

SEPA ENVIRONMENTAL CHECKLIST

A. Background [\[HELP\]](#)

1. Name of proposed project, if applicable:

Pier 66 Shore Power Project (Project)

2. Name of applicant:

Port of Seattle (Port)

3. Address and phone number of applicant and contact person:

Applicant:

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Contact:

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4. Date checklist prepared:

May 2021

5. Agency requesting checklist:

Port of Seattle

6. Proposed timing or schedule (including phasing, if applicable):

Construction of the Project is anticipated to begin in fall 2022. Upland construction is anticipated to take approximately 6 months to complete. Majority of the landside cable connections and ductbanks/conduits are anticipated to be completed before the installation of the submarine cable. Submarine cable protective features, including concrete mats, split-shell pipes, conduits, and other measures, will be completed after installing the submarine cable. Placement of the submarine cable and the cable protection is anticipated to require up to 2

weeks of in-water work by boat and divers. Once this is done, then the cable will be terminated at the upland splice vault/box, connected to the power source, and tested for faults. In-water work will occur during the in-water work window for projects in Elliott Bay, which is typically August 1 through February 15 of any year in which work is proposed.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

There are currently no plans for future additions, expansion, or further activity related to or connected with this proposal by the Port.

Seattle City Light (SCL) may use the newly constructed vault at Terminal 46 (T-46) in coordination with Washington State Ferries for a future project. Future activities would be led by SCL undergo separate environmental review and permitting.

Seattle City Light (SCL) will need to upgrade its feeder system leading up to T-46. This work will be completed under SCL's existing agreements for electrical infrastructure upgrades.

The Port is aware of other future potential projects occurring in and around T-46 and is designing this Project to be compatible with potential future uses.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

- King County SEPA Greenhouse Gas Emissions Worksheet (Attachment 1)
- Biological Evaluation (Attachment 2)
- Pier 66/Bell Street Cruise Terminal Shore Power Submarine Cable Installation Feasibility Review (Anchor QEA 2019)
- U.S. EPA 2020 Diesel Emissions Reduction Act Grant Application
- TransAlta Centralia Coal Transition Grant Program, Energy Technology Board Fund Grant Application
- Washington Department of Ecology Air Quality Volkswagen Electric Shore Power for Ocean Going Vessels Grant Application

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

T-46 is a total of 99.13 acres (86.5 acres consist of a terminal facility), the southern portion of which is managed by the Northwest Seaport Alliance, and the northern portion of which is

operated by the Port. This Project will occur in the far northern section of the Port-managed portion.

The Coast Guard is evaluating several sites for expansion of its Base Seattle, including the southern NWSA-managed portion of T-46. This portion of T-46 does not overlap with the portion of T-46 directed affected by this Project.

T-46 is the proposed site for a new cruise terminal that would occupy the northern 29 acres of the overall 86.5-acre terminal facility. The remainder of the site would be maintained as a marine cargo facility and for administrative use. Portions of the proposed cruise terminal development overlap with the portion of T-46 directed affected by this Project. As of April 28, 2020, the Port has indefinitely postponed the proposed new Cruise Terminal Project at the preferred location of T-46 while the Port evaluates the impacts of the COVID-19 pandemic on the cruise industry.

The Port is aware of these potential projects occurring at T-46 and this Project is designed to be compatible with potential future activities.

SCL will need to upgrade its feeder system leading up to T-46. This work will be completed under SCL's existing agreements for electrical infrastructure upgrades.

10. List any government approvals or permits that will be needed for your proposal, if known.

Federal/Tribal: U.S. Army Corps of Engineers Section 10/Section 404 Individual Permit

- Tribal Concurrence
- National Marine Fisheries Service/U.S. Fish and Wildlife Service Endangered Species Act Section 7 Concurrence
- Washington State Department of Archaeology and Historic Preservation National Historic Protection Act Section 106 Concurrence

State:

- Washington State Department of Ecology Coastal Zone Management Act Consistency Determination
- Washington State Department of Ecology Clean Water Act Section 401 Water Quality Certification
- Department of Natural Resources Aquatic Lands Use Authorization
- Washington Department of Fish and Wildlife Hydraulic Project Approval

Local:

- City of Seattle Department of Construction and Inspections (SDCI) Shoreline Substantial Development/Conditional Use/Variance Permit
- SDCI Building and Grading Permit
- SDCI Electrical Permit

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The Pier 66 Shore Power Project (Project) is located in Elliott Bay on the Seattle waterfront (Figures 1 and 2). The Port of Seattle (Port) is proposing to provide shore power (i.e., cold ironing) to serve shore power capable cruise vessels at the Pier 66/Bell Street Cruise Terminal (P66) by installing a shore power system with a submarine cable that will connect the P66 facility to a new power feeder extension at Terminal 46 (T-46) that is connected to the Seattle City Light (SCL) electrical power grid. Project components include the following:

- Installing upland electric cables, ductbanks, meter and switchgear infrastructure and vaults to connect the submarine cable to an existing SCL electrical power vault at T-46
- Installing upland electrical cables, ductbanks, and vault to an existing SCL vault north of S. King Street and continue to the north terminal property line. The Port will perform this work contingent on execution of a mutually satisfactory service agreement with SCL.
- Upland grading to install the cables and electric utility infrastructure at T-46
- Installing an approximately 6,110-foot-long, 26 kilovolt (kV) submarine cable from the north end of T-46 to the south end of the P66 pier structure
- Installing protective submarine cable features including a rigid conduit at the T-46 slope and articulated mats across the T-46 and P66 berth areas
- Installing electric utility infrastructure and shore power equipment/system on the P66 pier and routing the cable under the pier to two cruise vessel shore power connection or plug-in locations

Providing shore power at P66 allows shore power capable cruise vessels to plug into the local electrical grid and turn off their auxiliary diesel engines while at berth, resulting in an overall reduction in air pollutant and greenhouse gas emissions. As one of the most thoroughly demonstrated and robust methods for reducing at-berth emissions from cruise ships, shore power is a key strategy to meet the Port's Century Agenda goal of being the greenest and most

energy-efficient port in North America and to advance the region as leading tourism destination and business gateway.

The Biological Evaluation in Attachment 2 includes a complete Project Description. The attached Plan Set includes a graphical depiction of Project activities.

- 12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.**

Figures 1 and 2 present a Vicinity Map and Existing Conditions for the Project.

P66 is located at 2225 Alaskan Way, King County tax parcel numbers 7666202342, 7666202327, and 312504HYDR. Latitude 47.609716 N./ Longitude -122.347599 W., NW Section 31 of Township 25N, Range 4W.

T-46 is located at 401 Alaskan Way South, King County tax parcel numbers 7666207695, 7666207696, 7666202631, 7666207698, 7666207699, 7667800005. Latitude 47.597455 N./ Longitude -122.340299 W., NE Section 6 of Township 24N, Range 4W.

B. Environmental Elements [\[HELP\]](#)

1. Earth [\[help\]](#)

a. General description of the site:

The upland areas at T-46 and P66 are flat, concrete industrial piers with vertical bulkheads or riprap slopes.

(circle one) Flat, rolling, hilly, steep slopes, mountainous, other:

b. What is the steepest slope on the site (approximate percent slope)?

The steepest slope at T-46 is a vertical bulkhead for the apron structures. Slopes beneath T-46 apron structures are primarily riprap armored with slopes varying between vertical and approximately 1.5:1. P66 is an overwater pier structure with varying water depths.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any

agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

Both T-46 and P66 are characterized by pervious fill placement and alluvial layers. There is no agricultural land of long-term commercial significance along the shorelines.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

The Puget Sound region is situated in a moderately active seismic region where the Juan de Fuca plate is thrust beneath the North American plate along the toe of the continental slope. The Uniform Building Code (1997 Edition) places the Puget Sound area within Seismic Zone 3, which indicates significant seismic risk. The design level earthquake for this zone is magnitude 7.0 to 7.5 with peak ground acceleration of about 0.3g.

Soil liquefaction may occur in the Project area as a result of seismic shaking because the sites were constructed on filled former tidelands. The City of Seattle critical areas map identifies the T-46 and P66 areas as a liquefaction zone (City of Seattle 2021).

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Upland backfill material will consist primarily of material excavated from the same location as the trenching activities, consisting of asphalt and imported fill. Approximately 3,500 cy of existing asphalt and underlying fill material will be graded over approximately 18,900 sf (approximately 0.4-acre). Any imported fill materials used for installing the ductbank and electrical infrastructure will be clean and sourced from an off-site approved vendor.

Trenching depths for upland duct banks at T-46 will generally be 4 to 8 feet deep, and electrical vaults will likely require excavations between 8 and 12 feet deep. Grade and fill quantities are described above. Excess excavated material at T-46 from Port activities will be recycled for re-use or disposed of off site at an approved upland landfill. Any contaminated materials encountered will be properly disposed of at an approved off-site upland facility.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Construction will involve ground-disturbing activities at T-46 for electrical utility, including trenching and backfilling. These activities will affect approximately 18,900 square feet across the terminal. Potential impacts from increased erosion due to wind or stormwater will be

minimized through compliance with best management practices (BMPs) required by applicable stormwater regulations.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Activities proposed as part of this Project will not change the amount of impervious surfaces at T-46 or P66. Uplands at T-46 and P66 consist of 100% impervious concrete or asphalt. A total of 18,900 square feet of impervious asphalt will be replaced in-kind on Port property at T-46.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Erosion control BMPs will be implemented during construction of the Project consistent with the terms and conditions of applicable permits. The following erosion control BMPs are incorporated into Project design and construction methods to avoid or minimize potential impacts to the aquatic environment:

- Establishing clearing limits
- Stabilizing disturbed soils
- Installing silt fences, inlet protection, and other methods to minimize the potential for sediment leaving the site
- Installing construction entrances
- Installing stormwater conveyance and disposal systems
- Sprinkling exposed soils from a water truck to minimize wind erosion

Standard erosion control BMPs will be implemented as described in Section 11. Temporary Erosion and Sediment Control (TESC) Plans and Construction Stormwater Pollution Prevention Plans (SWPPP) will be created when applicable.

