelines of State-wide Significance," which are identified in the SMA, and "shorelines"; together these include all of the water areas of the state and their associated wetlands, together with the lands underlying them. Areas of Puget Sound and adjacent salt waters between the ordinary high water mark and the line of extreme low tide, which includes Elliott Bay and the Duwamish Waterway, are classified as a "Shoreline of State-wide Significance" under the SMA (Chapter 90.58.030 RCW).

Discussion. The SMA is implemented in Seattle through the City of Seattle SMP, which is contained in the Land Use Element of the City of Seattle Comprehensive Plan (Comprehensive Plan) and Chapter 23.60A of the Seattle Land Use Code. The consistency of the alternatives with the adopted City of Seattle SMP is discussed below.

SHORELINE MASTER PROGRAM

Management of Seattle's shorelines is guided by the Area Objectives for Seattle's shorelines as established in the Land Use Element of the Comprehensive Plan (goals LUG39-LUG63 and policies LU231-LU270) and by Chapter 23.60A of the Seattle Land Use Code. Together, these elements constitute the City of Seattle SMP. SMC 23.60A sets forth regulations for shoreline development and land use in the Shoreline Overlay District, which includes the land areas within 200 feet of the ordinary high water mark. The Washington State Coastal Zone Management Program and the City of Seattle SMP have designated the Duwamish River and Puget Sound as shorelines of statewide significance.

The SMP classifies the City of Seattle shorelines into "shoreline environments," such as urban, conservancy, and so on. It addresses uses appropriate for each shoreline environment. These shoreline designations are in addition to the City of Seattle zoning code, which also establishes appropriate uses for the area. Terminal 5 lies in the "Urban Industrial" (UI) shoreline environment, consistent with use of the sites for intensive industrial use and with the status of the sites as state harbor areas, reserved for navigation and commerce. The purpose of the UI environment is "to provide for efficient use of industrial shorelines by major cargo facilities and other water-dependent and water-related industrial uses" (SMC 23.60A.220). Some of the uses permitted outright on waterfront lots in the UI environment include marine-related commercial uses, warehouse and outdoor storage uses, passenger and cargo terminals, and some utility uses. Dredging is permitted as a special use when necessary for water-dependent and water-related uses or to install utility lines. Residential, entertainment, and lodging uses are prohibited in the UI environment. All commercial uses are permitted on upland lots within the UI environment (SMC 23.60A.840-854).

SHORELINE DEVELOPMENT STANDARDS

The City of Seattle SMP (SMC 23.60A.840) contains development standards for uses permitted in the Urban Industrial Shoreline Environment, which includes the area at Terminal 5 within 200 feet of the ordinary high water mark. Table 3.7-2 summarizes these regulations.

3.7.2 AFFECTED ENVIRONMENT

Terminal 5 is bounded by Harbor Avenue SW on the west, southwest Elliott Bay on the north, the West Waterway on the east, and SW Spokane Street on the south. The site is improved as a marine cargo terminal. The terminal includes 2,900 linear feet of wharf structure and adjacent deep draft vessel berth area along the Duwamish West Waterway, container cranes, a container marshalling yard, and an intermodal rail yard. The site contains a number of accessory terminal structures totaling over 231,000 square feet and currently provides 481vehicle parking spaces.

The east side of the wharf is adjacent to the Duwamish Waterway. The adjacent submerged lands are within a state waterway and are owned and managed by the Washington State Department of Natural Resources (DNR). Public ports, including the Port of Seattle, are authorized to manage state-owned aquatic lands and improvements under a Port Management Agreement (PMA) with the DNR; (Chapter 79.90 RCW, Washington Administrative Code [WAC] 332-30). The PMA provides for port management of such lands used in conjunction with and contiguous to port-controlled uplands. Lands being managed by the agreement are defined in the PMA, and the Port is obligated to manage these aquatic areas consistent with the state's general aquatic land management goals and other applicable state and federal regulations. PMAs typically cover the state harbor areas between the inner and outer harbor lines.

At Terminal 5, the outer harbor line is coincident with the wharf bull rail. The Port's current PMA does not include certain of the Project elements which fall outside the outer harbor line, such as the toe-wall and dredging. Construction of the toe-wall may require amendment of the existing PMA boundary. A right of entry authorization from DNR, which is short-term license, may be required in order to accomplish the berth dredging. These Project elements and the planned uses of the aquatic land areas are consistent with DNR aquatic lands management policies, which provide a preference for water-dependent uses (WAC 332-30-100). The berth use at the terminal meets the DNR definition of a moorage facility and is clearly included as water-dependent use envisioned under the PMA regulations (see WAC 332-30-106). Thus, such uses are clearly allowed by the amended PMA.

Terminal 5 is also adjacent to the federal navigation channel in the West Waterway. Directly south of the site is Nucor Steel, a large heavy industrial steel manufacturing facility formerly operated by Birmingham Steel. Directly east of the site are industrial warehouses, and further east, across the West Waterway, is the Port's 196-acre Terminal 18 cargo terminal. Single-family residential areas are located on land to the west of the site, west of Harbor Avenue SW. Land uses along the shoreline of southwest Elliott Bay to Duwamish Head include commercial and park land. Land uses are included below.

At the north end of the Terminal 5 site is Jack Block Park, a 5.8-acre public access park. The park has walking paths and viewing and play areas that were installed in 1998. The park is provided and maintained by the Port.

The site comprises approximately 197 acres with numerous structures, including the following:

- A 14,400-square-foot administrative office building (Building A-1)
- An 80,000-square-foot covered transit shed (Building W-6)

- A 48,000-square-foot maintenance and repair facility
- An 80,000-square-foot container freight station
- A 2,146-square-foot, south-end marina building (Building A-18)
- A 2,853-square-foot, north-end marina building (Building A-19)
- A 2,627-square-foot crane maintenance building
- A 1,429-square-foot yard office
- A gatehouse
- An on-terminal restroom building
- Various equipment sheds and storage structures
- 2,900-lineal-foot cargo wharf structure

The site is zoned General Industrial 1 (IG1/U85) and General Industrial 2 (IG2/85). The Comprehensive Plan designation for the site is Industrial. The City of Seattle SMP designation for the site is Urban Industrial (UI). The site is identified on City of Seattle GIS Critical Area Map layers as having the following critical areas: abandoned landfill; liquefaction zone; riparian corridor; salmon watershed; flood prone area; wildlife area; and shoreline habitat.

The terminal has employed approximately 2,350 people for cargo activities in the past. Recent and current tenants have employed between 350 and 470. Future tenants are expected to range from approximately 350 to 2,350. No residential uses are present at the Project site, and no residential occupancy is proposed.

The existing and proposed use of the site is marine cargo terminal, an industrial use that is consistent with the current and projected underlying zoning designation, the City of Seattle SMP, and Comprehensive Plan. The Project is also consistent with the Port's long-range planning objectives for the facility contained in the 1991 Container Terminal Development Plan and the updated Harbor Development Strategy 21, adopted in June 2001, which identify the need for continued viability of cargo terminal operations and improvement of existing facilities. The continuation of the use is further supported by the Port's Century Agenda planning document adopted in 2013 that calls for support and growth of the cargo business.

Terminal 5 currently is approved for cargo terminal and commercial moorage. The definition for "cargo terminal" in SMC 23.20A.906 is: "Cargo terminal" means a "transportation facility" use in which quantities of goods or container cargo are stored without undergoing any manufacturing processes, transferred to other carriers, or stored outdoors in order to transfer them to other locations. Cargo terminals may include accessory warehouses, railroad yards, rail transfer, storage yards, and offices. Other uses permitted outright in UI are parking accessory use and utility lines.

Moorage at the cargo terminal would include vessel moorage for transfer of cargo, container cargo, goods, supplies, equipment, stores, gear, provisions, and any other materials which may be transferred to and from the terminal to other locations. The terminal berths may also be used for commercial moorage, which may include the lay berthing of vessels and seasonal berthing of vessels. Fueling and provisioning of active, stored, and lay-berthed vessels may also take place. Such uses have been determined to be allowed outright as part of a permitted cargo terminal and not

requiring separate permit authorizations under the current SMP, SMC23.60A (see Seattle Hearing examiner files S-15-001; S-15-002, dated September 30, 2015).

3.7.3 IMPACTS

3.7.3.1 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, uses at Terminal 5 would remain the same as currently permitted and no impacts are expected.

3.7.3.2 ALTERNATIVES 2 AND 3

Under Alternatives 2 and 3, uses at Terminal 5 would include a cargo terminal and container yard, with truck gates, remodeled buildings for labor, management, and terminal operations, upgraded wharf and crane rails, upgraded lighting and utilities, and outdoor storage equipment. Accessory parking, utility lines and rail transit facilities may also be included. These uses are all permitted outright in the General Industrial zone. Other Land Use Code requirements that apply to the IG1 zone are summarized in Table 3.7-1.

The proposal would result in a more efficient use of existing built and committed container cargo facilities and would meet Land Use Code requirements for the General Industrial 1 zone. The height limits in the City of Seattle SMP, which are discussed in the following section, are more restrictive than the Land Use Code and supersede SMC 23.50.022.

Only a few small existing or proposed buildings would occupy Terminal 5, substantially below the maximum 2.5-floor area ratio.

Setbacks may be required in IG1 zones for certain street improvements, as per SMC 23.53.020. However, the proposed improvements at Terminal 5 would not trigger the need for street improvements.

Venting of odors, fumes, etc., would be at least 10 feet above grade. There are no residential uses within 50 feet of any potential vent on the Terminal 5 site.

Transportation concurrency and off-street parking requirements are discussed in the Transportation section of this DEIS.

SMC 23.50.018 addresses the need for view corridors on lots that are partially within the Shoreline District, except lots on the Duwamish Waterway. Since the Terminal 5 Improvements Project site is on the Duwamish Waterway, the zoning provisions for view corridors in SMC 23.50.018 do not apply.

Table 3.7-2: Development Standards

(The site is located in both the IG1 U/85 and IG2 U/85 zones; however, the proposal is located entirely within the IG1 portion of the site. A portion of proposal is also located within the UI Shoreline Overlay.)

Development Standard	Summary of Requirement	Project Consistency
SMC 23.50.012; Table A: L.1	Permitted and prohibited uses in Industrial Zones	Cargo terminals are permitted outright within IG1 and IG2.
SMC 23.54.015	Parking requirements	The installation of the electrical substation would eliminate 29 of the existing 481 parking spaces on the terminal. On-terminal parking spaces would continue to exceed the zoning requirement.
SMC 23.60A.152	General development standards for all shoreline environments	The proposal would comply with all requirements. Water quality controls would be applied during construction and operation of upland and in-water elements. Upland work would adhere to the applicable requirements of the Stormwater, Grading, and Drainage Code (SMC 22.800).
SMC 23.60A.158	Mitigation sequencing	The Project does not result in a net loss of shoreline ecological resources. Impacts of the Project are primarily temporary and construction-related. The short-term net effects of the Project on Endangered Species Act-listed species would be insignificant and the long-term net effects are expected to be positive. The Biological Assessment for the Project identifies numerous mitigation measures that avoid and minimize impacts on shoreline ecological resources.
SMC 23.60A.162	Standards for parking and loading zone requirements	No new parking is proposed. No over-water parking is proposed. The proposal complies with all requirements.
SMC 23.60A.164	Standards for regulated public access	No change or expansion in use is proposed. No change is proposed for the existing regulated public access, which is provided at Terminal 5 at the 15 -acre Jack Block Park directly adjacent and north of the terminal.
SMC.23.60A.167	Standards for shoreline setbacks	The proposed Project elements are water-dependent uses that functionally need to be in the setback and are allowed within the setback under 23.60A.167.D.
SMC 23.60A.170	Standards for view corridors	The proposal meets view corridor requirements.
SMC.23.60A.172 Table A.5	Applicable standards for Shoreline Modifications - Dredging	Dredging necessary for a water-dependent use is allowed as a special use permit in the UI environment.
SMC.23.60A.172 Table A.(7)(g)	Use Standards - Fill	Placement of clean sand cover after completion of dredging is ecological mitigation that is allowed as a special use; proposed fill would not permanently or negatively impact native aquatic vegetation; no filling

Development Standard	Summary of Requirement	Project Consistency
		incidental to the repair or replacement of shoreline stabilization is proposed.
SMC 23.60A.172 Table A(10)(a)	Use Standards – Piers and floats	Proposed piers and floats are allowed outright as accessory to a water-dependent use (cargo terminal).
SMC 23.60A.172 Table A(11)(b)	Use Standards – Shoreline stabilization	The proposed short sheet wall, or "toe-wall," is a shoreline stabilization method that is allowed as a special use permit in the UI environment. The criteria in 23.60A.188 would also be met.
SMC 23.60A.182	Standards for dredging	The proposal would comply with all requirements. Dredging is for navigational purposes. Dredging and disposal of dredged material would comply with all permitting requirements of federal and state agencies with jurisdiction. The dredged materials meet state and federal requirements for open-water disposal. The Biological Assessment for the Project identifies numerous mitigation measures that avoid and minimize potential adverse impacts.
SMC 23.60A.184	Standards for fill	The proposal would comply with all requirements. Placement of clean sand as cover after completion of dredging is allowed as a special use; no filling incidental to the repair or replacement of shoreline stabilization is proposed.
SMC 23.60A.187.D	Standards for piers and floats and over-water structures; non-residential	The proposal would meet the requirements. No expansion of over-water coverage is proposed. The wharf is necessary for loading and off-loading of cargo. Light transmitting features are infeasible because the pier is used for average loads that greatly exceed 30 pounds per square foot.
SMC 23.60A.188	Standards for shoreline stabilization	The proposal would comply with the requirements. The proposed short sheet wall at the base of the under-pier slope is adjacent to the navigation channel and necessary for a water-dependent use, marine cargo terminal. The stabilization elements are to protect from erosion and are necessary to prevent or reduce structural damage. The Port is providing detailed information about the geotechnical design as part of the construction permit review.
SMC 23.60A.190	Standards for vegetation and impervious surface management	No vegetation is present. No additions to impervious surfaces are proposed.
SMC 23.60A.217	Standards for utility lines	The proposed utility lines are within the UI environment and would be installed underground. Site grades would

Development Standard	Summary of Requirement	Project Consistency
		be restored after the utility lines are installed.
SMC 23.60A.482	Uses permitted outright on waterfront lots in the UI environment.	The proposal is a permitted use within the UI shoreline environment. The proposal conforms to all applicable development standards for the UI environment. No change in use is proposed. The use is Cargo Terminal, water-dependent. Utility improvements are accessory to the cargo terminal use.
SMC 23.60A.486	Height in the UI environment	The proposal is within the UG1/U85 portion of the site. The proposed structures (container cranes) are exempted from the maximum height limitation under SMC 23.60A.486.B.1, are necessary for the function of the water dependent, and are a use consistent with allowed uses in the UI environment.
SMC 23.60A.488	Lot coverage in the UI environment	The proposal does not affect the existing lot coverage at the site.
SMC 23.60A.490	Shoreline setbacks in the UI environment	The proposal is a water-dependent use and is allowed within the setback under 23.60A.167.
SMC 23.60A,492	View corridors in the UI environment	The proposal does not affect the existing view corridor condition at the site, which currently greatly exceeds the minimum standards. Open storage of marine cargo is allowed within view corridors under SMC 23.60.876.C.4.
SMC 23.60A.494	Regulated public access in the UI environment	The proposal does not alter or reduce public access at the site, which is provided by Jack Block Park, located at 2130 Harbor Avenue SW.
SMC 23.60.880	Development standards specific to water-dependent uses on waterfront lots in the UI environment	The proposal is for the rehabilitation of an existing marine cargo terminal to allow for modernization and more efficient use, and complies with all requirements of this code section.

In addition, see Volume II, Appendix L of this DEIS (Anchor QEA 2015) for a detailed report that was submitted to the City of Seattle Department of Construction and Inspections to show compliance with City of Seattle SMP Development Standards (SMC 23.60A.152).

3.7.3.3 NO-ACTION ALTERNATIVE

In the No-Action Alternative, the Terminal 5 facilities would retain uses as a container terminal and continue cargo operations. This alternative does not allow the Port to maximize container volume potential or achieve the related economic benefits of providing facilities to support projected growth in container shipping. Existing consistencies or inconsistencies (if any) with the development standards would continue.

3.7.3.4 ALTERNATIVES 2 AND 3

The proposal would meet development standards for the UI shoreline environment. Construction of a new container trucking gate system; new or remodeled buildings for labor, management, and terminal operations; rehabilitated wharf and new crane rails; and upgraded lighting and utilities would either meet the 35-foot height limit or would qualify as exceptions for equipment necessary for water-dependent uses. Since structures on lots in the UI environment may occupy 100 percent of the lot, lot coverage does not constrain development at Terminal 5. SMC 23.50.018 addresses the need for view corridors on lots that are partially within the Shoreline District, except lots on the Duwamish Waterway. Since the Project site is on the Duwamish Waterway, the zoning provisions for view corridors in SMC 23.50.018 do not apply. The site plan for Terminal 5 maximizes water-dependent uses along the shoreline. Required parking spaces and loading berths are discussed in Section 3.11 of this DEIS. New off-street parking at Terminal 5 would be located 50 feet from the shoreline.

The Port may need to obtain aquatic area use authorization or PMA boundary amendments may be required. The Port would follow appropriate BMPs (see Volume II, Appendix L of this DEIS for the complete list of BMPs to be followed).

3.7.4 MITIGATION MEASURES

3.7.4.1 NO-ACTION ALTERNATIVE

No mitigation is expected to be required.

3.7.4.2 ALTERNATIVES 2 AND 3

The Port would work with DNR to obtain any necessary aquatic area use authorization or PMA boundary amendments required. In addition, see Volume II, Appendix L of this DEIS (Anchor QEA 2015) for a detailed report that was submitted to the City of Seattle Department of Construction and Inspections to show compliance with City of Seattle SMP Development Standards (SMC 23.60A.152).

3.7.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.7.5.1 ALL ALTERNATIVES

Since the intensity of the proposed cargo terminal use is compatible with surrounding uses and all land use and shoreline codes would be adhered to, significant unavoidable adverse impacts are not anticipated.

3.8 RELATIONSHIP TO PLANS AND POLICIES

This section evaluates the relationship of the proposed action and alternatives to applicable and adopted plans and policies. Each of the key plans pertinent to the proposed Terminal 5 Improvements Project is discussed below.

3.8.1 REGULATORY CONTEXT

GROWTH MANAGEMENT ACT

Summary. The Growth Management Act (GMA; Chapter 36.70A, Revised Code of Washington [RCW]), adopted in 1990 and subsequently amended, provides a comprehensive framework for managing growth and coordinating land use planning with the provision of infrastructure. The general goals of the GMA include, in part, directing growth to urban areas, reducing sprawl, encouraging economic development consistent with adopted comprehensive plans, protecting private property rights, providing efficient multimodal transportation systems, protecting the environment, and ensuring that public facilities and services necessary to support development meet locally established minimum standards at the time development is in place (Chapter 36.70A.020 RCW).

Counties must designate urban growth areas (UGA) as areas within which urban growth and densities are permitted and public services and facilities are available and/or planned to be available (Chapter 36.70A.110 RCW). Within designated UGAs, residential and employment densities are to be sufficient to accommodate 20-year forecasts.