2. Air [\[help\]](#)

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

The Project is part of the Port's long-term planning goals for carbon and air emissions reduction, including the Port's Century Agenda, introduced in 2012, which outlines sustainability goals and objectives intended to guide Port investments and operations for the next 25 years, and the 2020 Northwest Ports Clean Air Strategy which includes an objective to install shore power at all major cruise berths by 2030. The Project will accomplish these

goals by providing standalone shore power for cruise vessels moored at P66, allowing equipped ships to connect to 93% clean electricity from SCL rather than relying on fossil fuel sources (SCL undated). As a result, shore power can nearly eliminate emissions from ships at berth while connected. Please see Attachment 1 for the Greenhouse Gas Emissions Worksheet.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

Existing sources of air pollution in the vicinity of the Project site include industry and transportation, including marine diesel-fueled vessels, both diesel and gas vehicles on the nearby roadways, and existing cargo-handling equipment. Criteria air pollutants of primary concern are oxides of nitrogen (NO_x) and particulate matter (PM₁₀ [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]). These off-site sources of emissions or odor will not affect the Project.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

All construction equipment will be maintained in proper working order and in compliance with Washington State regulations for vehicle emissions. During construction, the site will be watered as necessary to reduce fugitive dust emissions.

Once fully operational, the shore power connection at P66 is estimated to reduce annual emissions: 54 metric tons of oxides of nitrogen (NO_x), 1 metric ton of diesel particulate matter (DMP), and 2,700 metric tons of greenhouse gas (CO₂).

Long-term, the purpose of this project is to reduce overall air and GHG emissions.

3. Water [\[help\]](#)

a. Surface Water [\[help\]](#)

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

T-46 and P66 are both located on the shoreline of Elliott Bay, part of Puget Sound, a marine environment. T-46 is located in Water Resource Inventory Area (WRIA) 9 (Green-Duwamish Waterway) and P66 is in WRIA 8 (Cedar-Sammamish).

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Work will occur adjacent to and within Elliott Bay. Upland trenching and utility infrastructure installation at T-46 will include activities occurring within 200 feet of the shoreline. The underwater cable, approximately 6,110 feet long, will follow an alignment from T-46 to P66. The cable and associated protective measures will be placed on the seafloor via boat and divers (Figure 2). In-water work is expected to take approximately 2 weeks to complete. Work at P66 will occur both in-water for the cable connection and overwater on the pier for upland electrical equipment. Upland construction is anticipated to take approximately 6 months.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

The underwater cable, approximately 6,110 feet long, will be placed along the seafloor between T-46 and P66. Due to the weight of the cable, it is likely to be partially buried with native substrate quickly accumulating over it. No in-water dredging or trenching are proposed.

Articulated mats will be placed over the cable across the T-46 and P66 berths to protect the cable from vessel propwash and other forces. The articulated mats are approximately 8 feet wide and 1 foot thick, composed of pre-cast concrete blocks connected with rope/wire of stainless steel, galvanized steel, or polypropylene. The length of the articulated mats at T-46 and P66 will be approximately 100 lf and 200 lf, respectively. The mats will cover approximately 1,800 sf of substrate and include a total of 30 cy and 60 cy at each location (totaling 90 cy). The mats will be sourced from an approved manufacturer.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

The Port does not anticipate any surface water withdrawals or diversions occurring to support the Project.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

The portion of the Project area in the uplands of T-46 is not located within a FEMA-designated floodplain. The in-water portion of the Project from T-46 to P66 occurs within a FEMA-designated Zone VE (elevation 14 to 15 feet [NAVD88]) floodplain (FEMA 2020). The overwater work area at P66 is also in Zone VE. Areas designated as "Zone VE"

indicate those areas subject to a 1% annual chance of flooding with additional hazards due to storm-induced velocity wave action.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

The Project does not propose any discharges of waste materials to surface waters (Elliott Bay).

b. Ground Water [\[help\]](#)

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No groundwater will be drawn from or discharged to drinking wells as part of this Project.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No waste material is proposed to be discharged into the ground as part of this Project.

c. Water Runoff (Including Stormwater)

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

During construction, contractors will develop and follow a SWPPP to address any stormwater discharges resulting from Project activities.

The Project will replace existing impervious surfaces and will not alter existing drainage patterns at T-46 or P66. Installing the upland cable across T-46 may temporarily affect existing underground stormwater infrastructure. Affected stormwater facilities will be replaced in kind and no permanent changes to stormwater conveyance at the site will occur.

The transformer at P66 will be filled with oil and entirely contained within a concrete foundation and curb to provide approximately 110% containment and prevent any fluids from being discharged to surface waters. Since the containment area is exposed to rainwater, stormwater management features (e.g., pipe inserts or sump) will be installed to prevent oil from escaping the contained area.

2) Could waste materials enter ground or surface waters? If so, generally describe.

An equipment failure has the potential to spill fluids or diesel onto the ground or into the adjacent waterbody. The contractor will be required to prepare and implement a Spill Prevention, Control, and Countermeasures Plan and SWPPP.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

See response to Section 3.c.1.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

The Project will restore affected upland areas to previous conditions, so no changes in drainage patterns are anticipated. As previously described, the transformer will be installed within a concrete berm providing secondary containment (up to 110% containment capacity) to capture any potential leaks or spills that may occur during operation. The electrical equipment and transformer at P66 will be routinely inspected and maintained during operations to prevent any potential impacts to nearby surface waters (Elliott Bay).

See Section B.1.h for applicable erosion and sediment control measures to be implemented during construction. Other BMPs to be implemented during construction include:

- Any dewatering will require sedimentation tanks and treatment for discharge.
- Construction of the proposed Project will comply with water quality restrictions imposed by the Washington State Department of Ecology (Ecology), which state that turbidity in marine water exceeding state water quality standards will not extend beyond a 150-foot mixing zone during construction (WAC 173-201A-210(1)(E)(i)(D)).
- The contractor will be responsible for the preparation and implementation of a Spill Prevention, Control, and Countermeasure Plan (SPCC) Plan to be used for the duration of the project. The contractor will also maintain at the job site the applicable equipment and materials designated in the SPCC Plan.

- Excess or waste materials, petroleum products, concrete, chemicals, or other toxic or deleterious materials will not be allowed to enter surface waters.
- The contractor will regularly check fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. for leaks, and shall maintain and store materials properly to prevent spills.
- Barges will not be allowed to ground out during construction.
- In-water submarine cable protection features will be placed uniformly by a controlled placement in a manner that minimizes disturbance of underlying sediments.

4. Plants [\[help\]](#)

a. Check the types of vegetation found on the site:

- deciduous tree: alder, maple, aspen, other
- evergreen tree: fir, cedar, pine, other
- shrubs
- grass
- pasture
- crop or grain
- Orchards, vineyards or other permanent crops.
- wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- water plants: water lily, eelgrass, milfoil, other:
- other types of vegetation:

There is no known aquatic vegetation and no known eelgrass communities in or adjacent to the action area (WDNR 2021). The majority of installed cable will be placed in waters deeper than 40 feet, which is typically too deep to support aquatic vegetation in Puget Sound.

b. What kind and amount of vegetation will be removed or altered?

No native vegetation is proposed for removal or alteration as part of this Project. A small patch of non-native ivy may be impacted during trenching at T-46.

c. List threatened and endangered species known to be on or near the site.

There are no threatened or endangered plant species known to be at or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

No landscaping or vegetation enhancement is proposed as part of this Project.

e. List all noxious weeds and invasive species known to be on or near the site.

T-46 and P66 are both completely developed sites with no rooted vegetation. The SCL right-of-way may have some grassy areas near the eastern boundary of T-46 that could contain noxious weeds or invasive species. Small patches of non-native ivy are present near the South Substation.

5. Animals [\[help\]](#)**a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.**

Examples include the following:

Birds: hawk, heron, eagle, songbirds, other: waterfowl, seabirds

Mammals: deer, bear, elk, beaver, other: harbor seals, sea lions

Fish: bass, salmon, trout, herring, shellfish, other

The following Priority Habitats and Species may occur on or in proximity to the site, according to the Washington Department of Fish and Wildlife (WDFW 2021):

- Steelhead (*O. mykiss*)
- Chinook salmon (*Oncorhynchus tshawytscha*)
- Pink salmon (*O. gorbuscha*)
- Sockeye salmon (*O. nerka*)
- Coho salmon (*O. kisutch*)
- Chum salmon (*O. keta*)
- Dolly Varden/Bull trout (*Salvelinus malma*)
- Resident coastal cutthroat (*O. clarki*)
- Western pond turtle (*Actinemys marmorata*)
- Estuarine Zone

b. List any threatened and endangered species known to be on or near the site.

Federally listed species that may occur in the vicinity of the Project include the following:

- Chinook salmon, Puget Sound Evolutionarily Significant Unit (ESU)
- Steelhead, Puget Sound Distinct Population Segment (DPS)
- Bull trout (*Salvelinus confluentus*), Coastal-Puget Sound DPS
- Bocaccio (*Sebastes paucispinis*), Puget Sound/Georgia Basin DPS
- Yelloweye rockfish (*Sebastes ruberrimus*), Puget Sound/Georgia Basin DPS
- Killer whale (*Orcinus orca*), Southern Resident DPS

- Humpback whale (*Megaptera novaeangliae*)
- Marbled murrelet (*Brachyramphus marmoratus*)

Detailed information on federally listed species and critical habitat that occur in the vicinity of the Project and that may be affected by the Project are detailed in the Biological Evaluation in Attachment 2.

c. Is the site part of a migration route? If so, explain.

The Puget Sound area is part of the Pacific Flyway. Birds that inhabit the area vary seasonally due to migrations. Elliott Bay is also a significant migratory route for anadromous fish.

d. Proposed measures to preserve or enhance wildlife, if any:

The Project will comply with the terms and conditions of permits and approvals issued by the review agencies. In addition, BMPs and minimization measures will be implemented during construction to avoid or minimize impacts, including working within the allowable in-water work window for Elliott Bay and other BMPs described in Section B.3.d.

The Biological Assessment in Attachment 2 includes a thorough analysis of potential impacts to listed species and details further minimization measures to avoid adverse effects to sensitive species.

e. List any invasive animal species known to be on or near the site.

No invasive animal species are known to be at or near the site.

6. Energy and Natural Resources [\[help\]](#)

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

The proposed Project will route electricity from existing SCL service at T-46 to P66 through ductbanks, vaults and a submarine cable. During operation, the electricity will be used to provide power to cruise vessels moored at P66.

The transformer to be installed at P66 will be oil-based. The transformer will be used to transmit electricity from the submarine cable to the two cruise vessel shore power connection points that will be installed at the pier.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

The Project will have no adverse effect on potential use of solar energy at adjacent properties.

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:**

The Project design will be consistent with local regulations and applicable energy code requirements. The Project is included as part of the Port's long-term planning goals for carbon emissions reduction and will accomplish this by providing standalone shore power for cruise vessels moored at P66, rather than relying on diesel generators or other fossil fuel sources.

7. Environmental Health [\[help\]](#)

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.**

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

An oil-based transformer will be installed at P66 to transmit electricity from the submarine cable to the two cruise vessel shore power connection points. The transformer will be installed within a concrete berm providing secondary containment (up to 110% containment capacity) to capture any potential leaks or spills that may occur during operation. The berm will be fitted with stormwater control features designed to prevent oil from being discharged.

There are no other environmental health hazards that could occur due to the Proposed project. Potential hazards during construction are listed below.

- 1) Describe any known or possible contamination at the site from present or past uses.**

All Port of Seattle facilities share historical maritime industrial uses, and some sites have been identified as having suspected contamination.

At T-46, historic petroleum underground storage tanks (USTs) were located along the ductbank alignment on the uplands. All known tanks have been removed and investigated under the UST rules. Unknown soil contamination may be encountered

during ductbank excavation. If encountered, the appropriate investigation and cleanup will occur as required by MTCA.

Any Project activities that fall within a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund) or MTCA-designated cleanup site will be coordinated with the U.S. Environmental Protection Agency and Washington State Department of Ecology and will be designed to not preclude or foreclose future cleanup options.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Utility locations have been surveyed and are well documented at T-46. No subsurface activities are proposed at P66. If there are any underground hazardous liquid or gas transmission lines near any proposed earth-moving activities, the lines will be managed through the service provider and accounted for on final design drawings.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

There is a small risk of accidental spillage of fuels, oils, and/or hydraulic fluids associated with operation of watercraft and construction equipment. Use of standard construction practices and the requirement for the contractor to comply with the Port's spill prevention and response procedures are expected to acceptably minimize this risk.

As previously described, an oil-based transformer will be installed on P66. The transformer will have the capacity to store up to 4,500 gallons of oil (600 cubic feet).

4) Describe special emergency services that might be required.

No special emergency services are anticipated for the proposed Project.

5) Proposed measures to reduce or control environmental health hazards, if any:

The contractor will be required to comply with the Port's spill prevention and response procedures, which are expected to acceptably minimize the risk.

As previously described, the transformer will be installed within a concrete berm providing secondary containment (up to 110% containment capacity) to capture any

potential leaks or spills that may occur during operation. The electrical equipment and transformer at P66 will be routinely inspected and maintained during operations to prevent any potential impacts to nearby surface waters (Elliott Bay).

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

There are no noise sources that will affect the proposed Project activities.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

There will be short-term, temporary noise impacts due to operating construction equipment, particularly in the upland at T-46 where asphalt breaking and trenching are required. The Project is anticipated to be relatively small in nature and not result in a large number of truck trips. Work will occur during normal work hours and will comply with local noise ordinances. If nighttime construction occurs and is anticipated that it will exceed the limits of the local noise ordinance, then the Port will obtain a variance for the evening work period.

Upon Project completion, noise levels will return to pre-project levels.

3) Proposed measures to reduce or control noise impacts, if any:

The Project site and the surrounding properties are located within the City of Seattle, 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 operational noise and construction noise. These limits are based on the zoning of the source and receiving properties.

Compliance with specific regulatory requirements that will help to offset potential impacts include the following:

- City of Seattle Noise Ordinance
- WAC 173-60 (Maximum Environmental Noise Levels)

8. Land and Shoreline Use [\[help\]](#)

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Port properties are committed to maritime industrial, cargo, cruise, recreational, and commercial moorage, and other water-dependent or water-related commercial uses.

T-46 is located on the southeast side of Elliott Bay, just south of downtown Seattle and north of the BNSF Railway's Seattle Intermodal Gateway rail yard. Terminal 46 has traditionally been used for marine cargo operations and, since 2015, has been managed by the Northwest Seaport Alliance (NWSA). Container cargo transfer operations were relocated from Terminal 46 in late 2018, with recent use of the site limited to cargo and cargo handling equipment storage and moorage of marine cargo vessels.

P66 facility includes the Bell Street Pier, the Bell Street Cruise Terminal, the Bell Harbor International Conference Center, the south retail complex, and the Bell Harbor Marina. The facility comprises an 11-acre complex that houses Norwegian Cruise Line and Oceania Cruises, and is in the vicinity of other tourist attractions along the Seattle waterfront. The Terminal anchors various large cruise ships for passengers and provisioning / loading and unloading from late April through early October. The pier is also being used for vessel moorage and related activities between cruise ship calls and during non-cruise season. The International Conference Center is located within the main terminal complex and is being used for events and conferences. The south retail complex is occupied by Anthony's Pier 66 & Bell Street Diner. The Project alignment will include some work on the pier adjacent to Bell Harbor Marina which is used for moorage of recreational, commercial, and scientific boats. The overall land uses on nearby or adjacent properties will not be affected.

- b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?**

The Project sites have not been used as working farmlands or forest lands.

- 1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how?**

The Project will not affect or be affected by a working farm or forestland.

- c. Describe any structures on the site.**

P66:

P66 or the Bell Street Pier is an approximately 1,500-foot pier with concrete decking and is used for moorage of large cruise and commercial vessels. It is part of the Bell Street Pier

Cruise Terminal complex which also houses the Bell Harbor International Conference Center. The Port of Seattle's Bell Harbor Marina is located at the south end of the complex, east of the pier. The marina can accommodate approximately 70 boats. Adjacent to the marina is the south retail complex, which houses Anthony's Pier 66 & Bell Street Diner. These structures are in good condition.

Terminal 46:

T-46 is a commercial marine moorage and shipping container terminal with the following structures: a 3,100-foot concrete pier and 650-foot timber pier, a three-story administration/operations building, a maintenance and repairs building, two smaller operations buildings, four electrical substations, above-ground racks for shipping containers, and a small guard shack. Several container cranes sit on the west end of the pier over Elliott Bay. These structures are in good condition.

d. Will any structures be demolished? If so, what?

No structures are proposed to be demolished as part of this Project. If abandoned underground obstructions are encountered, they may be demolished.

e. What is the current zoning classification of the site?

The T-46 site is zoned Industrial, and the P66 site is zoned Downtown (City of Seattle 2021).

f. What is the current comprehensive plan designation of the site?

The Comprehensive Plan designation for the P66 site is Urban Centers and for the T-46 site is Manufacturing Industrial Centers (City of Seattle 2021).

g. If applicable, what is the current shoreline master program designation of the site?

The Shoreline Master Program designation of T-46 is Urban Industrial and of P66 is Urban Harborfront. Elliott Bay greater than 200 feet waterward of the shoreline is designated Conservation Navigation (City of Seattle 2015).

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

The sites are identified on the City of Seattle GIS critical area map as having the following critical areas: liquefaction zone; flood prone area; and wildlife preservation area (Elliott Bay).

i. Approximately how many people would reside or work in the completed project?

There will be no change in the number of people who reside or work in the completed Project sites.

j. Approximately how many people would the completed project displace?