Jurisdictions subject to GMA must prepare and adopt the following: countywide planning policies; comprehensive plans containing policies with specific elements for land use, transportation, housing, capital facilities, utilities, rural lands, and economic development; and development regulations implementing those plans. GMA requires certain jurisdictions subject to it to prepare and adopt a major update to their comprehensive plans every 7 years (GMA was amended to postpone the first required major updates in King County from 2002 to 2004). Jurisdictions subject to GMA must also have regulations governing the use of environmentally sensitive areas. The GMA authorizes the imposition of impact fees for specified public services and facilities, including roads, schools, parks and recreation facilities, and fire protection facilities.

Discussion. Consistent with the GMA and the King County Countywide Planning Policies (described below), the City of Seattle has adopted the City of Seattle Comprehensive Plan (Comprehensive Plan) to guide future development and fulfill the City of Seattle's responsibilities under GMA. The proposed action and alternatives, as identified in Chapter 2, are intended to encourage future growth within the UGA and the City of Seattle and are consistent with the GMA goals and policies outlined above. The relationship of the proposed action and alternatives to the Comprehensive Plan is discussed in greater detail below.

COUNTYWIDE PLANNING POLICIES

Summary. The King County Countywide Planning Policies (CPPs) were developed and adopted by the Growth Management Planning Council in 1992 (and subsequently amended), consistent with GMA mandates to provide framework policies to guide development of jurisdictional comprehensive plans. The CPPs include employment growth targets for jurisdictions within King County to accommodate within the 20-year growth management planning period. The 2001 to 2022 employment growth target for the City of Seattle is 92,083 jobs.

The CPPs also designate Manufacturing Industrial Centers (MICs) within the county. MICs are envisioned as areas of concentrated employment, including manufacturing, industrial, and advanced technology. Their purpose is to preserve and encourage the aggregation of land suitable for manufacturing/industrial uses, discourage non-compatible uses, and accommodate a minimum of 10,000 jobs per MIC (LU-52). Per LU-52, offices and retail uses should be limited in MICs, except as accessory uses. MICs with at least 15,000 jobs and sufficient employment density should be served by high-capacity transit (LU-59). The City of Seattle contains two designated MICs: the Ballard/Interbay Northend Manufacturing Industrial Center (BINMIC) and the Greater Duwamish Manufacturing/Industrial Center. There are currently five CPPs-designated MICs in King County.

SEATTLE COMPREHENSIVE PLAN

The following subsection on the Comprehensive Plan discusses specific plans and policies for the Greater Duwamish Manufacturing/Industrial Center.

Summary. The Comprehensive Plan (2004 and as amended) was developed in compliance with GMA and the CPP. The Comprehensive Plan establishes land use goals and policies that guide future land use and coordinate growth within Seattle and its planning area over a 20-year planning horizon (see Figure 3.8.1. In particular, the Comprehensive Plan serves as a guide for designating land uses, infrastructure development, and community services; its policies serve as a foundation for the City of Seattle's development regulations. In accordance with GMA, the Comprehensive Plan includes the Land Use, Transportation, Housing, Capital Facilities, and Utilities elements. Policy elements of Seattle's Shoreline Management Program are included in the Land Use Element, consistent with GMA. The Land Use component of the plan consists of two separate elements: Land Use and Urban Village. The Comprehensive Plan also includes the following elements: Neighborhood Planning, Economic Development, Environment, Human Development, and Cultural Resources.

The Comprehensive Plan promotes a development pattern called the urban village strategy, which directs most new household and employment growth into places the plan designates as either urban centers or urban villages. In addition, the Comprehensive Plan also designates two manufacturing-industrial centers in the Duwamish and Interbay areas. These are places where residential uses are not permitted and where the City of Seattle encourages growth of employment. The intent of MICs is to direct industrial development to "centers" where conditions can best support industrial use and encourage economic activity.

A neighborhood plan has been adopted for the Greater Duwamish Manufacturing/Industrial Center neighborhood, the locale of Terminal 5. The Neighborhood Planning Element of the Comprehensive

Plan includes general goals and policies regarding neighborhood planning efforts and implementation of neighborhood plans around Seattle. It contains the adopted goals and policies from collaboratively developed neighborhood plans, including those from the Greater Duwamish Manufacturing/Industrial Center Neighborhood Plan (2000). Relevant general neighborhood planning policies call for using adopted neighborhood plan goals and policies in City of Seattle decision-making (N12). The adopted policies from these plans that are relevant to the proposal are discussed below.

GREATER DUWAMISH MANUFACTURING/INDUSTRIAL CENTER PLAN

All of Terminal 5 (and all adjoining area in every direction) is indicated as Industrial on the Future Land Use Map of the Comprehensive Plan. The Project site is in the area of the 4,700-acre Greater Duwamish Manufacturing/Industrial Center. This center includes lands along both sides of the Duwamish River and waterways and all of Harbor Island, and extends east from Harbor Avenue SW in West Seattle to Interstate 5, north to the edge of Pioneer Square, and south to the Seattle city limits.

In 2000, the Comprehensive Plan was amended to incorporate neighborhood-specific goals and policies of the Greater Duwamish Manufacturing/Industrial Center Plan, and the official land use map was amended to reflect the boundaries of the Duwamish Manufacturing/Industrial Center. Concurrent revisions to the Land Use Code (Seattle Municipal Code [SMC] Title 23) were adopted to implement the approved neighborhood plan.

The adopted neighborhood plan for the Greater Duwamish Manufacturing/Industrial Center contains goals and policies for jobs and economics, land use, transportation, utilities, environmental remediation, and public safety. Goals and policies that are relevant to the proposed Project include the following:

- Maintaining land in the Greater Duwamish Manufacturing/Industrial Center for industrial uses, including the manufacture, assembly, storage, repair, distribution, and research about or development of tangible materials and advanced technologies, as well as transportation, utilities, and commercial fishing activities (GD-G3).
- Facilitating the location and expansion of industrial businesses in the Greater Duwamish Manufacturing/Industrial Center (GD-G4).
- Encouraging site assembly that would permit expansion or new development of industrial uses (GD-P4).
- Limiting the location or expansion of non-industrial uses in the Greater Duwamish Manufacturing/Industrial Center (GD-P5).
- Continuing the Duwamish waterway as a working industrial waterfront that retains and expands in value as a vital resource providing family-wage jobs and trade revenue for the city, region, and state (GD-G6).
- The Greater Duwamish Manufacturing/Industrial Center remaining a MIC, promoting the growth of industrial jobs and businesses and strictly limiting incompatible commercial and residential activities (GD-G8).

- Striving to protect the limited and non-renewable regional resource of industrial land, particularly waterfront industrial land, from encroachment by non-industrial uses (GD-PP8).
- Striving to maintain sufficient capacity in the shoreline areas for anticipated water-dependent industrial uses (GD-P11).
- Seeking to preserve the Duwamish Waterway's ability to function as Seattle's gateway to the Pacific and to provide adequate nearby land for warehousing and distribution that serves the shipping industry (GD-P12).
- Especially along the waterway, discouraging conversion of industrial land to non-industrial uses (GD-P13).
- Maintaining shoreside freight access to and from the waterway (GD-P14).
- Attaining a high level of general mobility and access within the Greater Duwamish Manufacturing/Industrial Center (GD-G9).

The Comprehensive Plan designates the Terminal 5 site as Industrial. Situated in the Duwamish industrial area, all land within a mile or more of the Project site is also designated Industrial. A primary purpose of the Industrial land use designation is to support growth in the industrial and manufacturing employment base of Seattle and to preserve industrial land.

CENTURY AGENDA

The Port of Seattle Commission adopted the Century Agenda in 2013. The goals in the Century Agenda provide a policy context for the Port for setting priorities and making decisions, and a framework for the Port Commission and staff to make choices among competing projects and investment options. An overarching goal is that over the next 25 years, the Port would add 100,000 jobs through economic growth led by the Port, for a total of 300,000 Port-related jobs in the region, while reducing the environmental footprint.

Strategic objectives from the Century Agenda that are relevant to the Terminal 5 proposal include the following:

- Grow seaport annual container volume to more than 3.5 million twenty-foot equivalent units (TEUs).
- Structure our relationship with Washington ports to optimize infrastructure investments and financial returns.
- Triple the value of our outbound cargo to over $50 billion.

ENVIRONMENTALLY CRITICAL AREAS—CRITICAL AREAS ORDINANCE

On March 27, 2006, the City of Seattle completed the first major update to environmentally critical areas (ECAs) regulations and policies since they were first adopted in 1990. These regulations address how development on and adjacent to Seattle's ECAs should be regulated. The new ordinance went into effect on May 9, 2006.

Summary. Regulations governing ECAs in the City of Seattle are contained within Chapter 25.09 of the SMC. ECAs include the following: steep slope, landslide-prone, and liquefaction-prone areas;

abandoned landfills; flood-prone areas; riparian corridors; wetlands; and fish and wildlife habitat areas.

Grading in ECAs must be completed or stabilized by October 31 of each year unless an exception is permitted by the Director (SMC 25.09.060). Soils engineering studies are required for development in areas subject to liquefaction, and appropriate mitigation measures must be implemented through the requirements of SMC Title 22, Subtitle VIII, Grading and Drainage Control, SMC Title 22, Subtitle I, Building Code, and other applicable regulations (SMC 25.09.100).

Discussion. City of Seattle Environmentally Critical Area Maps (March 2016a) identify the Terminal 5 area as having liquefaction-prone soils. Liquefaction zones are considered environmentally sensitive but not ECAs, and require special development considerations. Grading in any ECA would be completed and these areas stabilized by October 31 of the year during which construction would occur.

In addition, areas within 100 feet of the ordinary high water mark are also ECAs.

3.8.2 AFFECTED ENVIRONMENT

The proposed Project would need to be in compliance with the plans and policies listed above under the heading of Regulatory Context.

3.8.3 IMPACTS

3.8.3.1 NO-ACTION ALTERNATIVE

The existing uses at Terminal 5, which would be retained in the No-Action Alternative, are consistent with the goals and objectives of the Greater Duwamish Manufacturing/ Industrial Center Plan. The Port cannot maximize the utilization of the property by the shipping industry as effectively in the No-Action Alternative, so there would be less opportunity for industrial expansion.

The Century Agenda goal of growing the seaport annual container volume to more than 3.5 million TEUs would not be advanced because Terminal 5 would not be able to accommodate higher container volumes over what current operations allow. The No-Action Alternative would also limit infrastructure investments and financial returns and would not play a significant part in tripling the value of outbound cargo to over $50 billion.

The No-Action Alternative would be required to comply with the ECAs regulations.

3.8.3.2 ALTERNATIVES 2 AND 3

The proposal is consistent with the goals and objectives of the Greater Duwamish Manufacturing/Industrial Center Plan. The proposal would provide a single, highly efficient facility that would enable the Port to work closely with industrial lease-holders and major carriers. It would modify Port facilities to accommodate growth in Seattle's industrial base of shipping, storage, and distribution. The proposal seeks to provide adequate land for distribution near the waterway to

serve the shipping industry. The Duwamish Waterway would continue as a working industrial waterfront, retaining and creating jobs and trade revenue. The proposed uses are permitted outright as industrial functions in an industrial area.

Alternatives 2 and 3 would provide the terminal facilities that could accommodate higher container volumes and assist in reaching the goal of growing seaport annual container volume to more than 3.5 million TEUs. Alternatives 2 and 3 may also advance the optimization of infrastructure investments and financial returns and could play a part in tripling the value of outbound cargo to over $50 billion.

All alternatives would be required to comply with the ECAs regulations.

3.8.4 MITIGATION MEASURES

3.8.4.1 ALL ALTERNATIVES

No mitigation would be required under any of the Alternatives because they are all in compliance with the applicable plans and policies.

3.8.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.8.5.1 ALL ALTERNATIVES

No significant unavoidable adverse impacts are expected from relationship to plans and policies.

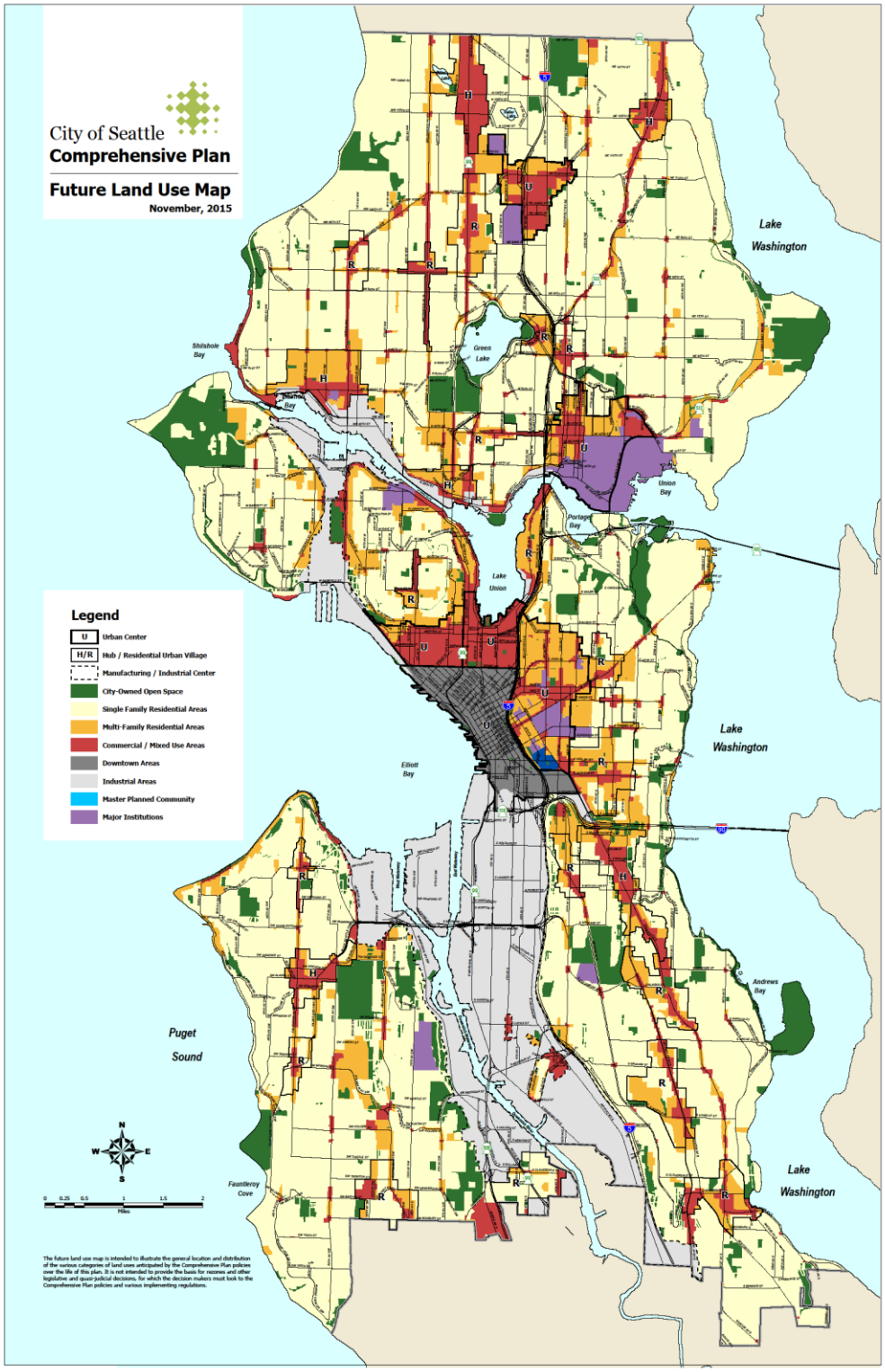

Figure 3.8.1: Comprehensive Plan Designations (City of Seattle website, March 2016)

3.9 AESTHETICS/LIGHT AND GLARE

This section assesses the potential impacts on aesthetics and visual resources of the proposed Project's alternatives. For the purposes of this assessment, aesthetics and visual resources refer to the overall visual character of the Project site and the surrounding area. This section describes the regulatory setting and methodology used to conduct the aesthetic analysis and describes the affected environment, including an identification of existing visual resources, such as key viewpoints in the study area. The section then assesses the proposed Project's potential impacts on aesthetics and visual resources. This assessment also includes an evaluation of potential impacts due to light (i.e., man-made artificial nighttime light) and glare (i.e., a strong or dazzling lighting condition originating with sources of either direct or reflected light that causes visual discomfort) resulting from the proposed Project.

3.9.1 REGULATORY CONTEXT

CITY OF SEATTLE PUBLIC VIEW PROTECTION POLICIES

The Seattle Municipal Code (SMC) Section 25.05.675 contains environmental policies related to public view protection. According to the SMC, it is City of Seattle policy to protect public views of significant natural and man-made features from public places, which include specified viewpoints, parks, scenic routes, and view corridors identified in SMC 25.05.675. It is also City of Seattle policy to protect public views of historic landmarks designated by the Landmarks Preservation Board and to protect views of the Space Needle from listed public places. No public places with views to the Space Needle listed in SMC 25.05.675 are located in the vicinity of the proposed Project.

CITY OF SEATTLE SEPA ORDINANCE

The City of Seattle SEPA Ordinance (SMC 25.05) protects public views of significant natural and human-made features: Mount Rainier, the Olympic and Cascade Mountains, the downtown skyline, and major bodies of water, including Puget Sound, Lake Washington, Lake Union, and the Ship Canal, from public places consisting of the specific viewpoints, parks, scenic routes, and view corridors listed in the ordinance. The places listed in the ordinance were reviewed to determine view impacts of the proposed Project.

SEATTLE SHORELINE MASTER PROGRAM

The Washington State Shoreline Management Act (SMA) of 1971 includes a provision that, except in certain circumstances, no permit shall be issued for new or expanded buildings or structures more than 35 feet in height that would obstruct the view of a substantial number of residences on areas adjoining the shorelines. However, the SMA does not limit the height of vessels. Also, the goals and policies of the SMA are implemented through the City of Seattle-adopted Shoreline Master Program (SMP). View corridors are required by the City of Seattle SMP in certain instances, but are not required where, as is the case with Terminal 5, the lot is developed with water-dependent uses. In addition, the City of Seattle SMP regulations state that vessels are not structures and those regulations allow vessels to be moored in required view corridors.

3.9.2 AFFECTED ENVIRONMENT

AESTHETICS

The visual character of the Terminal 5 site and the surrounding area is industrial. Terminal 5 has been a marine terminal for decades and is part of an industrial area that was developed within the Duwamish River estuary to serve water-dependent activities of the Seattle region. Terminal 5 currently operates up to six cranes, which can be configured to serve up to three cargo vessels berthed at the existing wharf. Vessel sizes that currently serve Terminal 5 range up to the 8,000 twenty-foot equivalent units (TEUs) in size.

VIEWS

Existing views over the Terminal 5 Improvements Project site are generally from West Seattle, Harbor Island and the Downtown Seattle area and include views of Puget Sound, Mount Rainier, and the Olympic and Cascade Mountains. The proposed Project site is a developed industrial area characterized by streets, bridge structures, and adjacent businesses. Most of the area (about 95 percent) is paved with asphalt or concrete or covered by buildings. The current view of Terminal 5 and vicinity includes cargo marshalling yards and facilities. Historically, container ships and other large vessels and cranes have partially blocked views of some of the scenic vistas.