The completed Project will not displace any people.

k. Proposed measures to avoid or reduce displacement impacts, if any:

The Project will not result in displacement impacts.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The Project will comply with City of Seattle Municipal Code and the City Shoreline Master Program, which include standards to ensure appropriate use and protection of properties in close proximity to the shorelines of the state.

The Project will comply with City of Seattle Land Use Code, which includes standards to ensure that projects do not have a deleterious effect on neighboring land uses.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

The Project will not have an impact on agricultural or forest lands of long-term commercial significance.

9. Housing [\[help\]](#)

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

No housing will be provided as part of this Project.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

No housing will be eliminated as part of this Project.

c. Proposed measures to reduce or control housing impacts, if any:

The Project will not displace any housing units, and no measures are required.

10. Aesthetics [\[help\]](#)

- a. **What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**

The tallest proposed structures related to the Project will be the aboveground electrical boxes and other equipment installed to support conveyance of electricity through the Project area, ranging in height up to approximately 10 feet above the ground.

- b. **What views in the immediate vicinity would be altered or obstructed?**

The Project is located predominantly on or near infill sites on Port property, where extensive industrial activities are already underway, and the sites are zoned and planned for industrial use. View changes will occur along the south end of Pier 66 with the addition of the electrical equipment/enclosure and chainlink security fence surrounding the electrical shore power equipment.

When considered in combination with existing land uses, the Project will not affect any viewsheds of significance and will be consistent with the general industrial aesthetic of the site vicinity.

- c. **Proposed measures to reduce or control aesthetic impacts, if any:**

No measures are proposed to reduce or control aesthetic impacts.

11. Light and Glare [\[help\]](#)

- a. **What type of light or glare will the proposal produce? What time of day would it mainly occur?**

The Project is not expected to alter existing light or glare conditions at the site.

Construction activities are anticipated to be performed during the day. Depending upon the final schedule of specific construction activities, temporary work lighting may be used to provide a safe work environment during low light conditions. Temporary work lighting, if necessary, is anticipated to be localized and short-term in duration.

- b. **Could light or glare from the finished project be a safety hazard or interfere with views?**

Light or glare from the Project is not expected to create a safety hazard or interfere with views.

c. What existing off-site sources of light or glare may affect your proposal?

There are no known sources of off-site light or glare that may affect the proposed Project.

d. Proposed measures to reduce or control light and glare impacts, if any:

Light levels for the site will be designed to meet Occupational Safety and Health Administration (OSHA) requirements. Lighting will be shielded and directed toward work areas, and no off-site glare impacts are expected to result from its use. Lighting on the proposed site will be designed to ensure compliance with local regulations, which prohibit off-site glare impacts from direct or reflected light sources.

12. Recreation [\[help\]](#)**a. What designated and informal recreational opportunities are in the immediate vicinity?**

There are numerous upland, shoreline, and in-water recreational areas, including parks, boat ramps, trails, public moorages, open space areas, and public access points, on the eastern shoreline of Elliott Bay and throughout the bay.

The Portside Trail is located immediately east of T-46, which is a grade-separated pedestrian sidewalk and striped bicycle path. This approximately 0.75-mile public trail extends between South King Street to the north and South Massachusetts Street to the south and serves pedestrians and bicyclists. North of South King Street, Waterfront Seattle construction will add a cycle track along the waterfront west of Alaskan Way South.

Bell Harbor Marina adjacent to P66 is a recreational marina in downtown Seattle that offers guest moorage year-round with accommodations for approximately 70 boats, 30 to 150 feet in length.

No public use or open space improvements are present within T-46 due to safety concerns with active cargo operations.

b. Would the proposed project displace any existing recreational uses? If so, describe.

The Project may result in temporary access constraints and noise impacts during construction. The Port will provide temporary access plans for the Portside Trail and Bell Harbor Marina if required for certain construction activities.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Impacts to public access and recreation will be short-term and temporary in nature. Enhanced opportunities will be available at P66 with the availability of standalone shore power resulting from the Project.

13. Historic and Cultural Preservation [\[help\]](#)

- a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.**

There are no buildings, structures, or sites located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers (DAHP 2021).

- b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.**

Aquatic areas in the vicinity of Elliott Bay, the East and West Waterways, and the Duwamish Waterway include Treaty-protected "usual and accustomed" fishing areas. The Port regularly consults with the Muckleshoot Indian Tribe and the Suquamish Tribe to ensure their members have access to these fishing areas. Members of the Muckleshoot Indian Tribe and the Suquamish Tribe harvest chinook, Coho, chum, pink, and steelhead salmon in the Elliott Bay/Duwamish traditional fishing areas during summer, fall, and winter of each year, generally from August through February. Treaty fishing access also includes shell fish, shrimp, and crab harvest.

The Project area was in-water prior to historic filling, then hosted various piers. Recent archaeological monitoring and surveys as part of the Alaskan Way Viaduct Replacement project found historic-period cultural materials throughout the historic fill layer of core samples (Miss et al. 2008). All findings were determined not eligible for listing. No precontact archaeological resources were found during this study.

Work at P66 and in Elliott Bay to T-46 does not include upland or in-water ground disturbance. The only ground disturbance will occur at T-46. The area was in-water until it was filled for the construction of the terminal. As part of grant funding requirements, the project will follow an Inadvertent Discovery Plan for archaeological resources.

- c. **Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.**

Review included relevant archaeological literature and the Washington State Department of Archaeology and Historic Preservation (DAHP) Washington Information System for Architectural and Archaeological Records Data (WISAARD) database.

- d. **Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.**

No impacts have been identified and no mitigation is proposed. If an inadvertent discovery of archaeological resources occurs, the project will follow the Inadvertent Discovery Plan as required by Ecology for grant funding.

14. Transportation [\[help\]](#)

- a. **Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.**

T-46 is served by South King Street, South Atlantic Street, South Jackson Street, and Alaskan Way for landside access and loading operations. P66 is served by Alaskan Way for all of its landside access and loading operations.

Nearby highways to T-46 include State Route 99. Both sites are in the vicinity of Interstate 5.

- b. **Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?**

T-46 is approximately 0.3 mile from King Street Station, a major bus and train hub for the region. P66 is served by public transit on Alaskan Way South. Cruise-line chartered, scheduled buses provide service between the cruise terminal and Sea-Tac Airport, but also may be used for service to downtown hotels or city tours.

King County Metro buses travel Alaskan Way South between State Route 99 and Columbia Street. Colman Dock ferries, King County Water Taxi, Link Light Rail, and additional bus routes are located approximately 0.3 to 0.5 miles north and northeast of T-46.

- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?**

The Project will not add or eliminate parking spaces.

- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).**

The Project will not require any new or improvements to existing roads, streets, pedestrian, bicycle, or state transportation facilities.

- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

The submarine cable will cross Elliott Bay through a Washington State Ferries route. Installation of the cable will be completed in coordination with the U.S. Coast Guard and Washington State Ferries to prevent disruption to services.

T-46 is adjacent to a Burlington Northern Santa Fe rail line spur for transportation of imported and exported goods. Project activities will not disrupt rail service at the terminal.

- f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?**

There will be limited construction truck traffic for soil removal and import of construction materials onto T-46. Work and traffic revisions will all occur on site at T-46 and will not impact public roadways. Work at P66 will not require a significant number of truck trips or revisions to any vehicular access routes.

- g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.**

The Project will not interfere with or be affected by the movement of agricultural and forest products.

- h. Proposed measures to reduce or control transportation impacts, if any:**

No measures to reduce or control vehicle or truck transportation impacts are proposed as part of the Project. Construction truck trips will be limited and occur within a largely

industrial area with ongoing material transfer. Traffic alterations at T-46 will occur on Port property, which is not publicly accessible. The Port will install U.S. Coast Guard-approved aid to navigation signage to alert boaters and others not to anchor or dredge near the submarine cable.

15. Public Services [\[help\]](#)

- a. **Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.**

The Project is located on property where residential uses are not allowed and access by the public is generally prohibited for safety reasons. Therefore, it is unlikely the proposed Project will result in an increased need for public transit, healthcare, or schools.

- b. **Proposed measures to reduce or control direct impacts on public services, if any:**

No measures are proposed to reduce or control impacts on public services.

16. Utilities [\[help\]](#)

- a. **Circle utilities currently available at the site:**

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

- b. **Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.**

The Project will extend SCL electrical service from T-46 to P66 to power cruise vessels moored at the pier through an underwater cable connected to T-46. This Project will be performed in close coordination with SCL. SCL will need to upgrade its feeder system leading up to T-46. This work will be completed under SCL's existing agreements for electrical infrastructure upgrades.

C. Signature [\[HELP\]](#)

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of Signee: Danielle Butsick

Position and Agency/Organization: Port of Seattle

Date Submitted: 6/4/2021

References

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US Army Corps
of Engineers®
Seattle District

**BIOLOGICAL EVALUATION
FOR INFORMAL ESA CONSULTATION**
For: NWS-2018-1040 (Corps Reference Number)
Version: May 2012



**** This form is for projects that have insignificant or discountable impacts on listed species. It contains all the information required for a biological evaluation, but in abbreviated form and with minimal instructions on how to fill it out. For more detailed instructions, a format for development of a biological assessment or biological evaluation can be found on the Seattle District Corps website (www.nws.usace.army.mil – click on regulatory and then on endangered species, BA Template). You may also contact the Corps at 206-764-3495 for further information.**

Drawings and Photographs - Drawings and photographs must be submitted. Photographs must be submitted showing local area, shoreline conditions, existing overwater structures, and location of the proposed project. Drawings must include a vicinity map; plan, profile, and cross-section drawings of the proposed structures; and over- and in-water structures on adjacent properties. (For assistance with the preparation of the drawings, please refer to our *Drawing Checklist* located on our website at www.nws.usace.army.mil Select Regulatory – Regulatory/Permits – Forms.) Submit the information to: U.S. Army Corps of Engineers, Regulatory Branch, P.O. Box 3755, Seattle, Washington 98124-3755.

Date: May 2021

SECTION A - General Information			
Applicant name: Danielle Butsick, Port of Seattle Maritime Environment & Sustainability			
Mailing address: PO Box 1209, Seattle, Washington 98111			
Work phone: (206) 787-3978	Mobile phone: (206) 549-2945	Email: Butsick.d@portseattle.org	Fax:
1. Joint-use applicant name (if applicable):			
Mailing address:			
Work phone:	Home phone:	Email:	Fax:
Authorized agent name: Josh Jensen, Anchor QEA, LLC			
Mailing address: 1201 Third Avenue, Suite 2600, Seattle, Washington 98101			
Work phone: (206) 903-3374	Home phone: (206) 287-9130	Email: jjensen@anchorqea.com	Fax: (206) 287-9131
2. Location where proposed work will occur			
Address (street address, city, county): Pier 66 (P66): 2225 Alaskan Way South, Seattle, King County, Washington Terminal 46 (T-46): 401 Alaskan Way South, Seattle, King County, Washington			
Location of joint-use property (street address, city, county):			
Waterbody: Elliott Bay, Puget Sound			
¼ Section: NW and NE	Section: 6 and 31	Township: 24N and 25N	Range: 4W
Latitude: 47.609716 N and 47.597455 N		Longitude: 122.347599 W and 122.340299 W	

5. Description of Work:

Include project drawings and site photographs.

Describe the proposed project in detail. Please describe any mitigation that is being proposed for impacts from your project. Attach a mitigation plan as an appendix, if appropriate.

The Pier 66 Shore Power Project (Project) is located in Elliott Bay on the Seattle waterfront (Figures 1 and 2). The Port of Seattle (Port) is proposing to provide shore power (i.e., cold ironing) to serve shore power capable cruise vessels at the Pier 66/Bell Street Cruise Terminal (P66) by installing a shore power system with a submarine cable that will connect the P66 facility to a new power feeder extension at Terminal 46 (T-46) that is connected to the Seattle City Light (SCL) electrical power grid. Project components include the following:

- Installing upland electric cables, ductbanks, meter and switchgear infrastructure, and vaults to connect the submarine cable to an existing SCL electrical power vault at T-46
- Installing upland electrical cables, ductbanks, and vault to an existing SCL vault north of South King Street and continue to the north terminal property line
- Upland grading to install the cables and electric utility infrastructure at T-46
- Installing an approximately 6,110-foot-long, 26 kilovolt (kV) submarine cable from the north end of T-46 to the south end of the P66 pier structure
- Installing protective submarine cable features including a rigid conduit at the T-46 slope and articulated mats across the T-46 and P66 berth areas
- Installing electric utility infrastructure and shore power equipment/system on the P66 pier and routing the cable under the pier to two cruise vessel shore power connection or plug-in locations

Providing shore power at P66 allows shore power capable cruise vessels to plug into the local electrical grid and turn off their auxiliary diesel engines while at berth, resulting in an overall reduction in air pollutant and greenhouse gas emissions. As one of the most thoroughly demonstrated and robust methods for reducing at-berth emissions from cruise ships, shore power is a key strategy to meet the Port's Century Agenda goal of being the greenest and most energy-efficient port in North America and to advance the region as leading tourism destination and business gateway.

Purpose

The Project is part of the Port's long-term planning goals for carbon and air emissions reduction, including the Port's Century Agenda, introduced in 2012, which outlines sustainability goals and objectives intended to guide Port investments and operations for the next 25 years, and the 2020 Northwest Ports Clean Air Strategy, which includes an objective to install shore power at all major cruise berths by 2030. The Project will accomplish these goals by providing standalone shore power for cruise vessels moored at P66, allowing equipped ships to connect to 93% clean electricity from SCL rather than relying on fossil fuel sources (SCL undated). As a result, shore power can nearly eliminate emissions from ships at berth while connected. Once fully operational, the shore power connection at P66 is estimated to reduce annual emissions: 54 metric tons of oxides of nitrogen (NO_x), 1 metric ton of diesel particulate matter (DMP), and 2,700 metric tons of greenhouse gas (CO₂).¹

The Project will also help the region as a leading tourism destination and a significant economic driver contributing 5,500 jobs and \$893.6 million a year in local business revenue. Shore power at P66 provides an additional amenity for cruise ships that makes Seattle a more appealing and sustainable

¹ Calculated using the U.S. EPA Shore Power Emissions Calculator: <https://www.epa.gov/ports-initiative/shore-power-technology-assessment-us-ports#assessment>.

homeport and provides the opportunity for advancement of shared Port and industry environmental objectives.

Project Activities

The Project includes installing an electrical cable between T-46 and P66, including both in-water and upland work. The four Project segments, described in the following section, are illustrated in Figure 3. The four Project segments include:

- **Segment 1:** SCL system extension located underground along the eastern edge of T-46, extending from the existing South Substation to the northern edge of T-46
- **Segment 2:** T-46 duct route, extending underground to the west from Segment 1 along the north edge of T-46 to the existing bulkhead
- **Segment 3:** Submarine cable, extending underwater from T-46 to P66
- **Segment 4:** P66 shore power connection

T-46 Upland Work (Segments 1 and 2)

At T-46, the submarine cable connection will be made in the upland, at the landward edge of the terminal (see Figure 4). The upland improvement will include two segments. In Segment 1, an approximately 2,800-linear-foot (lf) SCL electrical feeder system extension will connect at an existing SCL underground vault located within T-46's South Substation that currently provides power to T-46. This segment of ductbank and vaults will extend from the existing SCL vault inside the South Substation to the north end of the terminal, near the South King Street facility entrance. The approximately 600-foot segment at the north end of Segment 1 will be used to improve feeder system extension reliability and supplement future Washington State Ferries or electrical needs for others in coordination with SCL. SCL will own and maintain this segment after construction.

Segment 2 will extend approximately 1,100 lf west from the proposed SCL system extension through an underground ductbank to a vault adjacent to the waterward edge of T-46 where an existing bulkhead defines the upland property (Figure 6).

Segment 1 will be installed using trenching along the landward edge of the terminal, adjacent to the east property line of T-46 (Figure 4). Trenching will be completed using typical heavy construction equipment including saw cutters, excavators, and dump trucks. Approximately 2,800 cubic yards (cy) of material will be graded via trenching along approximately 2,800 lf to install the underground ductbank and vaults. The asphalt will be replaced in-kind (approximately 14,000 square feet [sf]) and restored back to its original grade. Excavation will occur within the footprint of existing asphalt and imported fill. Excavated material will be reused to the extent practicable. Excess material will be disposed of at an appropriate off-site disposal facility. Any contaminated materials will be removed and properly disposed of off site.

A new approximately 144-sf underground vault will be installed at the South Substation for the new cable connection. Two new vaults, 16 sf and 144 sf, will be installed at intermediate locations on the Segment 1 alignment. Segments 1 and 2 will connect in the northeast corner of T-46 near the South King Street facility entrance. At this connection area, Segment 1 will include three new underground vaults (144 sf each) that will connect to an aboveground concrete pad and SCL vista switch system. There will be one smaller 16-sf communications vault near these three electrical vaults. A 400-sf concrete pad will be installed to the west (approximately 1 foot above ground surface) to support power service equipment for the cable. The concrete pad and power service equipment will be surrounded by an 8-foot-tall chainlink fence for security.

Segment 2 will run west through an approximately 1,100-lf ductbank from the power service equipment pad to the T-46 bulkhead. The ductbank route will be installed using similar measures as described above, requiring approximately 700 cy of grading. Asphalt will be replaced in-kind (approximately 4,900 sf) and restored back to its original grade. An approximately 192-sf