LIGHT AND GLARE

Current lighting conditions on the site are indicative of the highly industrial Port environment. Lighting at Terminal 5 primarily consists of high-mast light poles and exterior building lights. The existing high-mast light poles are approximately 86 feet tall with eight 1-kilowatt, high-pressure sodium light fixtures. The level of lighting at Terminal 5 is generally similar to that of other adjacent industrial port areas in accordance with Washington State Labor & Industry standards. Lighting along the wharf is primarily comprised of high-mast light poles and directional lighting mounted on ship-to-shore (STS) cranes associated with Port operations at the site. All lighting complies with Washington State Labor & Industries standards.

3.9.3 IMPACTS

3.9.3.1 NO-ACTION ALTERNATIVE

AESTHETICS

No change to aesthetics of the site or area is expected under the No-Action Alternative because only minor repairs and upgrades to the site are expected.

VIEW ANALYSIS

Views from key viewpoints are not expected under the No-Action Alternative because equipment and operations would be similar to operations that are currently permitted at the site.

LIGHT AND GLARE

No impacts are expected from light and glare because there are no proposed changes to light and glare under the No-Action Alternative.

3.9.3.2 ALTERNATIVE 2

AESTHETICS

Under Alternative 2, the terminal may replace cargo crane equipment. The container terminal operation for Alternative 2 would increase the number of cranes from the current six cranes to a maximum of twelve cranes depending on the operational needs of a long-term tenant. The new cranes that would be installed would be up taller than the existing cranes, up to approximately 300 feet in height. They would be the same or similar to the cranes across the West Waterway at Terminal 18. The size of vessels would gradually change from the current 8,000-TEU vessels to the larger 18,000-TEU vessel.

The aesthetics of the Terminal 5 site are not expected to change significantly as a result of the proposed Project. The visual character of the Terminal 5 site and the surrounding area is now, would continue to be, industrial. Terminal 5 has been a marine terminal for decades and is part of an industrial area that was developed within the Duwamish River estuary to serve water-dependent activities of the Seattle region. Under Alternative 2 the site would continue to be a marine terminal.

VIEWS

An increase in the number of mobile cargo cranes, with increased height under Alternative 2, may alter views across Terminal 5 and to Harbor Island. However, potential changes in crane equipment would not affect the existing view corridor condition at the site.

The addition of the crane structures and the presence of the larger vessels have the potential to block public views of significant natural and human-made features: Mount Rainier, the Olympic and Cascade Mountains, the downtown skyline, and major bodies of water, including Puget Sound, and from public places consisting of specific viewpoints, parks, scenic routes, and view corridors.

Cargo cranes are exempt from height restrictions in the SMP as cited in Chapter 23.60A.486B SMC height exceptions in the Urban Industrial Environment which states that:

Cranes, mobile conveyers, light standards, and similar equipment necessary for the function of water-dependent uses or the servicing of vessels may extend above the maximum height limits.

A view analysis was conducted from public viewpoints and locations designated in the City of Seattle SEPA ordinance, as well as the view from the nearby public shoreline access site, Jack Block Park. The views were selected because they were considered the key viewpoints within the study area that would have the most likelihood for view obstruction. For each view, the analysis describes the existing conditions and the change in views that may be caused by the proposed Project. The views include public streets, public viewpoints, and parks. (Note: Residential views were analyzed from West Seattle neighborhoods, but the homes were located at a high enough elevation that the larger

vessels and higher cranes would not block views of water, shoreline, or mountains, but would be visible from some residences in these neighborhoods.)

The following viewpoints were selected for further analysis:

- View 1: Belvedere Park—SW Admiral Way and SW Olga Street
- View 2: Don Armeni Boat Ramp—Harbor Avenue SW
- View 3: Jack Block Park—SW Florida Street
- View 4: Seacrest Park—Harbor Avenue SW
- View 5: Victor Steinbrueck Park—Virginia Street and Western Avenue
- View 6: West Seattle Bridge

Each view was evaluated with the following criteria:

- Would the proposed Project increase, decrease, or cause no change to the view of the man-made elements (the shoreline, site facilities) visible in each view?
- Would the proposed Project increase, decrease, or cause no change to the view of the natural formations (Mt. Rainier, Puget Sound, Olympic Peninsula, Cascade Mountains, water) visible in each view?
- Would the proposed Project increase, decrease, or cause no change to the view of historic landmarks visible in each view?
- The changes are described below and illustrated in the corresponding figures. Whether the change is perceived as a negative or positive impact depends on the viewer's opinion.

View 1: Belvedere Park. Figure 3.9.1 and Figure 3.9.2 simulate what a person standing at Belvedere Park in West Seattle would observe, looking southeast toward Terminal 5. Figure 3.9.1 shows that there are views of the Cascade Mountains. Figure 3.9.2 shows that the proposed 6 additional cranes would not impact the views of the Cascade Mountains.

View 2: Don Armeni Boat Ramp. Figure 3.9.3 and Figure 3.9.4 simulate what a person standing at the south end of the Alki Trail at the Don Armeni Boat Ramp site would observe, looking southeast toward Terminal 5. Figure 3.9-3 shows that there are views of Mt. Rainier and Elliott Bay. Figure 3.9.4 shows that no views of Mt. Rainier or Elliott Bay would be obscured by the proposed cranes or vessels that would be moored at Terminal 5.

View 3: Jack Block Park. Figure 3.9.5 and Figure 3.9.6 simulate what a person standing at the south end of Jack Block Park would observe, looking southeast toward Terminal 5. Figure 3.9.5 shows that there are no protected views in sight. Figure 3.9.6 shows that the view would change to include a larger container vessel than currently moors at the terminal and the proposed cranes are higher, but there are no protected views.

View 4: Seacrest Park. Figure 3.9.7 and Figure 3.9.8 simulate what a person standing at Seacrest Park near the pier would observe, looking south toward Terminal 5. Figure 3.9.7 shows that there are views of Mt. Rainier and Elliott Bay. Figure 3.9.8 shows that no views of Mt. Rainier or Elliott Bay would be obscured by the proposed cranes or vessels that would be moored at Terminal 5.

View 5: Victor Steinbrueck Park. Figure 3.9.9 and Figure 3.9.10 simulate what a person standing at the south corner of the Victor Steinbrueck Park would observe, looking south toward Terminal 5. Figure 3.9.9 shows that there is a water view of Elliott Bay in the foreground but no protected views are obscured. Figure 3.9.10 shows higher cranes at the Terminal 5 site but they do not obscure any protected views.

View 6: West Seattle Bridge. Figure 3.9.11 and Figure 3.9.12 simulate what a person driving across the West Seattle Bridge would observe, looking northwest toward Terminal 5. Figure 3.9.11 shows that there are water views of Elliott Bay, but there are no other protected views. Figure 3.9.12 shows that some of Elliott Bay in the background would be obscured by the higher cranes. However, the views are currently obscured when large container vessels are moored at the site.

LIGHT AND GLARE

New temporary sources of light would be introduced to the site during construction activities. These lighting sources would be associated with utility and wharf construction, trucks, and other equipment. Lighting associated with exterior construction activities would be controlled by City of Seattle regulations, potentially limiting the hours of construction, and thereby limiting construction lighting during nighttime hours.

Lighting under Alternative 2 would maintain the current lighting levels throughout the terminal yard area by preserving the existing high-mast light poles and exterior building lights. The high-pressure sodium light-fixtures that are currently in use would be replaced by light-emitting diode (LED) or equivalent energy efficient fixtures and be operated using programmable control equipment.

Work areas along the wharf would be required to maintain a minimum of 5 foot candles measured 30 inches above the dock floor and maintain a minimum of 3 foot candles illumination measured along the bull rail per Washington Administrative Code (WAC) Chapter 296-56-60221. In order to maintain minimum required lighting levels, the approximately nine new poles would each be 150 feet tall with six LED fixtures oriented in a ring along with ten light-emitting plasma (LEP) directional lights with shields. The directional lights on the new standards would provide the same level of lighting along the wharf as currently exists. Additional localized lighting would be provided from the cranes and the terminal buildings at levels similar to the existing conditions.

3.9.3.3 ALTERNATIVE 3

AESTHETICS

The impacts would be the same as Alternative 2.

VIEWS

The impacts would be the same as Alternative 2.

LIGHT AND GLARE

New temporary sources of light would be introduced to the site during construction activities similar to Alternative 2. These lighting sources would be associated with utility and wharf construction, trucks, and other equipment and would be controlled by City of Seattle regulations.

Alternative 3 would generally lower the levels of operational lighting in several areas throughout the Terminal 5 yard, as the rail-mounted gantry cranes can function with local crane-mounted lighting only. The majority, and potentially all, of the existing lighting would be removed, and new lighting would only be installed on the exterior of buildings, in the truck turnaround areas, and along the wharf, landward of the STS cranes. New lighting would consist of LED and LEP light fixtures.

Similar to Alternative 2, lighting levels along the wharf would be maintained at current levels and in accordance with WAC 296-56-60221. New high-mast light poles would be provided landward of the cranes, along with directional lighting, in order to maintain current lighting levels.

3.9.4 MITIGATION MEASURES

3.9.4.1 NO-ACTION ALTERNATIVE

AESTHETICS/VIEWS/LIGHT AND GLARE

No mitigation would be required for aesthetics, views, or light and glare because there is minimal change from the current aesthetic, views, and light and glare at Terminal 5.

3.9.4.2 ALTERNATIVE 2

AESTHETICS

There is minimal projected impact to aesthetics from Alternative 2. It is currently a container/cargo terminal and would remain so with Alternative 2. Therefore, no measures are required to reduce or control impacts.

VIEWS

Because there is little projected impact to views from public viewpoints under Alternative 2, no measures are proposed to reduce or control such impacts.

LIGHT AND GLARE

Lighting associated with exterior construction activities would be controlled by City of Seattle regulations, potentially limiting the hours of construction, and thereby limiting construction lighting during nighttime hours. No other measures are expected to be required during construction.

Proposed operational lighting levels would conform to all applicable federal, state, and local standards. Replaced high-mast light poles would also use LED and LEP lights, which are more efficient and spill less light and glare into adjacent areas than those currently used on site.

Additionally, the fixtures would use directional (glare) shields and internal louvers to minimize light reflection onto the waterway or towards neighboring properties.

3.9.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.9.5.1 ALL ALTERNATIVES

AESTHETICS/VIEWS

No significant unavoidable adverse impacts to aesthetics or views are anticipated from any of the alternatives.

3.9.5.2 ALTERNATIVES 2 AND 3

LIGHT AND GLARE

Changes to site lighting under Alternative 2 and Alternative 3 are not anticipated to result in an increase in light and glare on the site or in the surrounding areas. With implementation of mitigation measures, no significant unavoidable adverse impacts are anticipated from light and glare.

Figure 3.9.1: Belvedere Park, Facing East – Existing View

Figure 3.9.2: Belvedere Park, Facing East – Proposed View

Figure 3.9.3: Don Armeni Boat Ramp, Facing Southeast – Existing View

Figure 3.9.4: Don Armeni Boat Ramp, Facing Southeast – Proposed View

Figure 3.9.5: Jack Block Park, Facing Southeast – Existing View

Figure 3.9.6: Jack Block Park, Facing Southeast – Proposed View

Figure 3.9.7: Seacrest Park, Facing Southeast – Existing View

Figure 3.9.8: Seacrest Park, Facing Southeast – Proposed View

Figure 3.9.9: Victor Steinbrueck Park, Facing Southwest – Existing View

Figure 3.9.10: Victor Steinbrueck Park, Facing Southwest – Proposed View

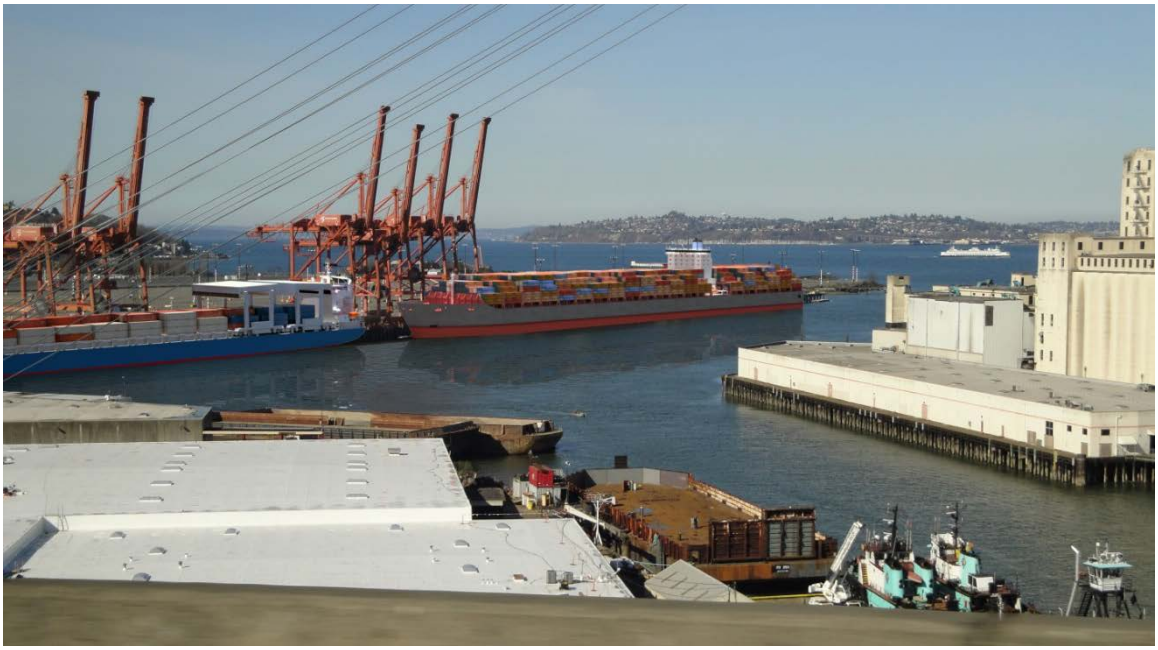

Figure 3.9.11: West Seattle Bridge, Facing Northwest – Existing View

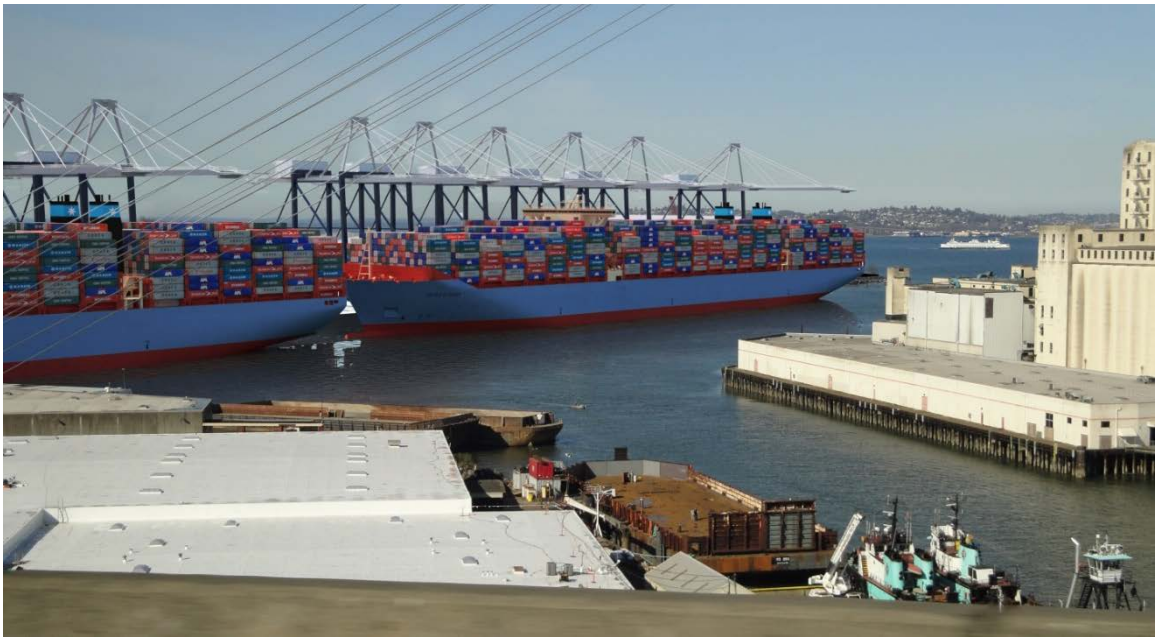

Figure 3.9.12: West Seattle Bridge, Facing Northwest – Proposed View

3.10 HISTORIC AND CULTURAL RESOURCES

3.10.1 REGULATORY CONTEXT

FEDERAL, STATE, AND CITY

Federal, state, and City of Seattle laws and processes govern the designation of historic resources in the City of Seattle. The National Register of Historic Places (NRHP) is the official federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. The National Park Service administers the register. Properties listed in the NRHP must possess historic significance and integrity. Generally, the property must typically be 50 years old to be considered and must be significant when evaluated in relationship to major trends of history in the community, state, or nation. The criteria for listing in the NRHP include the following: (A) the property is associated with events that have made a significant contribution to the broad patterns of our history; or (B) the property is associated with the lives of persons significant in our past; or (C) the property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or presents a significant and distinguishable entity whose components lack individual distinction; or (D) the property has yielded, or is likely to yield, information important in prehistory or history (36 Code of Federal Regulations Part 60).

Within the City of Seattle, historic recognition is provided through designation of a property as a landmark by the Landmarks Preservation Board. The City of Seattle's Preservation Ordinance (Seattle Municipal Code [SMC] 25.12) has threshold requirements that a potential landmark must meet in order to be designated. The ordinance requires a property to be more than 25 years old and "have significant character, interest or value, as part of the development, heritage or cultural characteristics of the City, State or Nation." "Significant character" is a standard of integrity, indicating that sufficient original building fabric is present to convey the historic and architectural significance of the property. The City of Seattle's landmark ordinance also requires a property to meet one or more of its six designation criteria: (A) it is associated in a significant way with an historic event, which has had a significant effect on the community, city, state or nation; (B) it is associated in a significant way with the life of a person important in the history of the city, state, or nation; (C) it is associated in a significant way with a significant aspect of the cultural, political or economic heritage of the community, city, state or nation; (D) it embodies the distinctive visible characteristics of an architectural style, period, or method of construction; (E) it is an outstanding work of a designer or builder; and (F) it is an easily identifiable feature of its neighborhood or the city due to the prominence of its spatial location; contrasts of siting, age, or scale; and it contributes to the distinctive quality or identity of its neighborhood or the city.

Since the Terminal 5 site falls within 200 feet of where the saltwater shoreline existed prior to fill or alteration (known as the U.S. Government meander line), this analysis adheres to the guidelines set out in the City of Seattle Department of Construction and Inspections Director's Rule 2-98 (SMC). This ruling describes how the City of Seattle environmental guidelines mesh with those implemented under SEPA. Director's Rule 2-98 states that many of Seattle's existing and former

shoreline areas may be sites of potential archaeological significance due to settlement patterns of Native Americans and early European settlements along Puget Sound. Areas where sites or resources of potential archaeological significance could be found include freshwater and saltwater confluences, river confluences and their vicinity, and historical sources of certain kinds of geological formations. Additionally, the City of Seattle recognizes that there is a possibility that new resources may be discovered during construction in other areas.