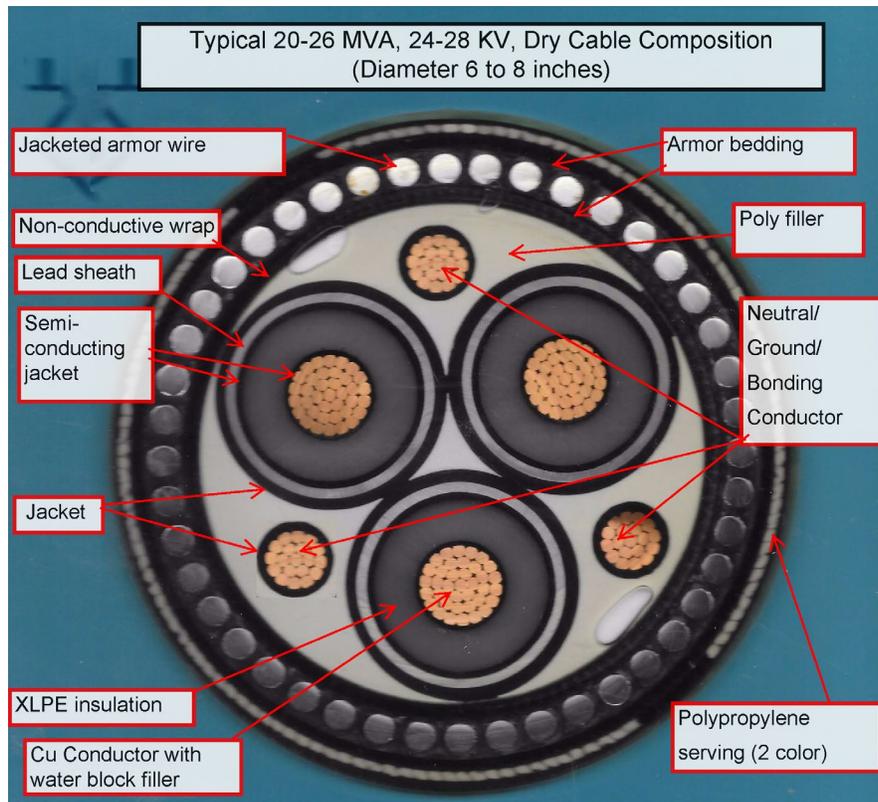
underground vault will be installed approximately in the middle of Segment 2. As the cable reaches the existing bulkhead, a second approximately 192-sf underground marine cable splice vault will be installed as the T-46 connection point for the submarine cable. A hole will be cut through the existing bulkhead wall, below the high tide line (HTL) (13.2 feet mean lower low water [MLLW]) and mean higher high water (MHHW) (11.36 feet MLLW at T-46), to connect and transition from the submarine cable to the upland cabling (Figure 6). Between the cable splice vault and bulkhead, the cable will be run approximately 17.5 feet through a 24-inch-diameter HDPE or similar material conduit casing pipe. The submarine cable connection will penetrate through a flexible bulkhead seal installed at the face of the bulkhead.

Staging and stockpiling of materials and equipment will occur in existing paved areas at T-46 and P66 and on the boat used to install the submarine cable (discussed below).

Submarine Cable (Segment 3)

Installation of the submarine cable (Segment 3) will be completed in coordination with the U.S. Coast Guard and Washington State Ferries because the proposed alignment runs through Elliott Bay and existing ferry service lanes (Figure 3). The submarine cable will be approximately 6,110 feet long and up to 8 inches in diameter, and composed of insulated and jacketed power cables wrapped with polypropylene and PVC-coated armor wire. The outer shell of the submarine cable will be armored with steel cabling, or similar material, for additional protection. A typical cross section of a submarine cable is shown in Exhibit 1.

Exhibit 1
Submarine Cable Cross Section (Typical)



The submarine cable will be installed by boat, using divers as needed along the alignment. The cable laying vessel may use a combination of dynamic positioning, temporary anchors, and/or spuds to maintain accurate placement of the submarine cable.

From T-46, the submarine cable will run through an approximately 12-inch-diameter, 120-foot-long split pipe rigid conduit (steel or similar material) that is anchored to the existing riprap to keep it from moving on the hard riprap material (Figure 6). The split pipe rigid conduit will run the extent of the riprap from a sealed conduit at the existing bulkhead (at approximately 10 feet MLLW) to the toe of slope (approximately -45 feet MLLW). The split pipe is a metal half pipe that is fitted around the cable on either side to provide supplemental protection as needed. The majority of the split pipe rigid conduit will be located underneath the existing T-46 concrete apron.

From the toe of slope, the submarine cable will be protected in-place by an articulated mat for up to 100 lf across the berth (at depths of approximately -45 feet to -60 feet MLLW) to protect it from vessel propwash and other forces. The articulated mat will be approximately 8 feet wide by 1 foot thick, and composed of pre-cast concrete blocks connected with rope/wire of stainless steel or polypropylene. Exhibit 2 shows an example of what the articulated mat may look like. These flexible mats are able to mold to the existing topography and infill with native substrate to adapt to dynamic conditions in the marine environment.

Exhibit 2
Example of Pre-Cast Articulated Concrete Mat (Typical)



In the area between T-46 and P66, the submarine cable will be placed on the surface of the substrate along a predetermined alignment (up to 6,110 lf) extending to a depth of approximately -240 feet MLLW (Figure 8). The alignment has been evaluated using a combination of bathymetric, magnetometer, and sub-bottom profiler data to avoid or minimize potential obstructions, such as large boulders, extreme changes in bathymetry, or other debris such as shipwrecks. At in-water locations

along the cable alignment where unavoidable obstructions may be present, the contractor may install a split pipe around the cable to protect it.

Near P66, an articulated concrete mat (similar to that described for T-46) will be placed over the submarine cable for the length of the entrance to the marina (approximately 200 lf) between depths of approximately -50 feet to -90 feet MLLW (Figure 5).

Following installation of the cable, its location will be marked with approved signage to alert boaters and others to the presence of the cable and not to anchor or dredge in the area. A typical cable crossing sign is shown in Exhibit 3.



P66 Shore Power Connection (Segment 4)

The submarine cable will be installed at P66 by affixing it to existing piles using pipe supports (Figures 5 and 7). An approximately 12-inch-diameter pipe sleeve for the cable will be anchored to the bottom of the pier decking and held in place with bracing attached to existing piles. The cable will be connected to an above-pier marine cable splice electrical box constructed at the south end of the pier. The electrical box will allow transition from the submarine cable to the transformer and switch gear equipment. The transformer will be filled with oil and entirely contained within a concrete foundation and curb to provide approximately 110% containment and prevent any fluids from being discharged to surface waters. In the event that the covered containment area is exposed to rainwater, stormwater management features (e.g., pipe inserts or sump) will be installed to prevent oil from escaping the contained area. Non-armored 26 kV power cable will run approximately 800 lf along the underside of the P66 apron structure to two connection points to provide shore power to moored vessels (Segment 4). The electrical equipment and transformer at P66 will be routinely inspected and maintained during operations to prevent potential impacts to nearby surface waters (Elliott Bay).

Summary of Project Components

Tables 1 and 2 summarize the location, dimensions, and other aspects of the Project components.

Table 1
Project Summary

Project Component(s)	Location ¹	Grading Quantity	Area/Length
Segment 1			
Trenching, vault, and cable installation; asphalt replacement	Upland, shoreline (partial)	2,800 cy cut/fill	14,000 sf 2,800 lf
Concrete pad/power service equipment	Upland	15 cy concrete	400 sf
Segment 2			
Trenching, vault, and cable installation; asphalt replacement	Upland, shoreline (partial)	700 cy cut/fill	4,900 sf 1,100 lf
Segment 3			
T-46 shoreline cable protection (rigid conduit)	In-water (Elliott Bay)	NA	120 sf 120 lf
T-46 shoreline articulated mat	In-water (Elliott Bay)	30 cy fill	800 sf 100 lf
Submarine cable	In-water (Elliott Bay)	NA	4,075 sf 6,110 lf
P66 shoreline articulated mat	In-water (Elliott Bay)	60 cy fill	1,600 sf 200 lf
Segment 4			
Underpier cable and conduit	Over-water (Pier 66 concrete deck)	NA	800 lf
Above-pier concrete curb and pad, switch gears, and transformer	Over-water (Pier concrete 66 deck)	20 cy concrete	840 sf 70 lf

Note:

1. In-water work is considered to be waterward of HTL and MHHW. Upland work is considered to be landward of HTL and MHHW.

Table 2
Proposed Electrical Equipment Dimensions

Component	Location	Dimensions (feet LxWxH)	Quantity
Segment 1			
Underground communications vault	T-46	4x4x4	3
Underground SCL 818-electrical cable vaults	T-46	8x18x9	5
Aboveground electrical meter and vista switches	T-46	15x15x1	1
Segment 2			
Underground electrical vault	T-46	8x12x1	1
Underground marine splice vault near T-46 bulkhead	T-46	8x24x10	1
Segment 4			
Aboveground (on pier) electrical box	P66	8x8x10	1
Aboveground (on pier) transformer and switch gears	P66	15x70	1

Best Management Practices

Best management practices (BMPs) incorporated into Project design and construction methods to avoid or minimize potential impacts to the environment include the following:

- In-water work will occur during the approved regulatory work window for Puget Sound.
- Any dewatering will require sedimentation tanks and treatment for discharge.
- Construction of the proposed Project will comply with water quality restrictions imposed by the Washington State Department of Ecology, which state that turbidity in marine water exceeding state water quality standards will not extend beyond a 150-foot mixing zone during construction (Washington Administrative Code 173-201A-210(1)(E)(i)(D)).
- The contractor will be responsible for the preparation and implementation of a Spill Prevention, Control, and Countermeasure (SPCC) Plan to be used for the duration of the Project. The contractor will also maintain at the job site the applicable equipment and materials designated in the SPCC Plan.
- Excess or waste materials, petroleum products, concrete, chemicals, or other toxic or deleterious materials will not be allowed to enter surface waters.
- The contractor will regularly check fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. for leaks, and shall maintain and store materials properly to prevent spills.
- Barges will not be allowed to ground out during construction.
- In-water submarine cable protection features will be placed uniformly in a controlled manner that minimizes disturbance of underlying sediments.

For projects that include pile driving

If steel or concrete piles are being installed with an impact hammer pile driver, marbled murrelets may be adversely impacted. For installation of any type of pile with a vibratory pile driver, marine mammals may be adversely impacted. A monitoring plan may be required to ensure protection of these species.

Not applicable. Pile driving activities are not proposed.

6. Construction Techniques:

Describe methods and timing of construction to be employed in building the project and any associated features. Identify actions that could affect listed / proposed species or designated / proposed critical habitat and describe in sufficient detail to allow an assessment of potential impacts. Consider actions such as vegetation removal, temporary or permanent elevations in noise level, channel modifications, hydrological or hydraulic alterations, access roads, power lines etc. Also discuss construction techniques associated with any interdependent or interrelated projects.

Address the following:

A. Construction sequencing and timing of each stage (duration and dates):

Construction of the Project is anticipated to begin in fall 2022. Upland construction is anticipated to take approximately 6 months total to complete, with individual construction tasks being staggered as needed. The landside cable connections and ductbanks/conduits are anticipated to be completed before the installation of the submarine cable. Submarine cable protective features, including concrete mats, split pipes, conduits, and other measures, will be completed after installing the submarine cable. Placement of the submarine cable and the cable protection is anticipated to require up to 2 weeks of in-water work by boat and divers. Once this is done, then the cable will be terminated at the upland splice vault/box, connected to the power source, and tested for faults. In-water work will occur during the in-water work window for projects in Elliott Bay, which is typically August 1 through February 15 of any year in which work is proposed.

B. Site preparation:

Project activities will occur by boat and using divers as necessary. No site preparation will be required for in-water construction other than cutting a hole in the existing T-46 bulkhead wall and positioning the boat for the cable installation. There will also be welding required at P66 to install the under-pier pipe sleeve, bracing, and conduit.

Upland construction will occur within existing developed areas characterized by impervious surfaces and limited habitat. No native vegetation removal is proposed. Upland site preparation will be more involved, including installing stormwater control BMPs and staging equipment at T-46 and P66 as needed.

C. Equipment to be used:

Upland construction will include typical heavy construction equipment including saw cutters, excavators, and dump trucks. The submarine cable will be installed by a crane or excavator-operated machine mounted on a boat, with assistance from divers as needed.

D. Construction materials to be used:

Upland construction materials will include cable, asphalt, concrete, power service equipment, PVC, and steel and/or rigid conduit cable casing. In-water construction materials will include an approximately 6,110-lb submarine cable, articulated mats, metal split pipe, and steel and/or rigid conduit cable casing.

E. Work corridor:

Upland construction will occur in existing developed areas with impervious surfaces at T-46 and on and under the existing concrete pier at P66. The in-water cable installation will take place from a boat and using divers as needed.

F. Staging areas and equipment wash outs:

The staging areas will be located on existing paved areas at T-46 and P66 and on the boat. Equipment wash-outs may be installed at T-46 if required during construction.

G. Stockpiling areas:

Stockpiling of construction material will be located on existing paved areas at T-46 and P66 and on the boat.

H. Running of equipment during construction:

Construction equipment will be in operation primarily during weekday daytime hours. Construction may occur during weekends or nighttime hours as needed and in compliance with the City of Seattle noise ordinance.

I. Soil stabilization needs / techniques:

Soil stabilization may be required during construction at T-46 where upland trenching and vault construction is proposed. Soil stabilization techniques will be determined by the contractor consistent with a TESC Plan. No excavation will be required at P66.

J. Clean-up and re-vegetation:

There will be no clearing or impacts to native vegetation from the project; therefore, no re-vegetation activities are proposed. One small patch of non-native ivy near the South Substation may be temporarily affected by construction.

K. Storm water controls / management:

The Project will replace existing impervious surfaces and will not alter existing drainage patterns at T-46 or P66. Installing the upland cable across T-46 will temporarily affect underground stormwater infrastructure. Affected stormwater facilities will be replaced in kind and no permanent changes to stormwater conveyance at the site will occur.

The transformer at P66 will be filled with oil and entirely contained within a concrete foundation and curb to provide approximately 110% containment and prevent any fluids from being discharged to

surface waters. In the event that the covered containment area is exposed to rainwater, stormwater management features (e.g., pipe inserts or sump) will be installed to prevent oil from escaping the contained area.

L. Source location of any fill used:

Upland backfill material will consist primarily of material excavated from the same location as the trenching activities, consisting of asphalt and imported fill. Approximately 3,500 cy of existing asphalt and underlying fill material will be graded over approximately 18,900 sf (approximately 0.4 acre). Any imported fill materials used for installing the ductbank and electrical infrastructure will be clean and sourced from an off-site approved vendor.

The articulated mats will be composed of clean materials (concrete blocks) and sourced from an off-site approved manufacturer. The T-46 and P66 articulated mat volumes will total approximately 30 cy and 60 cy, respectively.

M. Location of any spoil disposal:

No dredging is proposed, so no dredge spoils will be generated by the Project. Any upland material that is excavated and not reused by the Project will be disposed of off site at an approved upland landfill.

7. Action Area

Please describe the action area. The action area means all areas to be affected directly (e.g., earth moving, vegetation removal, construction noise, placement of fill, release of environmental contaminants) and indirectly by the proposed action. (Example: as a direct effect, the action area for pile driving would include the area out to where the noise from the pile driving falls below the level of harm or disturbance for listed species. For vibratory hammer pile driving impacts to killer whales, this level is 120 dB. Action area will include any area where the underwater noise level may exceed 120 dB).

The action area for the Project includes the geographic area potentially affected by construction activities. Potential impacts from upland construction activities include in-air noise. In-water construction activities include the potential for turbidity and changes to benthic habitat features that could affect prey species distribution and abundance. Potential operational impacts include electromagnetic field (EMF) effects on aquatic species from the submarine cable.

In-Air Noise

Potential in-air impacts are anticipated to be noise-related from typical heavy construction machinery. The Project area is in a populated area with intensive urban land uses. There are many sources of ambient terrestrial noise within the action area. Regular commercial, ferry, and recreational boat traffic in Elliott Bay are ongoing sources of noise that affect the in-air extent of the action area. Daytime ambient noise levels in the area have not been measured as part of this Project, but WSDOT (2018) indicates that high-density urban areas have typical ambient sound levels of approximately 78 A-weighted decibels (dBA).

Construction noise will be produced by heavy equipment such as saw cutters, excavators, dump trucks, front-end loaders, or similar equipment operating for the upland work. A crane or excavator-operated machine is the only heavy machinery on the boat that will be used for the cable deployment. Average sound levels range from 72 dBA to 97 dBA for these types of equipment (Table 3). Table 4 shows the sound level attenuation over land and water, based on a computed 6 dBA decrease for point source noise over water plus 1.5 dBA over land (for soft environment), for a total decrease rate

over land of 7.5 dBA per doubling of distance (WSDOT 2012). Using the Practical Spreading Loss Model, construction noise will attenuate to background levels of 78 dBA at a distance of about 300 feet over land and 400 feet over water (see Exhibit 4).

Table 3
Construction Noise Levels at 50 feet from Common Equipment

Equipment	Noise Range (dBA)	Equipment	Noise Range (dBA)
Heavy trucks	82–96	Backhoe	72–90
Grader	79–93	Paver/grinder	85–89
Excavator	81–97	Front loader	72–90
Crane	74–89	Generator	71–82
Pile driver	81–115	Jackhammers/rock drills	75–99
Concrete mixer	75–88	Roller	72–75
Compressor	73–88	Pumps	68–80

Sources: Bolt et al. (1971); Western Highway Institute (1971); WSDOT (1991)

Table 4
Construction Noise Level Attenuation

Distance from Construction (feet)	Attenuated Construction Noise Level Over Land (dBA)	Attenuated Construction Noise Level Over Water (dBA)
50	97	97
100	90	91
200	82	85
400	75	79

In-Water Noise

In-water noise will be limited to the placement of the cable and accessory cable material on the bottom substrate from a boat and by divers. Most of the cable placement will be in water greater than 40 feet deep, and more than half of the cable will be placed in water over 150 feet deep. The placement of the cable material on the bottom substrate of Elliott Bay will have insignificant or discountable in-water noise impacts in an area with high ambient noise levels associated with regular commercial, ferry, and recreational boat traffic.