TREATY FISHING

Elliott Bay, the East and West Waterways, and the Duwamish Waterway are recognized as treaty fishing access areas managed by the Muckleshoot Tribe and the Suquamish Tribe with the Washington State Department of Fish & Wildlife (WDFW, and the aquatic areas are treaty-protected "usual and accustomed" fishing areas. Treaty fishing access is a continuing activity and is a baseline condition within the Project area. Fishing by tribal members in this area is consistent with past federal government treaties and subsequent court decisions.

3.10.2 AFFECTED ENVIRONMENT

HISTORIC

No local-, state-, or federal-listed historic or cultural buildings, structures, or sites are located on or near the Terminal 5 Improvements Project boundary, and no sites appear eligible for listing on or near the Project boundary at Terminal 5.

ARCHAEOLOGICAL

A previous subsurface investigation by Larson Archaeological and Anthropological Services (LAAS 1993) was summarized in the 1994 Southwest Harbor Cleanup and Redevelopment Project Final EIS (USACE 1994) and indicated that archaeological sites are present in the Duwamish Waterway in the vicinity of the Project boundary at Terminal 5.

The nearest sites, 45KI039 and 45KI432, are 0.4 and 0.5 mile away, respectively, and are situated on different landforms (DAHP 2015). Terminal 5 is located in an area that was significantly modified during the dredging of the East and West Waterways and construction of Harbor Island in the early 1900s (the island was completed in 1909). Exhibit 3.10-1 includes a Duwamish River 1901 pre-dredging map with a Terminal 5 overlay.

No additional archaeological sites have been identified in the vicinity of the Project boundary at Terminal 5 since 1993, according to the Washington State Department of Archaeology and Historic Preservation (DAHP; personal communication between A. Hackett and G. Kaehler, February 2015 [SoundEarth 2015]).The possibility that historic or cultural resources are present at Terminal 5 is low since the present industrial facility consists of filled upland area, with the majority of fill placed in the former aquatic area of south Elliott Bay.

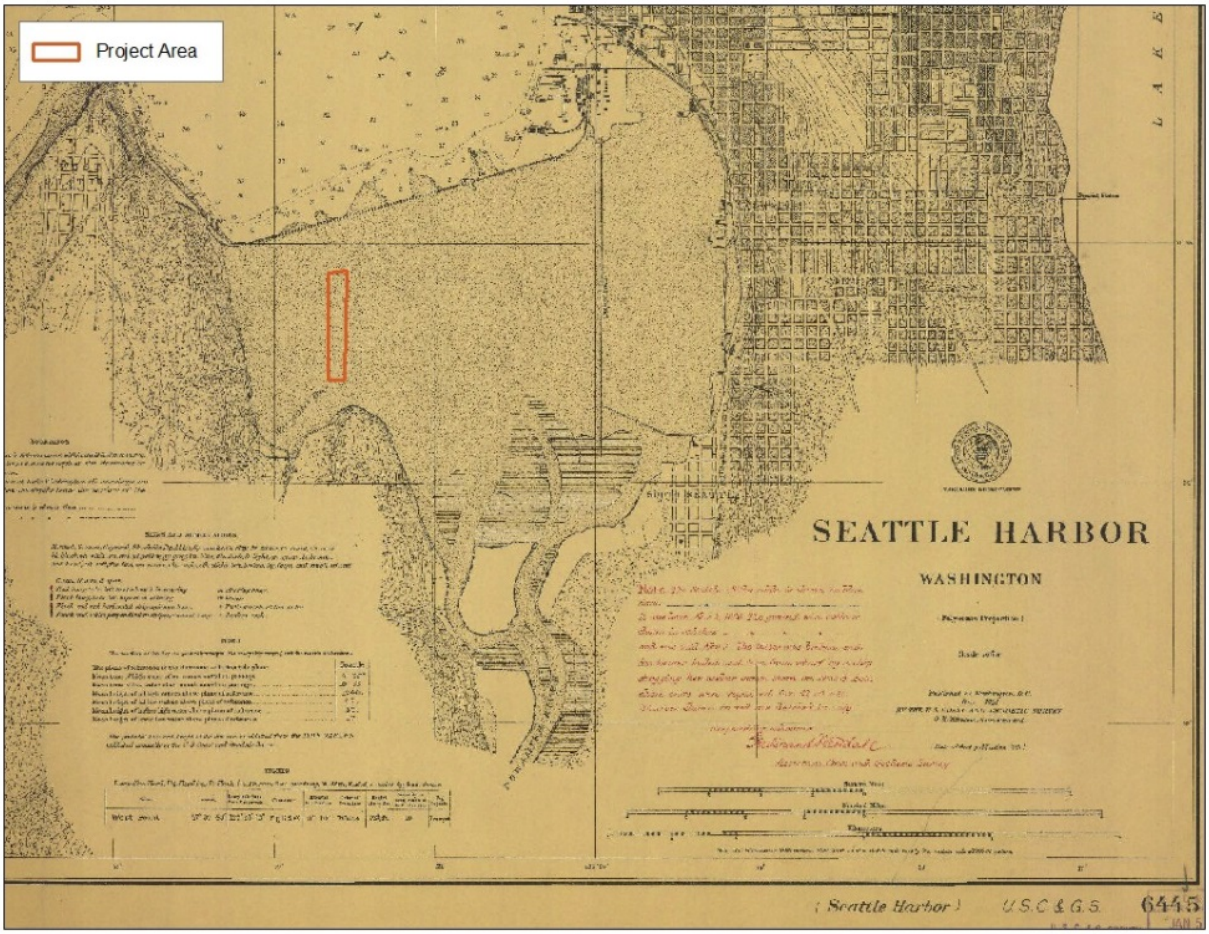

Figure 3.10.1: Duwamish River Delta 1901 Pre-Dredging Map Terminal 5 Overlay

TREATY FISHING

Elliott Bay, the East and West Waterways, and the Duwamish Waterway are recognized as treaty fishing access areas managed by the Muckleshoot Tribe and the Suquamish Tribe with the WDFW, and the aquatic areas are treaty-protected "usual and accustomed" fishing areas. Treaty fishing access is a continuing activity and is a baseline condition within the Project area. Fishing by tribal members in this area is consistent with past federal government treaties and subsequent court decisions.

Treaty fishing is an ongoing activity and, thus, a baseline condition within this area. Members of the Muckleshoot Indian Tribe and Suquamish Indian Tribe harvest chinook, coho, chum, and steelhead salmon in south Elliott Bay, the East and West Waterways, and the Duwamish Waterway during summer, fall, and winter of each year, generally from August through December and in January and February. Treaty fishers typically use drift gillnets to harvest salmon, including drift nets in Elliott Bay, and set nets along the south Elliott Bay shoreline and in the East and West Waterways and the Duwamish Waterway. Drift and set gill nets float at the surface, with the bottom edge of the nets extended vertically in the water column as a curtain. Drift gillnets are free floating nets attended by a fisherman. Set nets are often attached to structures or objects along the shoreline, with the

waterward end of the net held in place by an underwater anchor. Set gillnets may be left in place unattended. Aquatic area adjacent to Terminal 5 is an active set net fishing area.

3.10.3 IMPACTS

METHODOLOGY

Methods used to assess the potential impacts to historical and archaeological resources and treaty fishing included the following:

- Review of the Southwest Harbor Cleanup and Redevelopment Project Final Environmental Impact Statement, prepared in 1994, for the Project boundary at Terminal 5 (USACE 1994).
- Review of Cultural Resource Testing 45KI432 Alki Transfer/CSO Project West Seattle Pump Station, King County, Washington by Paul S. Solimano, Lynn L. Larson and Dennis E. Lewarch. Submitted to HDR Engineering, Bellevue, Washington. Prepared for: Municipality of Metropolitan Seattle, Seattle, Washington. Prepared by Larson Anthropological/Archaeological Services. LAAS Technical Report #93-7. Seattle, Washington. June 30, 1993 (LAAS 1993).
- Review of the DAHP's Washington Information System for Architectural and Archaeological Records Database on January 18, 2015 (DAHP 2015).
- Review of King County and City Landmarks List and Technical Paper No. 6, revised December 2015, on December 29, 2015 (King County 2015).
- Review of Seattle Department of Neighborhoods' database of historical properties on February 2, 2015 (Seattle Department of Neighborhoods 2015).
- Personal communication regarding archaeological sites in the Project boundary at Terminal 5 between Audrey Hackett, SoundEarth Strategies, Inc., and Gretchen Kaehler, Department of Archaeology and Historic Preservation, in February 2015 (SoundEarth 2015).

3.10.3.1 NO-ACTION ALTERNATIVE

HISTORIC

No known historic resources are located within the Project boundary at Terminal 5. Therefore, no historic resources would be expected to be affected by the No-Action Alternative.

ARCHAEOLOGICAL

The No-Action Alternative would not be expected to affect any known archaeological resources at Terminal 5. If any archaeological resources are present, they would continue to physically deteriorate naturally, primarily as a result of low-level ongoing weathering.

TREATY FISHING AT TERMINAL 5

By virtue of its location on the West Duwamish Waterway, Terminal 5 is within the tribal treaty fishing areas described above. Vessel activity to and from Terminal 5 would continue, at times, to move through drift and set gillnet fishing areas. The container terminal operations would not

impinge on mitigation measures previously implemented by the Port to support treaty fisheries under the No-Action Alternative.

3.10.3.2 ALTERNATIVES 2 AND 3

HISTORIC

No potential adverse effects on historic or cultural resources are anticipated under either Alternative 2 or 3.

ARCHAEOLOGICAL

All Port tenants are obligated by lease to meet all applicable local, state, and federal requirements regarding cultural and historical resources. As shown in Exhibit 3.10-1, Terminal 5 was previously located in the intertidal portion of the Duwamish River estuary. Prior to about 2,200 years ago, when the Duwamish River delta aggraded to its historic premodification maximum, the delta would have been a deep bay. The proposed Project includes deepening a previously maintained berth area occurring in potentially native sediments. The possibility that historic or cultural resources are present at the Project boundary at Terminal 5 is low since the present industrial facility consists of filled upland area, with the majority of fill placed in former aquatic area of south Elliott Bay. While the proposed Project is not expected to impact cultural resources, construction work for the proposed Project has the potential to interfere with undiscovered resources.

TREATY FISHING AT TERMINAL 5

The container terminal operations would not impinge on mitigation measures previously implemented by the Port to support treaty fisheries under Alternatives 2 and 3. Since Terminal 5 is an existing marine terminal facility and no expansion of the physical wharf structures within the Project boundary at Terminal 5 is proposed, the effect of the proposed Project on treaty fishing is limited physical access to approximately 1,500 feet of the dock face because of moored construction barges needed to complete in-water work.

3.10.4 MITIGATION MEASURES

3.10.4.1 NO-ACTION ALTERNATIVE

HISTORIC

No mitigation is expected to be required and none is proposed.

ARCHAEOLOGICAL

No mitigation is expected to be required and none is proposed.

TREATY FISHING AT TERMINAL 5

The proposed operations would not impinge on mitigation measures previously implemented by the Port to support treaty fisheries. No other mitigation is proposed under the No-Action Alternative.

3.10.4.2 ALTERNATIVES 2 AND 3

HISTORIC

No known historic resources are located within the Project boundary at Terminal 5. There are no recommended mitigation measures.

ARCHAEOLOGICAL

While there is little to no potential for unrecorded cultural resources in the Project boundary at Terminal 5, construction for Alternatives 2 and 3 would follow the SMC for Standards for Archaeological and Historic Resources in SMC 23.60A.154. More details are provided below.

SMC 23.60A.154A. Developments, shoreline modifications, and uses on any site having historic, cultural, scientific, or educational value, as defined by the Washington State Department of Archaeology and Historic Preservation and local tribes, shall reasonably avoid disruption of the historic, cultural, scientific, or educational resource.

If any archaeological resources are uncovered during the proposed work, work shall be stopped immediately and the applicant shall notify the City of Seattle, affected tribes, and the Washington State DAHP. The applicant shall submit a site inspection and evaluation report by a qualified professional archaeologist, approved by the City of Seattle that identifies all possible valuable archaeological data and makes recommendations on how to handle the data properly. When the report is prepared, the applicant shall notify affected tribes and the Washington State DAHP and provide them with copies of the report.

In addition, the minimal excavation and filling for electrical and water utility line placement anticipated for the Project would also be monitored such that historic or cultural materials discovered within the Project boundary at Terminal 5 can be protected from disruption, pending evaluation by participating responsible interests by using established protocol.

TREATY FISHING

The Port works in partnership with the Muckleshoot Indian Tribe and the Suquamish Indian Tribe to inform treaty fishermen of vessel activity in the vicinity of Terminal 5 during fishing periods. Information detailing vessel activity would be provided as a means of avoiding potential fishing use and vessel operation conflicts and to ensure continuing mutual access to this area of the West Waterway.

Dredging activities would be coordinated with fishing periods in order to minimize potential disruption of fishing locations due to the presence of floating dredging equipment and any shifts in cargo vessel mooring areas.

3.10.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.10.5.1 ALL ALTERNATIVES

HISTORIC

No potential adverse effects on historic or cultural resources are anticipated. The possibility that historic or cultural resources are present within the Project boundary at Terminal 5 is low since the present industrial facility resides on a filled upland area, with the majority of fill placed in the former aquatic area of south Elliott Bay.

ARCHAEOLOGICAL

Construction for Alternatives 2 and 3 would follow the Seattle Municipal Code for Standards for Archaeological and Historic Resources in SMC 23.60A.154. By following this protocol, no unavoidable adverse impacts to known significant prehistoric or historical archaeological resources are anticipated.

TREATY FISHING AT TERMINAL 5

No significant unavoidable adverse impacts to treaty fishing are expected from any of the alternatives because the Port would coordinate with the Tribes.

3.11 TRANSPORTATION

Detailed transportation impact analyses were performed to evaluate the Terminal 5 Improvements Project impacts to all modes of land transportation, and are presented in Volume II, Appendix C and Appendix F of this DEIS. The technical reports summarized in this section are the *Transportation Technical Report for Draft EIS* (Heffron Transportation, Inc. [May 5, 2016]**;** Appendix C), and the *T-5 Rail Infrastructure and Grade-Crossing Analysis* (Moffatt & Nichol [April 22, 2016]**;** Appendix F).

3.11.1 REGULATORY CONTEXT

Projects in the City of Seattle must meet requirements and approvals of the City of Seattle Department of Transportation (SDOT) and the Washington State Department of Transportation (WSDOT).

3.11.2 AFFECTED ENVIRONMENT

Detailed information about the existing and planned future conditions are presented in Appendix C and Appendix F. Elements included in those reports are summarized below.

Appendix C—Transportation Technical Report for Draft EIS

- Existing roadway network that serves Terminal 5 and improvements that have been made since the terminal opened in 1999.
- Existing traffic volumes, including how traffic volumes have grown over time and how they fluctuate by month and time of day.
- Traffic operations at key intersections along SW Spokane Street and E Marginal Way S.
- Bridge opening operations of the SW Spokane Street Swing Bridge.
- Traffic safety and historical collision data at roadway intersections.
- Existing and planned transit service near the Terminal 5 Improvements Project.
- Existing and planned bike and pedestrian (non-motorized) facilities near the Terminal 5 Improvements Project.
- Existing parking facilities.
- Historical operating conditions and traffic generated by Terminal 5.
- Future plans and policies related to the transportation system.

Appendix F—T-5 Rail Infrastructure and Grade-Crossing Analysis

- Existing rail networks that serve South Seattle.
- Description of railroad and Terminal 5 intermodal rail yard operations.
- Existing crossing locations.
- Existing freight rail volumes generated by Terminal 5 and other area businesses.
- Historical collision data at area railroad crossings.
- Railroad regulations.

The transportation study area for this report includes SW Spokane Street between Harbor Avenue SW and E Marginal Way S, and E Marginal Way S between S Hanford Street and the N Argo Access

Road. These corridors cover the primary travel routes between Terminal 5 and the near-dock intermodal rail yard, and between the terminal and the Spokane Street Viaduct, which is the primary route to and from the Interstate Highway System. The following intersections within the study area were evaluated for this report:

- SW Spokane Street/Harbor Avenue SW
- SW Spokane Street/W Marginal Way SW/Chelan Avenue SW
- SW Spokane Street/Terminal 5 Access
- SW Spokane Street/11th Avenue SW
- SW Spokane Street/E Marginal Way S
- S Hanford Street/E Marginal Way S
- E Marginal Way S/N Argo Access Road

Key information about the transportation affected environment, relevant to the Project impact assessment, is presented in the following section.

3.11.3 IMPACTS

This section summarizes the potential impacts for each element of the transportation system: terminal throughput and traffic volumes, traffic operations, gate queuing, traffic safety, transit, non-motorized facilities, parking, rail volumes, and railroad crossings. Further detail is provided in Volume II, Appendix C and Appendix F.

3.11.3.1 TERMINAL THROUGHPUT, TRUCK TRIPS, AND EMPLOYEE TRIPS

3.11.3.2 NO-ACTION ALTERNATIVE

The Northwest Seaport Alliance, the new partnership between the Port of Seattle and the Port of Tacoma, anticipates that larger vessels would dominate future ship calls to the Pacific Northwest. Improvements at Terminal 5 are proposed to accommodate the larger ships. If the Alternative 2 or 3 improvements are not made (No-Action Alternative), Terminal 5 would not be able to accommodate larger ships because of limitations in the crane height and overreach.

An analysis was performed by Moffatt & Nichol to determine the potential throughput that could be accommodated by the terminal with each alternative, given the potential berth capacity, container yard area, storage density, peaking factors associated with larger ships, and container dwell time in the terminal. Alternative 1 (No-Action Alternative) assumes an annual throughput at Terminal 5 of 647,000 twenty-foot equivalent units (TEUs). Alternative 1 assumes that existing cranes would continue to be used, and that the vessel calls would be similar to what occurred previously when an average of six vessels per week called at the terminal. The vessels reflected a mix of sizes, and only a portion of the vessel capacity was unloaded from or loaded onto each ship.

3.11.3.3 ALTERNATIVES 2 AND 3

With Alternatives 2 or 3, the improved wharf and deeper berth would allow larger ships to call at Terminal 5. For Alternative 2, which would have modest upland improvements, the throughput is

estimated at approximately 1.3 million TEUs per year. For Alternative 3, which would have increased container yard and intermodal rail yard capacities, the throughput is estimated to be 1.7 million TEUs per year. The range of volumes could be achieved with various vessel service call scenarios. For the purpose of this analysis, a total of four ships per week was assumed: two 18,000-TEU ships and two 8,000-TEU ships. Detailed information related to assumed ship calls is presented in Volume II, Appendix C of this DEIS.

COMPARISON OF ALTERNATIVES

Volume II, Appendix C of this DEIS presents detailed information about factors used to estimate the number of truck trips that the improved terminal could generate. This includes analysis of how larger ships could affect truck volumes through the terminal gate, the share of cargo expected to be transported through the terminal's on-dock intermodal rail yard, and the peak hours for truck movements depending on whether the terminal would operate with one truck gate shift (daytime only) or with a second swing gate shift. Alternative 1 (No-Action Alternative) and Alternative 2 assume that the terminal would operate with just one truck gate shift. Alternative 3 assumes that a second shift would be added to the truck gate on peak days due to capacity limitations of the rail-mounted gantry (RMG) cranes within the terminal to load trucks. Under this peak condition, a reservation system would also be implemented to spread truck traffic across the two shifts.

These factors were used to estimate truck trips for the increased throughput scenarios, which are presented in Table 3.11-1. As shown, with the increased throughput volumes, the upgraded Terminal 5 is expected to generate 3,560 to 4,660 truck trips on the Design Day for Alternatives 2 and 3, respectively. It is noted that truck trips are reported as one-way trips (e.g., 4,660 truck trips per day reflects 2,330 trucks entering the terminal and 2,330 trucks exiting the terminal). The table also shows the estimated net increase in trips for the action alternatives as compared to the No-Action Alternative. Alternative 2 is projected to result in 1,080 additional Design Day truck trips, and Alternative 3 is projected to result in 2,180 additional Design Day truck trips.

The table also summarizes projected peak hour trips. As previously described, Alternatives 1 and 2 are assumed to operate with only a daytime shift at the truck gate. Alternative 3, however, would require a second gate shift on peak days. Therefore, Alternative 2 would have the highest peak hour truck trips and is estimated to generate an additional 130 truck trips during the AM peak hour and 31 truck trips during the PM peak hour on the Design Day.

Table 3.11-1: Terminal 5 Truck Trip Generation Estimates—All Alternatives

Condition	Average Day Truck Trips			Design Day Truck Trips		
	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Alternative 1, No-Action [(a)]						
Drayed to off-dock rail yard	630	76	19	890	107	27
Trucked to local/regional businesses	1,140	137	34	1,590	191	48
Total	1,770	213	53	2,480	298	75
Alternative 2, 1.3 Million TEUs/Year [(a)]						
Drayed to off-dock rail yard	1,270	152	38	1,780	214	53
Trucked to local/regional businesses	1,270	152	38	1,780	214	53
Total	2,540	304	76	3,560	428	106
Alternative 3, 1.7 Million TEUs/Year [(b)]						
Drayed to off-dock rail yard	1,660	133	33	2,330	186	47
Trucked to local/regional businesses	1,660	133	33	2,330	186	47
Total	3,320	266	66	4,660	372	94
Net Change in Trips for Alternative 2	770	91	23	1,080	130	31
Net Change in Trips for Alternative 3	1,550	53	13	2,180	74	19

Source: Derived by Heffron Transportation, Inc. 2016.

Note:

(a) Terminal gate for Alternatives 1 and 2 assumed to be open during day shift only. With that condition, 12 percent of the daily trips would occur in the AM peak hour, and 3 percent would occur in the PM peak hour.

(b) Terminal gate for Alternative 3 assumed to be open during both day and night shift. With that condition, 8 percent of the daily trips would occur in the AM peak hour and 2 percent would occur in the PM peak hour.

The number of employees needed to staff the terminal during various ship unload/load events was estimated for each alternative. When the terminal is operating at peak capacity, it is likely to have all cranes staffed. This in turn increases the yard equipment needed, as well as staffing at the terminal's on-dock intermodal rail yard and truck gates. Based on the estimated staffing levels, the highest number of employee trips would occur in the PM peak hour, when employees who work the day shift leave the terminal and those who work the night shift arrive at the terminal. Employee trip generation for the Design Day, which assumes all cranes in service plus a swing shift, is summarized in Table 3.11-2 Additional detail related to the staffing level and trip generation assumptions is presented in Volume II, Appendix C of this DEIS.

Table 3.11-2: Terminal 5 Employee Trip Estimates – All Alternatives for Design Day Conditions

	Daily [a]			**AM Peak Hour**			**PM Peak Hour**		
	In	Out	Total	In	Out	Total	In[b]	Out	Total
No-Action (Alternative 1)	379	379	758	124	0	124	111	124	235
Alternative 2	600	600	1,200	199	0	199	172	199	371
Alternative 3	742	742	1,484	237	0	237	223	237	460
Net Change, Alternative 2	221	221	442	75	0	75	61	75	136
Net Change, Alternative 3	363	363	726	113	0	113	112	113	225

Source: Heffron Transportation, Inc. 2016.

Note:

(a) Daily trips assume that each employee generated 2.10 trips per day, and that 65 percent of the employees commute during the peak one hour period in the morning and afternoon.

(b) Accounts for 2nd shift employees arriving during PM peak hour.

Trip distribution patterns for the Terminal 5 truck and employee trips were derived from existing travel patterns. The methodology to determine the patterns is described in Volume II, Appendix C. Truck trips for all three Terminal 5 alternatives were assigned to the roadway network based on this distribution pattern (see Figure 15 in Volume II, Appendix C).

3.11.3.4 TRAFFIC VOLUMES

3.11.3.5 NO-ACTION ALTERNATIVE

Three future years—2020, 2030, and 2040—were evaluated to capture the potential growth in terminal throughput over time. The No-Action Alternative (Alternative 1) volumes for Terminal 5 were evaluated for each of these horizon years to provide a basis for comparison. Under these conditions, container operations could continue with existing terminal infrastructure.

3.11.3.6 ALTERNATIVES 2 AND 3

Alternative 2 was evaluated for year 2030 conditions, and Alternative 3 was evaluated for year 2040 conditions. Figure 3.11.1 illustrates the projected future terminal throughput evaluated for the alternatives. It also shows the growth trend line between the actual conditions in 2013 and the projected Alternative 3 conditions in the year 2040. This reflects a compound growth of 4.4 percent per year, a conservatively high assumption for container growth.

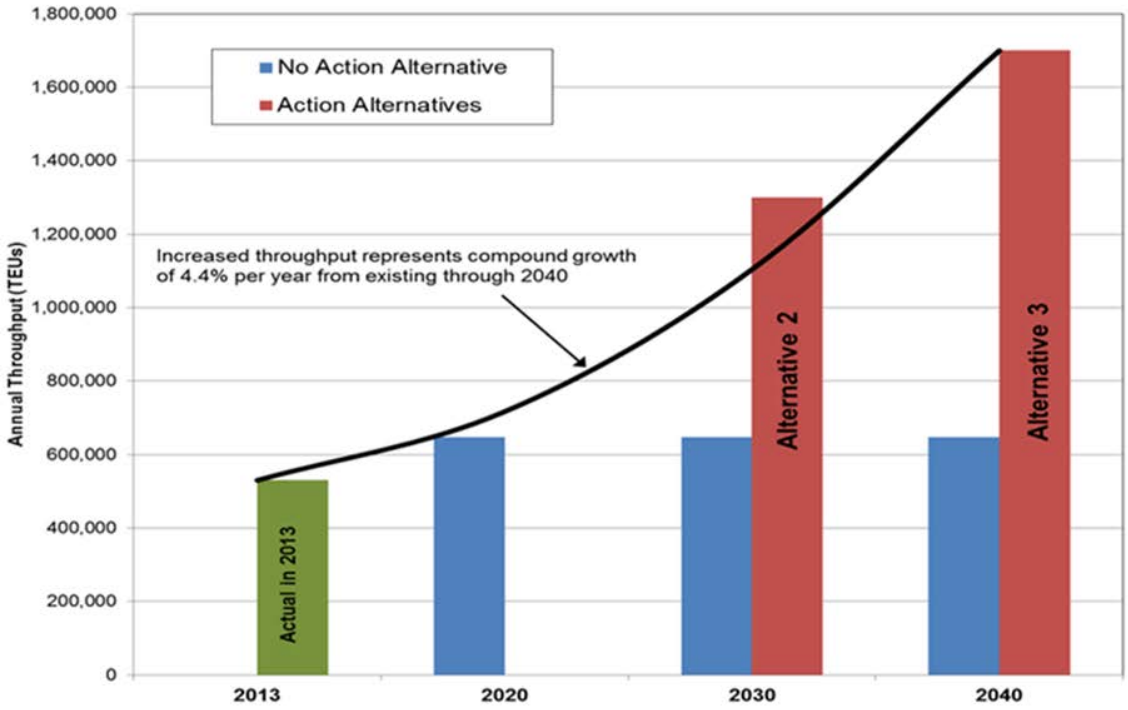

Figure 3.11.1: Analysis Conditions and Projected Future Terminal Throughput
Source: Heffron Transportation, Inc. 2016.

COMPARISON OF ALTERNATIVES

Traffic volumes for the 2020, 2030, and 2040 No-Action Alternative were derived by applying an annual growth rate of 1.6 percent per year to existing non-Terminal 5 traffic volumes, to account for background traffic growth not related to the Project alternatives. This is the historical growth rate for traffic on the SW Spokane Street Swing Bridge observed from 2005 through 2013, which accounts for the economic recovery since the 2008/2009 recession, as well as increased traffic due to growth in West Seattle, and is similar to growth rates expected elsewhere in Seattle. This growth rate exceeds the growth rate predicted by *Container Terminal Area Traffic Analysis Tool* (The Transpo Group 2015), which used regional forecasts prepared by the Puget Sound Regional Council. That tool estimated a future growth rate for the Lower Spokane Street Swing Bridge of 0.3 percent per year. The forecast Terminal 5 truck and employee trips for each alternative were then added to the network. Volume II, Appendix C includes graphics showing traffic volumes for the various future conditions.

3.11.3.7 TRAFFIC OPERATIONS

Level of service (LOS) is a qualitative measure used to characterize traffic operating conditions. Six letter designations, "A" through "F," are used to define LOS. LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. LOS D is acceptable to the City of Seattle. Traffic operating conditions for the study area intersections were evaluated for each of the future year conditions described in

the previous section. Information about the methodology used to determine LOS and the analysis results are presented in Volume II, Appendix C.

SW SPOKANE STREET/W MARGINAL WAY SW/CHELAN AVENUE SW.

No-Action Alternative

Four intersections in the study area are forecast to operate at LOS E or LOS F in the future without the proposed Terminal 5 improvements. The intersection of SW Spokane Street/W Marginal Way SW/Chelan Avenue SW is forecast to operate at LOS F for the 2020 No-Action Alternative conditions during both the AM and PM peak hours. Conditions would get progressively worse in the subsequent decades due to background traffic growth in the corridor, with average PM peak hour vehicle delays in excess of 280 seconds per vehicle by 2040. During the AM peak hour, the intersection of SW Spokane Street/Harbor Avenue SW is also forecast to operate at LOS E in the year 2030, and it would degrade to LOS F by 2040. During the PM peak hour, the intersections of S Spokane Street/E Marginal Way S is forecast to operate at LOS E in 2030 without the proposed Project, and the intersection of S Hanford Street/E Marginal Way is forecast to operate at LOS E in 2040 without the proposed Project.

Alternatives 2 and 3

Traffic generated by the Terminal 5 improvements is projected to add up to about 20 seconds of average delay per vehicle to the SW Spokane Street/W Marginal Way SW/Chelan Avenue SW intersection in the year 2040. As described later in the Mitigation section of this report, it is recommended that the north leg of the five-legged intersection (the at-grade connection to Terminal 5) be closed to vehicle traffic with Alternative 2 or 3. Eliminating this leg of the intersection would dramatically improve traffic operations by eliminating one phase of the sequential-phase signal operation and allowing some movements to operate concurrently. With closure of the north leg, it is estimated that in 2040 with Alternative 3 the intersection would operate at LOS E during the AM peak hour (73.7 seconds of delay per vehicle) and at LOS F in the PM peak hour, but with substantially reduced delay (97.3 seconds per vehicle) compared to the No-Action Alternative. Closing the north leg of the intersection would also eliminate the at-grade railroad crossing and the signal preemption associated with train movements adjacent to the intersection. With implementation of this measure, all traffic to and from Terminal 5, as well as local businesses at Terminals 7A, 7B, 7C, and 8, would be directed to use the Terminal 5 Access Bridge, which has capacity to accommodate this diverted traffic.

Terminal 5 would add a small amount of delay to the SW Spokane Street/Harbor Avenue SW, S Spokane Street/E Marginal Way S, and S Hanford Street/E Marginal Way S intersections. The delay increases would be less than 2 seconds per vehicle. However, operations at all three intersections could be improved with changes to existing signal timing and phasing. Further detail about recommended signal improvements for the SW Spokane Street corridor are presented in Section 3.11.3 Mitigation.

3.11.3.8 GATE QUEUING

3.11.3.9 NO-ACTION ALTERNATIVE

Gate queuing is not expected to change under the No-Action Alternative. The existing gate would remain with the single pre-check lane. Truck queues would be similar to what has occurred in the past.

3.11.3.10 ALTERNATIVES 2 AND 3

Queue analysis was performed for both the pre-check gate and the main gate. Details about the analysis methodology and results are presented in Volume II, Appendix C.

The analysis determined that the pre-check gate is the constraint in the system. Currently, the pre-check gate facility is located about 1,900 feet from SW Spokane Street, a distance that can accommodate about 24 trucks. A single-lane gate with one security guard could accommodate hourly volumes up to about 180 trucks per hour before the truck queue would extend to SW Spokane Street. With two gate lanes for trucks, a single guard could accommodate hourly volumes up to about 280 trucks per hour. Beyond that volume, two security guards would be needed, one for each lane. To reduce the potential that queues would reach SW Spokane Street, it is recommended that Terminal 5 provide two pre-check gate lanes, and that the pre-check gate open at least 30 minutes before the main gate to accommodate early-arriving trucks. The main gate would have adequate capacity to accommodate truck volumes on most days, but would need to open one hour early on days when more than 1,500 truck arrivals are expected, in which case the pre-check gate hours would also need to open earlier. The analysis also determined that the pre-check gate(s) would need to remain open for the entire workday (i.e., a security guard would staff the pre-check gate during morning, lunch, and afternoon breaks). The main gate could close for lunch and breaks.

If RMG cranes are installed within the terminal (Alternative 3), the number of trucks that can be served by the terminal's yard equipment would be constrained. Under that condition a second gate shift and a reservation system would be needed to meter the number of trucks that enter the terminal during each hour. Therefore, although the Design Day volumes would be higher for Alternative 3, hourly queues are expected to be lower.

It is recognized that incidents and labor conditions can affect gate operations and queuing conditions. Protocols to manage the queue should be established if such conditions were to occur in the future.

Recommended operating protocols for the gates are described in Section 3.11.4.

3.11.3.11 TRAFFIC SAFETY

3.11.3.12 NO-ACTION ALTERNATIVE

Traffic safety is not expected to change under the No-Action Alternative.

3.11.3.13 ALTERNATIVES 2 AND 3

Increased throughput at the terminal would add traffic to the surrounding street network which could increase the potential for conflicts. Historical collision data for the study area do not indicate any unusual safety issues, and the data include truck traffic generated by the existing terminal along the same travel routes that would be used in the future. Therefore, the Terminal 5 improvements are not expected to adversely affect safety on the roadway network.

Increased throughput could increase the number of train crossings of W Marginal Way SW. Section 3.11.3, Mitigation recommends that the north leg of the SW Spokane Street/W Marginal Way SW/Chelan Avenue SW intersection be closed to all but emergency vehicle traffic with Alternative 2 or 3. This would eliminate the potential conflict at this intersection.

3.11.3.14 TRANSIT

3.11.3.15 NO-ACTION ALTERNATIVE

Transit would change only to the extent existing transit proposals are initiated. The No-Action Alternative does not proposed transit changes.

3.11.3.16 ALTERNATIVES 2 AND 3

The Terminal 5 Improvements Project is expected to generate few, if any, transit trips. A potential closure of surface W Marginal Way SW at the railroad tracks would make it more difficult for employees to walk between the terminal and bus stops located along SW Spokane Street. It may be possible to retain a pedestrian connection across the tracks for employees. However, if the crossing is closed to pedestrians, then employees who walk to the site would need to use an alternative route, either via the Terminal 5 Overpass or at the north end of the terminal.

3.11.3.17 NON-MOTORIZED FACILITIES

3.11.3.18 NO-ACTION ALTERNATIVE

The No-Action Alternative does not propose non-motorized facility changes and is not expected to have any impact on non-motorized forms of transportation.

3.11.3.19 ALTERNATIVES 2 AND 3

Terminal 5 would generate little, if any, pedestrian or bicycle traffic. SDOT recently completed short-term bicycle improvements at and near the five-legged intersection of SW Spokane Street/W Marginal Way SW/Chelan Avenue SW, and is considering long-range improvements. As described in Section 3.11.4, it is recommended that surface W Marginal Way SW north of SW Spokane Street be closed to all traffic except emergency vehicles. This change would improve overall intersection operations and allow existing signal “green time” to be allocated to other movements, including for bicycle movements, if needed. This would improve operations with the City of Seattle proposed short-term bicycle improvements.

Closing this crossing would also improve conditions for the City of Seattle proposed medium-term bicycle improvement project that would provide a surface bicycle trail along the east and north side of W Marginal Way SW. That at-grade trail would no longer need to cross vehicular movements at the intersection, and it could flow freely across that leg of the intersection.

The City of Seattle potential long-term bicycle improvement plan proposes to cantilever a new bicycle facility off of the Terminal 5 Access Bridge. It would also add a new pedestrian/bicycle crosswalk on the west side of the SW Spokane Street/Terminal 5 Access intersection. It is recognized that the City of Seattle would need to do additional structural analysis and design for the long-term bicycle improvement to determine if it is feasible to cantilever a bicycle/pedestrian path off the side of the existing Terminal 5 Access Bridge; however, the Terminal 5 improvements would not affect these long-term plans. The additional crosswalk could be accommodated by the existing signal. It would not affect the overall intersection level of service even with the Terminal 5 improvements and closure of the W Marginal Way SW grade-crossing, which would add more traffic to the intersection. Based on this analysis, the Project is not expected to adversely affect non-motorized facilities in the site vicinity.

3.11.3.20 VEHICLE PARKING

3.11.3.21 NO-ACTION ALTERNATIVE

There are currently 481 vehicle parking spaces near the Terminal 5 Administration Building which would remain for Alternative 1 (No-Action). The No-Action Alternative does not propose changes to vehicle parking and is not expected to have any impact on vehicle parking.

3.11.3.22 ALTERNATIVE 2

Parking would be reduced from 481 vehicle parking spaces to 452 vehicle spaces with Alternative 2 due to construction of the substation, which would eliminate some parking near the Administration Building.

3.11.3.23 ALTERNATIVE 3

Alternative 3 would reconfigure the yard, buildings, and parking lots. This alternative would have approximately 530 vehicle parking spaces. The proposed parking supply would accommodate the Design Day employment for each alternative.

3.11.3.24 RAIL AND ON-DOCK INTERMODAL RAIL YARD OPERATIONS

Terminal 5 has an on-dock intermodal rail yard that allows the direct transfer of containers between rail and ship within the terminal. This yard is primarily used to create or discharge unit trains that transport containers with a common origin or destination. Intermodal containers with other origins or destinations are usually handled through one of the near-dock rail yards operated by the BNSF Railway and UP Railroad. At these facilities, a terminal's cargo is combined with cargo from other terminals to create either full unit trains or mixed-service trains that may drop or pick up segments at inland destinations. These containers are drayed (trucked) between Terminal 5 and the off-dock

rail yards. Detailed information about the rail system that serves South Seattle and Terminal 5 is provided in Volume II, Appendix F.

3.11.3.25 NO-ACTION ALTERNATIVE

It is estimated that Terminal 5 would generate 9 trains during a peak week (each way) through its on-dock intermodal rail yard under Alternative 1 (No-Action) conditions. Alternative 1 assumes that the on-dock rail yard would return to operations similar to what has occurred in the past.

3.11.3.26 ALTERNATIVES 2 AND 3

Trains could increase from 9 to 18 trains in the peak week for Alternative 2 and from 9 to 24 trains in the peak week for Alternative 3.

Alternative 2 would not impact the capacity or operations of this yard. There would be some additional utilization of storage tracks in the West Seattle Yard (WSY) to support the increased rail volume. Alternative 3 would increase the capacity of the yard. Some train building operations would have to be transferred to the WSY, and on-terminal air compressor equipment would be added so that the brakes on a fully-built train could be tested prior to connecting to the locomotive. The addition of an on-terminal air system would result in substantial reductions in idle times for locomotives assembling departing trains. The process of building and testing a train is described in Volume II, Appendix F.

3.11.3.27 RAILROAD GRADE CROSSING IMPACTS

COMPARISON OF ALTERNATIVES

Increased rail volumes moving to and from Terminal 5 would result in additional closure times of near-terminal driveways and at-grade crossings. The additional closures would not require mitigation for impacts to rail infrastructure and capacity.

Arriving and departing trains would have additional impacts on near-terminal crossings beyond just the transit time for a train to move through the crossing. Time may be added for the switching movements between the intermodal rail yard of the terminal and the adjacent storage yard. Volume II, Appendix F provides detailed analysis of potential delays at the vicinity grade crossings.

The arrival-departure of full 7,500-foot trains would impact all five of the crossings west of the West Waterway. The closure time associated with the through train movements is estimated to be approximately 200 minutes per day for Alternative 1, 300 minutes per day for Alternative 2, and 400 minutes per day for Alternative 3.

The switching movements to break down or build a train would add further delay at these crossings. Under Alternative 1, the Terminal 5 surface access via W Marginal Way SW could experience closures of up to 623 minutes per day due to switching. This could increase to 924 minutes under Alternative 2 and 1,246 minutes under Alternative 3. The Terminal 8 access, which is located farther east, would experience approximately one-third the closure time with all alternatives since only the

longest switching moves would affect this crossing. The combination of the arriving, departing, and switching trains would effectively block the Terminal 5 surface access route for more than 20 hours in a day for Alternative 2, and almost continuously for Alternative 3.

As previously noted, it is recommended that the surface access to Terminal 5 be closed to improve operations at the five-legged intersection at SW Spokane Street/W Marginal Way SW/SW Chelan Avenue. The surface access is the north leg of this intersection. Closing this access would allow the intersection to operate with more conventional signal phasing and would eliminate the railroad preemption phase that goes into effect whenever a train crosses that leg. Given the potential increase in rail closure times of that intersection with Alternative 2 or 3, the north leg would effectively be blocked for much of the day. The traffic analysis determined that the overpass, which connects from SW Spokane Street to Terminal 5 and private properties north of the tracks (Terminals 7A, 7B, 7C, and 8), has adequate capacity to accommodate all of the traffic generated by the terminal and those businesses.

3.11.4 MITIGATION MEASURES

3.11.4.1 NO-ACTION ALTERNATIVE

CONSTRUCTION MITIGATION

No construction mitigation would be needed for the No-Action Alternative.

OPERATIONS MITIGATION

No operations mitigation would be needed for the No-Action Alternative.

3.11.4.2 ALTERNATIVES 2 AND 3

CONSTRUCTION MITIGATION

No transportation or parking impacts are expected from construction of the Terminal 5 wharf improvements or deepening of the berth. The terminal would generate fewer truck and employee trips during the construction period than the No-Action operations would generate. Therefore, no mitigation would be required.

OPERATIONS MITIGATION

The following describes measures recommended to mitigate the long-term transportation impacts of the proposed Terminal 5 improvements. This includes both infrastructure improvements and operational protocols.

Off-site Intersection Improvements

Intersection of SW Spokane Street/W Marginal Way SW/Chelan Avenue SW

The analysis determined that increased vehicular traffic associated with either Alternative 2 or 3 would adversely affect operations at the five-legged intersection of SW Spokane Street/W Marginal Way SW/Chelan Avenue SW. In addition, increased train crossings of surface W Marginal Way SW, which is the north leg of this intersection, would exacerbate delay and congestion by increasing the number of signal preemptions of the intersection. Under Alternative 2 or 3, train arrivals, departures, and switching movements would effectively block the crossing during most of the day on peak days. Therefore, it is recommended that the north leg of the intersection (W Marginal Way SW) be closed to all vehicular traffic except emergency vehicles and the occasional out of gauge cargo. All traffic to and from Terminal 5, as well as local businesses at Terminal 7A, 7B, and 7C should be directed to use the Terminal 5 Access Bridge which has capacity to accommodate this diverted traffic.

Signal Upgrades on Spokane Street Corridor

With the closure of the north leg of the five-legged intersection (described above), the traffic signal operating and preemption protocols for that intersection would change. Railroad preemption would no longer be required when a train crosses the north leg of the intersection. Signal timing changes should also be made at SW Spokane Street/Harbor Avenue SW and S Hanford Street/E Marginal Way S intersections to accommodate future background traffic growth. In addition, the manner in which signals operate following an opening of the lower Spokane Street Swing Bridge should be updated. Therefore, it is recommended that a comprehensive signal improvement project for the Spokane Street corridor be implemented as part of the Terminal 5 Improvements Project that would reprogram signals along SW Spokane Street from Harbor Avenue SW to E Marginal Way S, and include the signal at E Marginal Way S/S Hanford Street. This project should include upgrading the signal controller at the five-legged intersection and improving interconnection equipment, if needed.

Gate Design and Operations

Increased truck traffic associated with Alternatives 2 and 3 would require improvements and operational protocols at the truck gates. Based on the queue analysis, the following measures are recommended:

- Provide two inbound pre-check lanes entering Terminal 5 with infrastructure that allows the lanes to be staffed by one security guard. The transition to the second queue lane should also provide space for at least two trucks to queue in the first lane before the gate house.
- Open the pre-check gate at least 30 minutes prior to main gate opening to reduce potential for queue overspill. Keep the pre-check gate open and staffed during morning, lunch, and afternoon break periods. The pre-check gate may be closed during these periods if fewer than 10 trucks are in queue approaching the gate.
- Use video monitoring of the pre-check gate queue lanes near SW Spokane Street. If inbound volumes are expected to exceed 280 trucks per hour **OR** if the truck queue extends to SW Spokane Street (based on video monitoring), provide a second security guard at the inbound pre-check lanes.

- On days when truck arrivals are expected to exceed 1,500 trucks per day, open the main gate at 7:00 AM (one hour earlier than the typical day shift), and the pre-check gate at 6:30 PM.

If the queue extends to SW Spokane Street and cannot be ameliorated by additional staffing at the gate (for example, in emergency conditions when computers are down), require the terminal operator to implement one or more of the following measures:

- Open up additional queuing space at the main terminal gate to process trucks through the pre-check lane.
- Notify truck drivers and dispatchers at the Port operations center (using radio, cell phone, and internet communications) to avoid Terminal 5 until the queue has cleared.
- Notify SDOT and WSDOT traffic operations personnel about closure, so that messages alerting drivers to closure can be posted on select Dynamic Message signs along terminal access routes.
- Pay the cost of locating a police officer at the intersection of SW Spokane Street and the Terminal 5 ramp to redirect truck traffic and prevent the queue from blocking through traffic on SW Spokane Street.

If queues frequently extend onto SW Spokane Street and cannot be resolved with other operational measures, require the terminal operator to implement a reservation system and/or extend the gate hours into a second shift to reduce the number of trucks that arrive during the peak gate hours.

On-Dock Intermodal Rail Yard Improvements

Increase use of storage tracks in the WSY. No improvements to the intermodal rail yard or storage yard would be needed.

3.11.4.3 MITIGATION UNIQUE TO ALTERNATIVE 3

CONSTRUCTION MITIGATION

Same as Alternative 2, no additional mitigation needed.

OPERATION MITIGATION

Same as Alternative 2, except for changes in the rail improvements noted as follows:

Add on terminal air system and locate qualified technicians on terminal to perform brake tests for staged cuts of cars.

3.11.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

There would be no significant unavoidable adverse impacts for any of the alternatives if the recommended mitigation measures are implemented to mitigate the long-term transportation impacts of the proposed Terminal 5 improvements. This includes both infrastructure improvements as well as operational protocols.

3.12 PUBLIC SERVICES

3.12.1 REGULATORY CONTEXT

POLICE SERVICES

The Port's maritime properties are subject to increased security provisions as a result of changing federal requirements. The Transportation Security Administration, as an agency of the federal Department of Homeland Security, oversees the security efforts for all Port properties. Currently, the United States Coast Guard maintains responsibility for shoreline security for the Port. Revised security measures may affect access to Terminal 5.

3.12.2 AFFECTED ENVIRONMENT

POLICE SERVICES

The Port of Seattle Police Department (POSPD) provides primary police protection to the Port sites. Headquarters and dispatch for the POSPD are located at the Seattle-Tacoma International Airport, and operations are conducted out of the Port's police substation at Terminal 30 at 2431 E Marginal Way S. POSPD is the primary E-911 emergency call/dispatch for all Port-owned properties. As such, POSPD provides special teams/units, such as Criminal Investigations, Tactical, Bomb, K-9, SCUBA, Boat Operators, Crisis Negotiations, Incident Command, and other police services.

FIRE AND EMERGENCY SERVICES

The City of Seattle Fire Department (SFD) provides fire protection and basic life support and emergency medical service throughout Seattle from 33 fire stations and Harborview Medical Center. Headquarters for the department are located at Fire Station 10 in Pioneer Square. The closest fire station to Terminal 5 is the SFD Station 5 located at 925 Alaskan Way.

3.12.3 IMPACTS

3.12.3.1 NO-ACTION ALTERNATIVE

POLICE SERVICES AND FIRE AND EMERGENCY SERVICES

Construction and Operations

No impacts are anticipated under the No-Action Alternative because terminal operations would not be expected to change from existing permitting conditions.

3.12.3.2 ALTERNATIVES 2 AND 3

POLICE SERVICES

Construction and Operations

No significant impacts for police services are expected during construction or operations at the terminal under Alternatives 2 or 3. The number and type of calls for police services would be expected to continue at their present level at Terminal 5.

FIRE AND EMERGENCY SERVICES

Construction

During construction, there could be an increase in service calls related to site construction and to respond to potential construction-related injuries. Site preparation and construction of the new terminal building could increase the risk of a medical emergency or accidental fire.

Operations

No significant impacts for fire and emergency services are expected during construction or operations at the terminal under Alternatives 2 or 3. The number and type of calls for fire and emergency services would be expected to continue at their present level at Terminal 5.

3.12.4 MITIGATION MEASURES

3.12.4.1 NO-ACTION ALTERNATIVE

POLICE SERVICES AND FIRE AND EMERGENCY SERVICES

Construction and Operations

Mitigation measures are not expected to be required.

3.12.4.2 ALTERNATIVES 2 AND 3

POLICE SERVICES

POSPD would coordinate with the United States Coast Guard on security plans.

FIRE AND EMERGENCY SERVICES

Construction and Operations

If buildings are demolished or constructed, it would be in compliance with the International Building Code and Fire Code regulations. Adequate fire flow for the Project would be provided according to code. On-site security measures, such as fencing and securing areas where equipment is stored, could be implemented to reduce the potential for construction-related incidents. Existing utility

systems (including water systems and capacity) would be installed and improved, as needed, to meet water capacity demands and code requirements for the SFD.

3.12.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.12.5.1 ALL ALTERNATIVES

FIRE AND EMERGENCY SERVICES

Construction and Operations

With implementation of mitigation measures, no significant unavoidable adverse impacts to police services or fire and emergency services would be expected to result for any of the alternatives.

3.13 UTILITIES

This section assesses the potential impacts of the proposed Project alternatives on utilities and potential mitigation measures required.

3.13.1 REGULATORY CONTEXT

Projects in the City of Seattle are serviced by a variety public and private utilities. Proposed projects must meet the requirements of each of the applicable local, state and federal agencies.

3.13.2 AFFECTED ENVIRONMENT

EXISTING UTILITIES AT THE SITE

Existing utilities at Terminal 5 are described below. They are made available by the following providers:

- Seattle City Light
- Seattle Water Department
- Metro/King County Water Pollution Control Department
- Port of Seattle
- Comcast
- Waste Management, Inc.
- Puget Sound Energy
- Seattle Public Utilities
- Electricity
- Water
- Commercial solid waste collection service
- Storm drainage
- Telephone
- Solid Waste
- Natural Gas
- Sanitary sewer

Electrical

Terminal 5 has a significant existing electrical infrastructure. Power is brought into the site by Seattle City Light (SCL) to the main substation near the intersection of W Marginal Way SW and Chelan Avenue SW. Power is fed from the SCL Delridge substation with a single 240 ampere feeder and distributed from the terminal main substation to numerous secondary substations throughout the Terminal 5 site. These substations in turn feed the container cranes, site lights, buildings, refrigerated container storage area, and convenience power along the apron.

Lighting

Lighting at Terminal 5 primarily consists of high-mast light poles and exterior building lights. The existing high-mast light poles are approximately 100 feet tall (86 feet tall near the apron) each with eight 1-kilowatt high-pressure sodium light fixtures.

Water and Sewer

A Seattle Public Utilities (SPU) water main traverses the site along the terminal's southern and western boundaries. The main connects to Harbor Avenue SW at S Forest Street, at 26th Avenue SW,

and at W Marginal Way SW. Internal to the terminal is a network of Port-owned water distribution mains that serve the buildings, site, and wharf with domestic and fire protection water.

A 96-inch-diameter Metro force main sewer pipe runs under the southern portion of the site from W Marginal Way SW past the southern edge of the existing maintenance building northwest under the railroad tracks before connecting back to Harbor Avenue SW at the S Forest Street right-of-way. Terminal buildings connect to various sanitary sewer pipes and typically drain south connecting to a City of Seattle or Metro main at W Marginal Way SW.

Stormwater

Stormwater drainage at Terminal 5 consists of 11 drainage basins. The drainage system infrastructure primarily consists of a network of catch basins and pipes. Extensive trench drains are installed in the intermodal rail yard. There are approximately 650 catch basins, 235 manholes, and 2.1 miles of trench drain connected and conveyed to the 11 outfalls by 16.5 miles of subsurface pipe. Six oil/water separators have been installed in areas of intense industrial activity, such as the fueling station and maintenance and repair building. The location of the drainage basins and outfalls and information on stormwater structure types and stormwater pipe types are provided in Section 3.3 of this DEIS and in the Stormwater Technical Memorandum (Volume II, Appendix D).

Natural Gas

Puget Sound Energy has natural gas mains in the vicinity of Terminal 5. Several of the existing terminal buildings have a natural gas service connection for heating. The terminal also uses propane for fueling smaller yard equipment. The propane is trucked into the site, and tanks are filled in the vicinity of the existing fueling stations.

Communications

Terminal 5 is served by fiber optic communication cabling from a local service provider. The point of connection is the administration building at the southern entrance to the site. This communication network is then distributed through existing buried conduit to each terminal building and most high mast light poles. The system is used to track and convey instructions on cargo operations, as well as normal business communication functions with the remote office spaces.

3.13.3 IMPACTS

3.13.3.1 NO-ACTION ALTERNATIVE

CONSTRUCTION

Although substantial changes to the utility system for the No-Action Alternative are not proposed, minor construction activities proposed by a new tenant may include repair and maintenance of existing utility systems. The extent of repairs would require trenching to expose existing utility systems, making repairs, and replacing fill and pavement repairs. Construction impacts, such as the interruption of some utility supplies, would be temporary and localized within the existing terminal footprint.

Stormwater treatment and improvements would be installed, as needed, to support the operations of the new facility. Prior to reestablishing container cargo terminal operations, the facility would be reevaluated for the appropriate Level 3 Corrective Actions, requiring a new engineering report. The new engineering report would define treatment options and detailed construction plans for Washington State Department of Ecology's (Ecology) review and approval. Upon approval, the stormwater system would be constructed prior to beginning of operations. The extent of work would likely include installation of below-ground treatment systems, trenching over existing conveyance systems, and repairs to existing conveyance systems.

OPERATIONS

Electrical

The No-Action Alternative does not propose any significant upgrades to the existing electrical supply or on-site distribution. A new tenant may provide additional low-voltage power to the light poles in order to support their specific container tracking and yard communication systems. However, this minor development would not require an increase in overall power supply to the site.

Lighting

While a new terminal tenant may install additional lighting controls (automatic or timer on-off switches) to aid in energy savings, substantial upgrades to the existing terminal lighting system are not anticipated.

Conduit

Additional conduit may be added to provide low voltage power and communication to various locations throughout the container yard. However, these types of modifications would not result in a need to increase power supply to the site.

Water and Sewer

No significant changes are proposed to the domestic water, fire water, or sanitary sewer demand for this alternative. New connections to the City of Seattle main are not proposed, but may occur if construction of a project element warrants it. No impacts to the Metro force main or existing easement are anticipated. No changes are anticipated to the existing City of Seattle and Metro mains that cross the Terminal 5 site.

Natural Gas

No change to the natural gas demand is anticipated for the No-Action Alternative. On-site storage would be expanded if needed to accommodate additional yard equipment that runs on natural gas

Solid Waste

No significant changes in the Terminal 5 solid waste demand are anticipated.

Communications

No significant changes to the Terminal 5 communication systems are anticipated.

Stormwater System

Stormwater improvements would meet state and City of Seattle stormwater regulations. There may be impacts to stormwater if it cannot be properly controlled through the use of operational source control and treatment best management practices (BMPs). Stormwater impacts could include waterborne contaminants from a variety of activities, including oil and grease (hydrocarbons) and heavy metals such as copper, lead and zinc, that can adversely impact receiving waters by introducing pollutants, reducing water quality, and adversely impacting aquatic life. Additional information on the existing stormwater system at Terminal 5 is provided in Section 3.3 and in Volume II, Appendix D.

3.13.3.2 ALTERNATIVE 2

Alternative 2 would require more substantial construction to upgrade utilities at Terminal 5 than the No-Action Alternative. Construction would take more time, may require construction outside of the terminal footprint, and may require coordination with the utility provided. Trenching would also be required. See Section 3.1 of this DEIS for estimated excavation and fill quantities. Improvements would be made to electrical, water, and stormwater systems to accommodate the rehabilitated cargo wharf and support continuing operations. The additional electrical work would also allow the terminal to provide plug-in capability for ships that want to use shorepower as well as provide sufficient electricity for larger and more numerous ship-to-shore (STS) cranes. The upgrades are described in more detail below.

UPGRADE ELECTRICAL SYSTEM

Alternative 2 would require an upgrade to the existing power supply to Terminal 5 by SCL. A system impact study was performed to evaluate the upgrades needed by SCL to provide additional power. The upgrades required include installing new higher-capacity feeders from the Delridge Substation to the South Substation to Terminal 5. A new main terminal substation would be constructed in the vicinity of the existing duct banks in the southeastern of the facility near the current administration building. New duct banks would be constructed to distribute power up to four new substations near the terminal apron and existing substations. These improvements would increase the on-terminal power capacity to approximately 26 megawatts (MW). This additional capacity would accommodate up to 8 next generation STS cranes and expansion of the terminal refrigerated container capacity to about 2,000, and would provide shorepower for two berths at 4 MW each, as well as provide sufficient capacity for existing electrical systems such as buildings and lighting.

The electrical demand and equipment upgrades proposed for Alternative 2 are summarized in Table 3.13-1 and are compared to those in place at the existing site (Alternative 1 – the No-Action Alternative) and to those proposed for Alternative 3.

Table 3.13-1: Proposed Electrical System Upgrades for Alternatives 2 and 3

	No-Action 1	Alternative 2	Alternative 3
Demand			
Supply Required by SCL	No change in existing power demand	Increase supply to site to a total of 26 MW	Increase supply to site to a total of 70 MW
Equipment Accommodated			
Ship-to-Shore Cranes	Up to (6) 5 kV cranes	Up to (8) 15 kV cranes	Up to (12) 15 kV cranes
Container Yard Electrification	None	None	Up to 52 RMG cranes
Refrigerated Containers	Existing 160	Up to 2,000	Up to 2,000
Shorepower (cold ironing)	None	2 berths at 4 MW each	2 berths at 4 MW each
Rail Electrification	None	None	Up to 6 RMG cranes
Time at Berth	16 to 20 hours	25 to 50 hours	30 to 50 hours

Note:
kV = kilovolt
MW – megawatt(s)
RMG = rail-mounted gantry
SCL = Seattle City Light

REPLACE DOCKSIDE POTABLE WATER SYSTEM

The existing dockside water distribution system would be removed and replaced. A sectional distribution system would be provided and integrated with the existing looped water distribution system and existing fire hydrant layout. Existing vessel water supply assemblies would be removed and replaced. Water use metering would be included in replacement, including water use metering.

UPGRADE STORMWATER SYSTEM

Stormwater treatment and improvements would be installed to support the operations of the new facility. Prior to reestablishing container cargo terminal operations, the facility would be reevaluated for the appropriate Level 3 Corrective Actions, requiring a new engineering report. The new engineering report would define treatment options and detailed construction plans for Ecology's review and approval. Upon approval, the stormwater system would be constructed prior to beginning of operations. The extent of work would likely include installation of below-ground treatment systems, trenching over existing conveyance systems, and repairs to existing conveyance systems. The stormwater system would be constructed prior to beginning of operations.

LIGHTING

In Alternative 2, existing light poles may be reused to provide sufficient lighting for yard, intermodal rail yard, and STS transshipment operations. Many of the existing light poles in the vicinity of the wharf would be relocated further upland and away from the water to avoid conflict with the new container cranes. Existing luminaries may be replaced with more energy efficient lighting systems and programmable controls that are designed with appropriate shades to prevent light and glare impacts.

CONDUIT

Alternative 2 proposes to upgrade the conduit systems as needed to accommodate the rehabilitated cargo wharf and to support ongoing operations. A new tenant may provide additional low voltage power to the light poles in order to support their specific container tracking and yard communication systems.

WATER AND SEWER

Existing dockside water distribution system would be removed and replaced under Alternative 2. Sectional distribution systems would be constructed and integrated with the existing looped water distribution system and the existing fire hydrant layout. Existing vessel water supply assemblies would be removed and replaced, including water-use metering code requirements. Substantial changes are not proposed for the domestic water, fire water or sanitary sewer demand and systems under this alternative. New connections to the City of Seattle main are not anticipated but may be completed if construction of another project element warrants it. No impacts to the Metro force main or SPU water main or easement are anticipated.

NATURAL GAS

No change to the natural gas demand is proposed under Alternative 2. If additional yard equipment is purchased that runs on natural gas, on-site storage would be expanded to accommodate it and minor upgrades would be made as needed to support the terminal operations.

SOLID WASTE

No changes are anticipated to the quantity or type of solid waste generated by the terminal. Minor improvements would be made as needed to support the terminal operations.

COMMUNICATIONS

Alternative 2 proposes to upgrade the communication systems, as needed, to accommodate the rehabilitated cargo wharf and to support ongoing operations.

OPERATIONS

Stormwater System

The potential operational impacts in Alternative 2 would be similar to the No-Action Alternative except it is more likely that higher container throughput may require more aggressive operational treatment BMP approaches.

The Industrial Stormwater General Permit (ISGP) would require meeting benchmarks. If operations do not meet benchmarks within one quarter, the site operator would be required to perform adaptive management until benchmarks are achieved. See Section 3.3 Water and Volume II, Appendix D for detailed information on stormwater requirements.

3.13.3.3 ALTERNATIVE 3

Utility upgrades under Alternative 3 would be the same as those described for Alternative 2, except that trenching would be required. See Section 3.1 of this DEIS for estimated excavation and fill quantities.

ELECTRICAL

Alternative 3 would require substantial upgrades to the existing power supply to the terminal to accommodate electrification of new equipment and systems. Load increases identified in Alternative 3 would require the expansion of the system identified in Alternative 2, which increased peak demand from 5 megavolt amperes (MVA) to 26 MVA to up to 70 MVA. This increase in terminal power capacity (up to about 70 MW) would accommodate up to 12 next-generation STS cranes, up to 52 electrified rail mounted gantry cranes in the container storage yard, expansion of the terminal refrigerated container capacity to about 2,000, STS power for two berths at 4 MW each, electrification of the rail loading operation with up to 6 rail-mounted gantry (RMG) cranes, and other electrical systems, such as buildings and lighting.

SCL has developed solution options to serve a peak load of up to 70 MVA for Terminal 5 based on studies they have conducted. The full demand would not be expected to be needed when a tenant first operates at the Terminal 5 site. It is expected that it would take approximately 10 years or more for SCL to design, complete a separate environmental review, and build the full power supply demand for the facility. It is expected that this time period for permitting and construction would coincide with the needs for electricity of any tenant at the Terminal 5 site.

A new main terminal substation would be required on the terminal site in the vicinity of the substation proposed as part of the current Project. New duct banks would also be needed to distribute power to new substations near the apron and substations near the truck circulation between the container yard and the intermodal rail yard.

LIGHTING

Alternative 3 would reduce some of the of the high-mast lighting in the container yard. New lighting would be placed in the truck circulation areas and near the wharf. Existing luminaries may be replaced with more energy efficient lighting systems and programmable controls that are designed with appropriate shades to prevent light and glare impacts.

CONDUIT

Alternative 3 would require the construction/installation of an entirely new and upgraded duct bank system for both power distribution and communication systems.

WATER AND SEWER

The existing dockside water distribution system would be removed and replaced. A sectional distribution system would be provided and integrated with the existing looped water distribution system and the existing fire hydrant layout. Existing vessel water supply assemblies would be removed and replaced, including water use metering code requirements. Water distribution would

be rerouted in the container yard to serve new hydrant locations and avoid RMG crane foundations. Relocated buildings would have new sanitary sewer connections to the City of Seattle main. No significant changes are anticipated in the domestic water, fire water, or sanitary sewer demand for this alternative. While new connections to the City of Seattle main are not anticipated, they may be incorporated if construction of another project element warrants it. Impacts to the Metro force main or SPU water main or easement are not anticipated.

NATURAL GAS

No change to the natural gas demand is proposed under Alternative 3. If additional yard equipment is purchased that runs on natural gas, on-site storage would be expanded to accommodate it.

SOLID WASTE

No changes are anticipated to the quantity or type of solid waste generated by Terminal 5 operations.

COMMUNICATIONS

The Project proposes to upgrade the communication systems, as needed, to accommodate the rehabilitated cargo wharf and to support the densified operations. An upgraded communication system could include a network of Wi-Fi transponders positioned throughout the terminal interconnected by communications cabling back to the main terminal computer room.

OPERATIONS

Stormwater System

The potential operational impacts in Alternative 3 would be similar to Alternative 2; however, higher container throughput may require more aggressive operational treatment BMP approaches. See Section 3.3 and Volume II, Appendix D for detailed information on stormwater requirements.

3.13.4 MITIGATION MEASURES

3.13.4.1 NO-ACTION ALTERNATIVE

No mitigation measures are required or proposed for utilities other than stormwater. Mitigation measures for stormwater are described in detail in Section 3.3, Water, and in Volume II, Appendix D.

3.13.4.2 ALTERNATIVE 2

CONSTRUCTION MITIGATION

Utility upgrades would be constructed or installed to meet anticipated site demand and to comply with all applicable local, state, and federal code requirements. Implementation of any improvements would be coordinated with, and approved by, the applicable utility provider. Mitigation measures for utility construction impacts would include those described for general construction activities on the terminal site (see Chapter 2, Section 2.2.2). Lighting associated with

exterior construction activities would be controlled by City of Seattle regulations, potentially limiting the hours of construction, and thereby limiting construction lighting during nighttime hours. No other measures are expected to be required during construction. Further mitigation measures are not proposed for upgrades to electrical, water and sewer, natural gas, solid waste, or communications.

OPERATION MITIGATION

Lighting

Proposed lighting levels would conform to all applicable federal, state, and local standards. Mitigation to minimize light and glare impacts is described in Section 3.9 .

Stormwater

Compliance with the Clean Water Act through compliance with ISGP and City Stormwater code provides the regulatory-based mitigation standards for potential operational impacts to stormwater. See Section 3.3 and Volume II, Appendix D for detailed information.

3.13.4.3 ALTERNATIVE 3

CONSTRUCTION MITIGATION

Similar to Alternative 2, utility upgrades would be constructed or installed to meet anticipated site demand and to comply with all applicable local, state, and federal code requirements. Implementation of any improvements would be coordinated with, and approved by, the applicable utility provider. Mitigation measures for utility construction impacts would include those described for general construction activities on the terminal site (see Chapter 2, Section 2.2.2). Lighting associated with exterior construction activities would be controlled by City of Seattle regulations, potentially limiting the hours of construction and thereby limiting construction lighting during nighttime hours. No other measures are expected to be required during construction. Additional mitigation measures are not proposed for upgrades to electrical, water and sewer, natural gas, solid waste, or communications.

OPERATIONS MITIGATION

Lighting

Proposed lighting levels would conform to all applicable federal, state and local standards. Mitigation to minimize light and glare impacts is described in Section 3.9.

Stormwater

Compliance with the Clean Water Act through compliance with ISGP and City Stormwater code provides the regulatory-based mitigation standards for potential operational impacts to stormwater. See Section 3.3, Water, and Volume II, Appendix D for detailed information.

3.13.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.13.5.1 ALL ALTERNATIVES

With implementation of mitigation measures, no significant unavoidable adverse impacts to utilities are expected.

Chapter 4

Bibliography

4.0 BIBLIOGRAPHY

Adelsman, H., and Ekrem, J. (Adelsman and Ekrem). 2012. *Preparing for a Changing Climate.* State of Washington Department of Ecology, Publication No. 12-01-004.

Albright, R. and P.K. Borithilette (Albright and Borithilette). 1981. *Benthic Invertebrate Studies in Grays Harbor, Washington.* Unpublished report by the Washington Game Department to the U.S. Army Corps of Engineers, Seattle District. Anchor QEA.

_____. 2012a. *East Waterway Operable Unit Supplemental Remedial Investigation/Feasibility Study: Final Sediment Transport Evaluation Report*. Prepared for the Port of Seattle. August.

_____. 2012b. *Elliott Bay Seawall Project, Elliott Bay Fish Survey Study.* Prepared for the City of Seattle Department of Transportation in conjunction with Tetra Tech, Inc. April.

Anchor QEA and Coast and Harbor Engineering (Anchor and Harbor). 2012. *Final Sediment Transport Evaluation, East Waterway Operable Unit, Supplemental Remedial Investigation/Feasibility Study*. Submitted to the U.S. Environmental Protection Agency, Region 10. August.

Anchor QEA, LLC. 2015. *Shoreline Master Program Development Standards compliance Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening Project* (DPD Project No. 3019071). December.

Aspect Consulting. 2015. *Industrial Stormwater Treatment Planning Study for Terminal 5*, Prepared for the Port of Seattle. April 30.

Baird, R. W. 2001. "Status of Killer Whales, *Orcinus orca*, in Canada." *Canadian Field-Naturalist.* 115. pp. 676–701.

_____. 2002. *Killer Whales of the World: Natural History and Conservation*. Voyageur Press. Stillwater, Minnesota.

Barrett-Lennard, L.G. and G.M. Ellis (Barrett-Lennard and Ellis). 2001. *Population Structure and Genetic Variability in Northeastern Pacific Killer Whales: Towards an Assessment of Population Viability.* Research Document 2001/065, Department of Fisheries and Oceans, Nanaimo, British Columbia.

Bisson, P.A., and R.E. Bilby (Bisson and Bilby). 1982. "Avoidance of Suspended Sediment by Juvenile Coho Salmon." *North American Journal of Fisheries Management.* 2. pp. 371–374.

Braham, H.W. and M.E. Dahlheim (Braham and Dahlheim). 1982. *Killer Whales in Alaska Documented in the Platforms of Opportunity*.

Celedonia, M.T., L. Zhuozhuo, S.T. Sanders, R.A. Tabor, T. Lee, S. Damm, D.W. Lantz, and B.E. Price (Celedonia et al.). 2009. *Movement and Habitat Use of Chinook Salmon Smolts in the Lake Washington Ship Canal. 2007–2008 Acoustic Tracking Studies.* Review Draft to Seattle Public Utilities. U.S. Fish & Wildlife Service, Lacey, Washington.

City of Seattle (unpublished) with Booth, Troost, and Shimel. 2002. Geologic Map of the West Part of the Seattle North 7.5 x 15-minute Quadrangle, Washington. 1:12,000 Scale.

City of Seattle. 2000. *City of Seattle Parks and Recreation Plan 2000*.

_____. 2010. *City of Seattle Parks and Recreation 5-Year Strategic Plan (Plan 2008)*.

_____. 2016. "Stormwater, Grading, and Drainage Control Code (Title 22.800)." Volume 4-Appendix A, Department of Design Construction and Land Use, Seattle, Washington.

City of Seattle Department of Construction and Inspections. 2016a. Environmentally Critical Areas Folio. April.

City of Seattle Department of Construction and Inspections. 2016b. Online Interactive DPD-GIS Map Database. Web page: <http://web6.seattle.gov/dpd/maps/dpdgis.aspx>.

City of Seattle Department of Planning and Development. 2000. Seattle Municipal Code Zoning Map, Plate 129.

City of Seattle Parks and Recreation Department. Undated. *Seattle Park Guide*.

City of Seattle Strategic Planning Office. *Seattle's Comprehensive Plan—Toward a Sustainable Seattle*. Adopted July 25, 1994. Amended January 2005.

Converse Consultants NW. 1993. *Report: Final Phase I Environmental Site Assessment, Terminal 91 Facility, Seattle, Washington.* Prepared for the Port of Seattle. February 16.

Cyrus, D.P., and S.J.M. Blaber (Cyrus and Blaber). 1987a. "The Influence of Turbidity on Juvenile Marine Fishes in Estuaries. Part 1: Field Studies at Lake St. Lucia on the Southeastern Coast of Africa." *Journal of Experimental Marine Biology and Ecology.* 109. pp. 53–70.

_____. 1987b. "The Influence of Turbidity on Juvenile Marine Fishes in Estuaries. Part 2: Laboratory Studies, Comparisons with Field Data and Conclusions." *Journal of Experimental Marine Biology and Ecology*. 109. pp. 71–91.

Dahlheim, M.E. and J.E. Heyning (Dahlheim and Heyning). 1999. "Killer Whale Orcinus Orca (Linnaeus 1758)." *Handbook of Marine Mammals*. S. Ridgway and R. Harrison, editors. Academic Press. San Diego, California. pp. 281–322.

Easterbrook, Don J. (Easterbrook). 1993. *Surface Processes and Landforms.* MacMillan Publishing Company. New York. Falcon Research Group.

Energy Facility Site Evaluation Council. 2015. Tesoro Savage Vancouver Energy Distribution Terminal Facility Draft Environmental Impact Statement. <http://www.efsec.wa.gov/Tesoro%20Savage/SEPA%20-%20DEIS/DEIS%20PAGE.shtml>

Federal Highway Administration (FHWA), U.S. Department of Transportation. 2016. FHWA Traffic Noise Model. Version 2.5.

Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06. May.

Feist, B.E., J.J. Anderson, and R. Miyamoto (Feist et al.). 1996. *Potential Impacts of Pile Driving on Juvenile Pink (Oncorhynchus gorbuscha) and Chum (O. keta) Salmon Behavior and Distribution.* University of Washington, Fisheries Research Institute, FRI-UW-9603, Seattle, Washington.

Ford, J.K.B., G.M. Ellis, and K.C. Balcomb (Ford et al.). 2000. *Killer Whales: The Natural History and Genealogy of Orcinus orca in British Columbia and Washington State.* 2nd ed. UBC Press, Vancouver, British Columbia.

Franklin, Jerry F. and C. T. Dyrness (Franklin and Dyrness). 1973. *Natural Vegetation of Oregon and Washington.* Pacific Northwest Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture. U. S. Government Printing Office, Washington D. C.

Galster, Richard W. and William T. Laprade (Galster and Laprade). 1963. *Geology and Ground-Water Resources of Northwestern King County, Washington*. Water Supply Bulletin No. 20. Division of Water Resources, Department of Conservation. Olympia, Washington. January.

_____. 1991. "Geology of Seattle, Washington, United States of America." *Bulletin of the Association of Engineering Geologists*. 28. pp. 239–302.

Grette, G.B. 1985. *Fish Monitoring during Pile Driving at Hiram H. Chittenden Locks, August–September 1985.* Prepared for the Seattle District Army Corps of Engineers, and Evans-Hamilton, Inc. Seattle, Washington.

Hart Crowser, Inc. (Hart Crowser). 2009. *Acoustic Monitoring and In-site Exposures of Juvenile Coho Salmon to Pile Driving Noise at the Port of Anchorage Marine Terminal Redevelopment Project, Knik Arm, Anchorage, Alaska*. Prepared for US Department of Transportation; Maritime Administration; Port of Anchorage; and Integrated Concepts and Research Corporation.

_____. 2010. *Maintenance Dredging in the Lower Snohomish River Acoustic and Water Quality Monitoring, Everett, Washington*. Prepared for the Port of Everett, Everett, Washington.

_____. 2014a. *Preliminary Geotechnical Engineering Design Study, Terminal 5 Deepening and Crane Rail Upgrade, Seattle, Washington.* Prepared for Port of Seattle. May 30.

_____. 2014b. *Southwest Harbor Terminal 5, Groundwater Quality Monitoring Evaluation Report, Seattle, Washington*. Prepared for Port of Seattle. July 8.

_____. 2016. *Biological Assessment, Terminal 5 Cargo Wharf Rehabilitation and Berth Deepening, Seattle, Washington*. Prepared for Port of Seattle. May 6.

Havis, R.N. 1988. *Sediment Resuspension by Selected Dredges*. EEDP-09-2. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Healey, M.C. 1991. "Life History of Chinook Salmon (*Oncorhynchus tshawytscha*)." *Pacific Salmon Life Histories.* C. Groot and L. Margolis, eds. UBC Press. Vancouver, BC, Canada. pp. 311–394.

Healey, M.C. 1982. "Juvenile Pacific Salmon in Estuaries: The Life Support System." Department of Fisheries and Oceans. Pacific Biological Station, Nanaimo, British Columbia. *Estuarine Comparisons.* Academic Press, Inc.

Heffron Transportation, Inc. (Heffron). 2016. *Transportation Technical Report for Draft EIS*. May 12, 2016.

Heusser, Calvin J. 1977. "Quaternary Palynology of the Pacific Slope of Washington." *Quaternary Research.* 8. pp. 282–306. November.

ICF Jones & Stokes and Ilingworth and Rodkin. 2009. *Technical Guidance and Mitigation of Hydroacoustic Effects of Pile Driving on Fish.* Prepared for the California Department of Transportation, Sacramento, California. Updated 2012.

Institute of Transportation Engineers (ITE). 2004. *Trip Generation Handbook*. 2nd Edition.

_____. 2008. *Trip Generation*. 8th Edition.

King County, Washington. 1998 and subsequent updates. *Surface Water Design Manual*.

_____. 2001. *Reconnaissance Assessment of the State of the Nearshore Report Including Vashon and Maury Islands (WRIAs 8 and 9).* Prepared for the King County Department of Natural Resources, Seattle, Washington.

_____. 2012. *King County Countywide Planning Policies.* November. Amended October 2015.

_____. 2015. King County and City Landmarks List. Technical Paper No. 6. December 29, 2015. Available online at <http://www.kingcounty.gov/~/media/property/historic_preservation/documents/resources/T06_KCLandmarkList.ashx?la=en>.

Larson Anthropological and Archaeological Services (LAAS). 1993. *Cultural Resource Testing 45KI432 Alki Transfer/CSO Project West Seattle Pump Station, King County, Washington.* Submitted to HDR Engineering, Bellevue, Washington. Prepared for: Municipality of Metropolitan Seattle, Seattle, Washington. Prepared by Paul S. Solimano, Lynn L. Larson and Dennis E. Lewarch of Larson Anthropological and Archaeological Services. LAAS Technical Report #93-7. June 30.

Larson, K.W. and C.E. Moehl. 1990. "Entrainment of Anadromous Fish by Hopper Dredge at the Mouth of the Columbia River." *Effects of Dredging on Anadromous Pacific Coast Fishes*. C.A. Simenstad, ed. University of Washington. Seattle, Washington. pp. 102–112.

LaSalle, M.W. 1988. "Physical and Chemical Alterations Associated with Dredging: An Overview." *Effects of Dredging on Anadromous Pacific Coast Fishes*. C.A. Simenstad, ed. University of Washington. Seattle, Washington. pp. 1–12.

Mauger, G.S., J.H. Casola, H.A. Morgan, R.L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L. Whitely Binder, M.B. Krosby, and A.K. Snover (Mauger et al.). 2015. *State of Knowledge: Climate Change in Puget Sound*. Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93 777D.

McCauley, J.F., R.A. Parr, and D.R. Hancock (McCauley et al.). 1977. "Benthic Infauna and Maintenance Dredging—A Case Study." *Water Research.* Pergamon Press. II. pp. 233–242.

McGraw, K.A. and D.A. Armstrong. 1988. "Fish Entrainment by Dredges in Grays Harbor, Washington." *Effects of Dredging on Anadromous Pacific Coast Fishes*. C.A. Simenstad, ed. University of Washington. Seattle, Washington. pp. 13–131.

Miller, J.A. and C.A. Simenstad. 1997. "A Comparative Assessment of a Natural and Created Estuarine Slough as Rearing Habitat for Juvenile Chinook and Coho Salmon." *Estuaries*. 20(4): 792–806.

Moffatt & Nichol. 2015. *Thruster Impact Analysis. Terminal 5, Port of Seattle, Washington*. Prepared for the Port of Seattle. June 10.

_____. 2016a. *Seattle T-5 Vessel Traffic and Navigation, Terminal 5 Cargo Wharf Rehabilitation, Berth Deepening, and Improvements Project*. Draft Memorandum, Prepared for the Port of Seattle. April 20.

_____. 2016b. *T-5 Rail Infrastructure and Train Volume Analysis Memorandum*. April 20.

Munsch, S.H., J.R. Cordell, J.D. Toft, and E.E. Morgan (Munsch et al.). 2014. "Effects of Seawalls and Piers on Fish Assemblages and Juvenile Salmon Feeding Behavior." *North American Journal of Fisheries Management.* 34. pp. 814–827.

Nightingale, B., and C. Simenstad. 2001. *White Paper—Dredging Activities: Marine Issues*. Submitted to Washington Department of Fish & Wildlife, Washington Department of Ecology, and Washington Department of Transportation. University of Washington, School of Aquatic and Fishery Sciences, Wetland Ecosystem Team. Seattle, Washington.

National Marine Fisheries Service (NMFS). 1998. Essential Fish Habitat West Coast Groundfish Appendix. Seattle, Washington.

_____. 2003. Endangered Species Act—Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Middle Waterway Remediation Action, Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington. NMFS Tracking No.: 2003/00574. September.

_____. 2004. Endangered Species Act—Section 7 Consultation Programmatic Biological Opinion and Conference Opinion & Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation. Revised Standard Local Operating Procedures for Endangered Species (SLOPES III) to Administer Certain Activities Authorized or Carried out

by the Department of the Army in the State of Oregon and on the North Shore of the Columbia River. November 30. NOAA's National Marine Fisheries Service Northwest Region.

_____. 2011a. Batched Endangered Species Act Section 7 Informal and Magnuson-Stevens Fishery Management Act Consultations, Thiesen and McClure Lots, Arcadia Point Seafood, Thurston County, Washington (4th Field HUC 17110019, Puget Sound). August 2.

_____. 2011b. Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Trident Marine Services, Shelton, Mason County, Washington (NWR-2007-1721, 6th Field HUC 171100190608). September 26.

_____. 2015. Endangered Species Act Section 7(a)(2) Informal Consultation for the Port of Seattle East Waterway Maintenance Dredge Project COE NO. NWS-2014-413-WRD, East Waterway, Lower Duwamish River, and Elliott Bay, King County, Washington (6th) Field HUC 171100130399, Lower Green River and 4th Field HUC 17110019, Puget Sound). July 16.

National Oceanic and Atmospheric Administration (NOAA). 2012. Endangered and Threatened Species: Final Rule to Revise the Critical Habitat Designation for the Endangered Leatherback Sea Turtle. Federal Register. pp. 4170–4201.

_____. 2005. Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales. 50 CFR Part 224. RIN No. 0648-AS95. November 18.

Pearson, W.H., J.R. Salaski, and C.I. Malme. 1992. "Effects of Sound from a Geophysical Survey Devise on Behavior of Captive Rockfish (*Sebastes* spp.)." *Canadian Journal of Fisheries and Aquatic Science.* 49. pp. 1343–1356.

Pacific Fisheries Management Council. 1998. Final Environmental Assessment/Regulatory Review for Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan. October.

_____. 1999. Appendix A. Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon.

Permanent International Association of Navigation Congresses (PIANC). 2015. *Guidelines for Protecting Berthing Structures from Scour Caused by Ships*.

Port of Seattle. 2001. *Harbor Development Strategy 21*.

_____. 2003. *Five-Year Strategic Plan (2003–2007)*. June 26.

Port of Kalama. 2013. SEPA Checklist for the East Port Development Agreement. Port of Kalama. Kalama, WA.

_____. 2015a. Port of Kalama makes way for commercial development with approval of Spencer Creek Business Park Master Plan. November 18, 2015. Available:

<http://portofkalama.com/port-of-kalama-makes-way-for-commercial-development-with-approval-of-spencer-creek-business-park-master-plan/>.

Quantitative Environmental Analysis, LLC (QEA). 2008. *Lower Duwamish Waterway Sediment Transport Modeling Report, Final*. Prepared for the U.S. Environmental Protection Agency, Region 10, and the Washington State Department of Ecology. October.

Ramboll Environ. 2016a. *Terminal 5 Wharf Rehabilitation, Berth Deepening, and Improvements Project, Air Quality Technical Report.* May.

_____. 2016b. *Terminal 5 Wharf Rehabilitation, Berth Deepening, and Improvements Project, Noise Technical Report.* April.

Romberg, P., C. Homan, and D. Wilson. 1995. The Denny Way Sediment Cap 1990–1992 Data. King County Department of Metropolitan Services (METRO), Seattle, Washington.

Ruggerone, G.T., S. Goodman, and R. Miner. 2008. *Behavioral Response and Survival of Juvenile Coho Salmon Exposed to Pile Driving Sounds.* Prepared for the Port of Seattle, Seattle, Washington, prepared by Natural Resources Consultants, Inc. Seattle, Washington.

Seattle Department of Neighborhoods. 2015. Seattle Historical Sites database. Accessed online at <http://web6.seattle.gov/DPD/HistoricalSite/default.aspx>. February 2, 2015.

Servizi, J.A. 1988. "Sublethal Effects of Dredged Sediments on Juvenile Salmon." C.A. Simenstad, ed. *Effects of Dredging on Anadromous Salmonids Pacific Coast Fishes*. University of Washington. Seattle, Washington.

Shannon & Wilson, Inc. 2000. *Seattle Landslide Study, Volumes 1 and 2.* Submitted to Seattle Public Utilities. January.

Sigler, J.W. 1990. "Effects of chronic turbidity on anadromous salmonids; recent studies and assessment techniques." In: *Effects of Dredging on Anadromous Salmonids Pacific Coast Fishes*. C.A. Simenstad, ed. University of Washington. Seattle, Washington.

Simenstad, C.A. 1988. *Effects of Dredging on Anadromous Pacific Coast Fishes*. Workshop Proceedings Sept 8–9. University of Washington, Seattle, Washington.

Simenstad, C. A. and J. R. Cordell (Simenstad and Cordell). 2000. "Ecological Assessment Criteria for Restoring Anadromous Salmonid Habitat in Pacific Northwest Estuaries." *Ecological Engineering.*

Simenstad, C.A., K.L. Fresh, and E.O. Salo (Simenstad et al.). 1982. "The Role of Puget Sound and Washington Coastal Estuaries in the Life History of Pacific Salmon: An Unappreciated Function." *Estuarine Comparisons*. V.S. Kennedy, editor. Academic Press. New York, New York.

Skalski, J.R., W.H. Pearson, and C.I. Malme. 1992. "Effects of Sounds from a Geophysical Survey Device on Catch-Per-Unit-Effort in a Hook-and-Line Fishery for Rockfish (Sebastes spp.)." *Canadian Journal of Fisheries and Aquatic Science.* 49. pp. 1357–1365.

SoundEarth Strategies, Inc. (SoundEarth) 2015. Personal Communication Regarding Archaeological Sites in the Project Boundary at Terminal 5 Between Audrey Hackett, SoundEarth Strategies, Inc. and Gretchen Kaehler, Department of Archaeology and Historic Preservation. February.

Stadler J.H. and D.P. Woodbury. 2009. "Assessing the Effects on Fishes from Pile Driving: Application of New Hydroacoustic Criteria." *Inter-noise*.

Stober, Q.J., and K.B. Pierson. 1984. *A Review of the Water Quality and Marine Resources of Elliott Bay, Seattle, Washington. Final report.* Fisheries Research Institute, CW/F2-82, University of Washington. Seattle, Washington.

Swartz, R.C., W.A. DeBen, F.A. Cole, and L.C. Bentsen (Swartz et al.). 1980. "Recovery of the Macrobenthos at a Dredge Site in Yaquina Bay, Oregon." *Contaminates and Sediments*. Robert A. Baker, ed. Ann Arbor Science Publishers, Inc. Ann Arbor, Michigan. 2. pp. 391–408.

Toft, J.D., J.R. Cordell, C.A. Simenstad, and L.A. Stamatiou (Toft et al.). 2007. "Fish Distribution, Abundance, and Behavior Along City Shoreline Types in Puget Sound." *North American Journal of Fisheries Management*. 27. pp. 465–480.

Transportation Research Board. 2010. *Highway Capacity Manual.*

U.S. Fish & Wildlife Service (USFWS). 1999. *The Bald Eagle is Back.* U.S. Fish & Wildlife Service Endangered Species Homepage. <www.fws.gov>.

U.S. Army Corps of Engineers (USACE). 1994. *Southwest Harbor Cleanup and Redevelopment Project. Final Environmental Impact Statement*. U.S. Army Corps of Engineers, Washington Department of Ecology, and Port of Seattle.

_____. 1999. Columbia and Lower Willamette Rivers Navigation Channel, Oregon and Washington Final Integrated Feasibility Report for Channel Improvements and Environmental Impact Statement

U.S. Department of Transportation. 2015. *Kelso Martin's Bluff Improvement Projects Task 5 and Task 6 Finding of No Significant Impact and Section 4(f) de minimis Determination*. March.

Walsh, T.J., V.V. Titov, A.J. Venturato, H.O. Mofjeld, F.I. Gonzalez (Walsh et al.). 2003. *Tsunami Hazard Map of the Elliott Bay Area, Seattle, Washington. Washington* Division of Geology and Earth Resources Open file Report 2003-14.

Warner, E.J. and R.L. Fritz. 1995. *The Distribution and Growth of Green River Chinook Salmon (Oncorhynchus tshawytscha) and Chum Salmon (Oncorhynchus keta) Outmigrants in the Duwamish Estuary as a Function of Water Quality and Substrate.* Muckleshoot Indian Tribe. Auburn, Washington.

Washington Associated General Contractors. Undated. *Guide to Handling Fugitive Dust from Construction Projects.*

Washington State Department of Ecology (Ecology). 1994. *Washington State Water Quality Assessment [305(b)] Report Companion Document*. Olympia, Washington.

_____.2005 and subsequent updates. *Stormwater Management Manual for Western Washington.*

_____. 2011. Water Quality Standards for Waters of the State of Washington (Chapter 173-201A Washington Administrative Code).

_____. 2012. *Stormwater Management Manual for Western Washington*. Publication No. 14-10-055. Amended December 2014.

_____. 2013. *Guidelines for the Preparation of Industrial Stormwater General Permit Engineering Reports*. Publications 13-10-007. February.

_____. 2015. *Washington State 2014 Marine and Rail Oil Transportation Study*. Spill Prevention Preparedness and Response Program. Available: <https://fortress.wa.gov/ecy/publications/publications/1508010.pdf>. March 1.

Washington State Department of Archaeology and Historic Preservation (DAHP). 2015. Washington Information System for Architectural and Archeological Records Data. Cited: November 16.

Washington Department of Fish & Wildlife Priority Habitats and Species (WDFW PHS). 2014. Priority Habitats and Species GIS Database. Washington Department of Fish & Wildlife. Olympia, Washington.

Whitman, R.P., T.P. Quinn, and E.L. Brannon (Whitman et al.). 1982. "Influence of Suspended Volcanic Ash on Homing Behavior of Adult Chinook Salmon." *Transactions of the American Fisheries Society*. 111. pp. 63–69.

Wilson, D. and P. Romberg. 1999. *The Denny Way Sediment Cap, 1994 Data, Final Report*. King County Department of Natural Resources Water Pollution Division, Seattle, Washington. May.

Windward Environmental, LLC. 2011. *Soil and Groundwater Management and Restoration of Engineered Environmental Controls – Terminal 5 Remediation Areas, Seattle, Washington*. Prepared for the Port of Seattle. April 27.

WorleyParsons. 2014. Vessel Traffic Study for Vancouver Energy Terminal: Vessel Traffic Risk Assessment Traffic Impact Analysis. Prepared for Tesoro Savage Petroleum Terminal LLC.

Washington State Department of Transportation (WSDOT). 2013. Biological Assessment Preparation for Transportation Projects—Advanced Training Manual. Version 2013.

Chapter 5

Distribution List

5.0 DISTRIBUTION LIST

(Partial List included below. Full list on file at Port of Seattle offices)

5.1 FEDERAL AGENCIES

U. S. Army Corps of Engineers

U. S. Bureau of Indian Affairs

U. S. Coast Guard

U. S. Customs and Border Protection, Department of Homeland Security

U. S. Environmental Protection Agency

U. S. Fish & Wildlife

U. S. National Marine Fisheries Services

5.2 REGIONAL AGENCIES

Puget Sound Clean Air Agency

Puget Sound Water Quality Authority

5.3 WASHINGTON STATE AGENCIES

Washington Council on International Trade

Washington Department of Archaeology and Historic Preservation

Washington Department of Ecology

Washington Department of Fish & Wildlife

Washington Department of Natural Resources

Washington Department of Transportation

Washington Environmental Council

Washington State Ferries

Washington State Labor Council

5.4 CITY OF SEATTLE

Seattle City Council Members and Mayor's Office

Seattle City Light

Seattle Civil Service Commission

Seattle Department of Neighborhoods

Seattle Department of Construction and Inspections

Seattle Department of Transportation

Seattle Fire Department

Seattle Office of Intergovernmental Relations

Seattle Planning Commission

Seattle Public Utilities

5.5 KING COUNTY

King County Council Members and Executive

King County Department of Natural Resources

King County Development/Environmental Services

King County Industrial Waste

King County Public Health

King County Transit Division

King County Wastewater Treatment Division

5.6 INDIAN TRIBES

Duwamish Tribal Office

Muckleshoot Indian Tribe

Suquamish Indian Tribe

United Indians of All Tribes

5.7 PUBLIC LIBRARIES

Seattle Public Library – Central Branch, West Seattle Branch, Delridge Branch, South Park Branch

University of Washington Libraries, Government Publications Division

5.8 NEIGHBORHOOD ASSOCIATIONS AND SERVICE CENTERS

Admiral Neighborhood Council

Delridge District Council

Georgetown Community Council

Greater Duwamish District Council
South Park Neighborhood Association

Southwest District Council

Terminal 5 Interest Group

West Seattle Transportation Coalition

5.9 LOCAL BUSINESSES

Alaska Maritime Agencies

BNSF Railway Company

Clipper Navigation

Crowley Maritime Corporation

King County Labor Council

Northwest Ships Services LLC

Puget Sound Energy

Republic Parking Northwest, Inc.

Seattle Times

SSA Marine

5.10 ORGANIZATIONS

Bicycle Alliance

Bluewater Network

Cascade Land Conservancy

Downtown Seattle Association

Freight Mobility Advisory Committee

ILWU Local 9

ILWU Local 19

League of Women Voters

NW Steelhead Salmon Council

Ocean Advocates

People for Puget Sound

Puget Sound Pilots

Puget Sound Regional Council

Puget Soundkeeper Alliance

Sea Scouts

Seattle Audubon

Seattle Convention and Visitors Bureau

Seattle Downtown Alliance

Seattle Parks Foundation

SEIU Local 6

SEIU Local 9

SODO Business Association

Sound Transit

Urban League

Washington Toxics Coalition