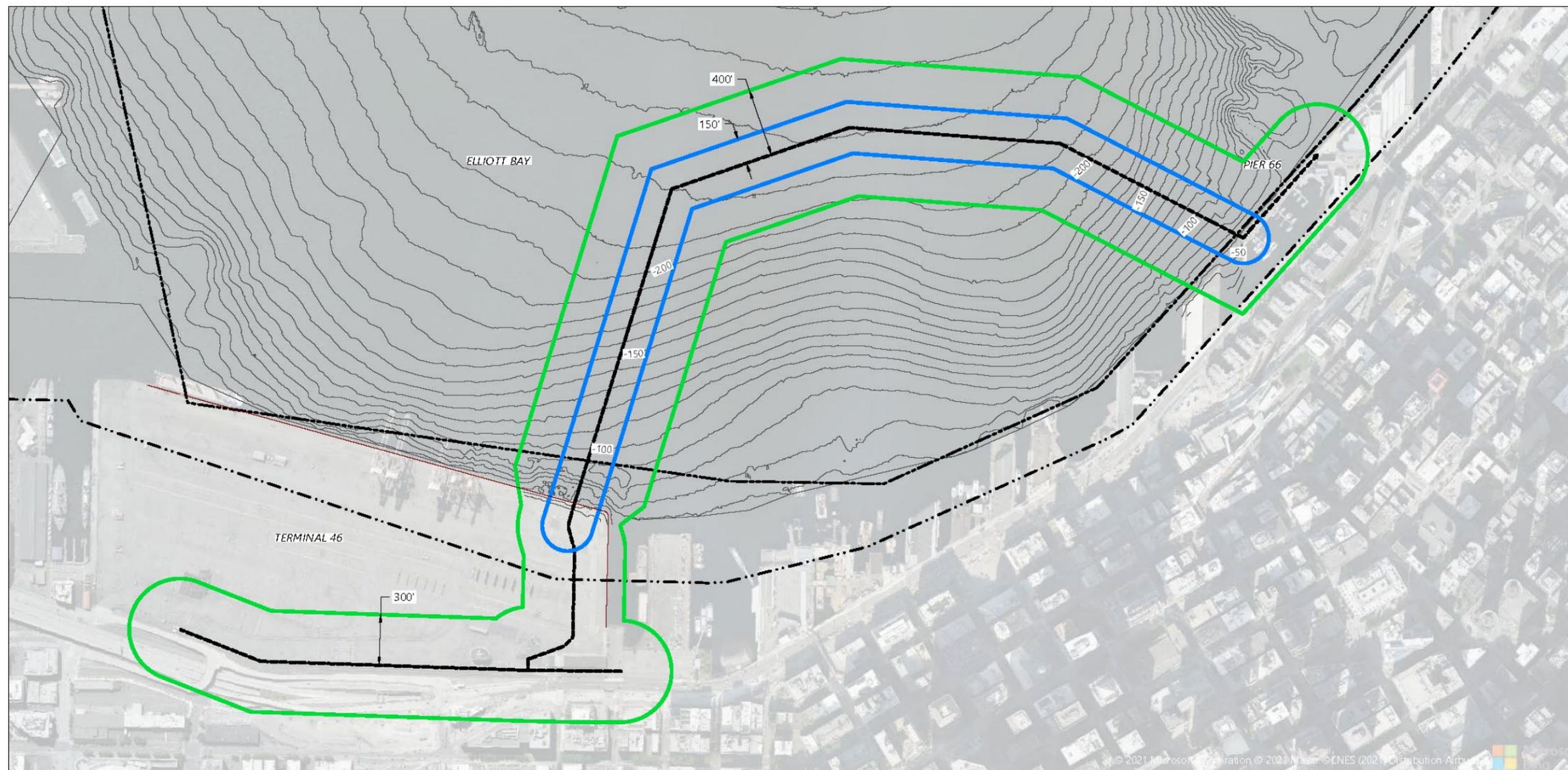
In-Water Turbidity

In-water construction includes the placement of the cable and accessory materials on the bottom substrate. No trenching or excavation to place the cable is proposed. Thus, the in-water portion of the action area is defined by the limits of turbidity. In Washington, water quality standards (WAC 173-201A) specify a mixing zone in which visible turbidity must not extend more than 150 feet from the construction location. Therefore, the action area is set to extend 150 feet in water from the work area below mean higher high water (MHHW; see Exhibit 4).

In-Water EMF

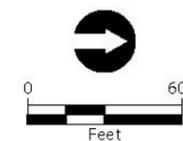
The submarine cable type and design were selected to attenuate EMF impacts to the extent practicable. The design will include a 3-phase 26 kV power cable, with closed conductor spacing that is to reduce EMF. The material encasing the cable is also designed to further attenuate EMF. As described in Section 10, no measurable EMF impacts to ESA-listed species during cable operation are anticipated based on existing literature and conservation measures included in the Project design.

**Exhibit 4
Action Area**



SOURCE: Aerial by Bing Maps. Bathymetry composite from NOAA dated May 2013 and eTrac dated April 2021.
HORIZONTAL DATUM: Washington State Plane South Zone, NAD83, U.S. Survey Feet
VERTICAL DATUM: MLLW

- LEGEND:**
- Inner Harbor Line
 - Outer Harbor Line
 - - - Proposed Utility Route
 - Action Area In-Air Extent
 - Action Area In-Water Extent



8. Species Information:

Identify each listed or proposed species, including terrestrial species, as well as designated or proposed critical habitat in the action area. Please include information on which listed species use are expected to be found in the action area and the potential for them to be there during project activities.

ESA-listed species and critical habitats under NMFS and USFWS jurisdiction in Western Washington are referenced on the agencies' websites. The USFWS identifies ESA-listed species that occur or may occur within a specific location where a project is proposed (USFWS 2021a). The NMFS identifies ESA-listed species that occur or may occur within a broad geographic area, such as an evolutionarily significant unit (ESU) or a distinct population segment (DPS), as opposed to a project-specific location (NMFS 2021a).

The April 2021 status of federally listed species and/or critical habitats protected under the ESA that occur or may occur within the proposed Project action area is presented in Table 5. There are three ESA-listed species identified by the USFWS and NMFS that do not occur in Elliott Bay or the vicinity of the Project action area and do not provide potential habitat based on the species' life history and habitat requirements. These species are identified in Table 6.

Table 5
Federally Listed Species, ESA Status, and Critical Habitat Status that May Occur in the Project Action Area

Common Name (Scientific Name)	Jurisdiction	ESA Status	Critical Habitat
Chinook salmon (<i>Oncorhynchus tshawytscha</i>) Puget Sound ESU	NMFS	Threatened	Designated: Includes action area
Steelhead (<i>O. mykiss</i>) Puget Sound DPS	NMFS	Threatened	Designated: Does not include action area
Bull trout (<i>Salvelinus confluentus</i>) Coastal-Puget Sound DPS	USFWS	Threatened	Designated: Includes action area
Bocaccio rockfish (<i>Sebastes paucispinus</i>) Puget Sound/Georgia Basin DPS	NMFS	Endangered	Designated: Includes action area
Yelloweye rockfish (<i>Sebastes ruberimus</i>) Puget Sound/Georgia Basin DPS	NMFS	Threatened	Designated: Does not include action area
Killer whale (<i>Orcinus orca</i>) Southern Resident DPS	NMFS	Endangered	Designated: Includes action area
Humpback whale (<i>Megaptera novaeangliae</i>) Central America DPS or Mexico DPS ¹	NMFS	Threatened/Endangered ¹	Proposed: Does not include action area
Marbled murrelet (<i>Brachyrhampus marmoratus</i>)	USFWS	Threatened	Designated: Does not include action area

Note:

1. There are 14 identified DPSs of humpback whales. The Central America DPS is endangered, and the Mexico DPS is threatened; both have the potential to occur in the project area.

**Table 6
Federally Listed Species, ESA Status, and Critical Habitat Status that Do Not Occur in the Project Action Area**

Common Name (Scientific Name)	Jurisdiction	ESA Status	Critical Habitat
Pacific eulachon/smelt (<i>Thaleichthys pacificus</i>) Southern DPS	NMFS	Threatened	Designated: Does not include action area
Streaked horned lark (<i>Eremophila alpestris strigata</i>)	USFWS	Threatened	Designated: Does not include action area
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	USFWS	Threatened	Designated: Does not include action area

The following discussion provides an assessment of the potential presence of ESA-listed species and habitats within the site.

All seven of the ESA-listed aquatic species identified in Table 5 are documented in Puget Sound and are known to occur in Elliott Bay.

The fish species bocaccio and yelloweye rockfish are associated with deepwater habitats of Puget Sound and typically breed and forage near the ocean floor. Designated deepwater critical habitat for bocaccio and yelloweye rockfish is located in the water of Elliott Bay deeper than 98 feet (NMFS 2021b). Adults of these species are very unlikely to be present in the nearshore of Elliott Bay and are typically associated with deeper waters of Puget Sound. Juveniles of these species do migrate in nearshore habitats and may potentially occur in the nearshore habitat of Elliott Bay in the action area.

The marine mammal species Southern Resident killer whale typically occurs in the deepwater habitat of Puget Sound and are known to occur in Elliott Bay. Areas with water less than 20 feet deep are not designated as critical habitat for Southern Resident killer whales. Offshore habitat of Elliott Bay with water depths deeper than 20 feet does meet the criteria for Southern Resident killer whale designated critical habitat.

Humpback whales generally occur off the outer coast but are observed in Puget Sound and occasionally occur in Elliott Bay. They are very unlikely to occur in the vicinity of the action area.

Of the seven ESA-listed aquatic species, only the following three species are likely to occur within Elliott Bay in the vicinity of the action area:

- Chinook salmon (Puget Sound ESU)
- Steelhead trout (Puget Sound ESU)
- Bull trout (Coastal-Puget Sound DPS)

The marine habitat of Elliott Bay is within designated critical habitat for Chinook salmon and bull trout.

Marbled murrelets are not expected in the nearshore area of the Project action area but could forage in the deeper water of Elliott Bay in the vicinity of the Project action area. The WDFW Priority Habitats and Species (PHS) database records no species occurrence for marbled murrelets in or near the Project action area (WDFW 2021a). The nearest marbled murrelet critical habitat areas to Elliott Bay are located approximately 30 miles west on the Olympic Peninsula (61 FR 26257).

As identified in Table 6, three ESA-listed species that occur in Puget Sound are not addressed in the BE due to the location of the Project and the species' life history and habitat requirements. These

include the southern DPS of Pacific eulachon and two ESA-listed terrestrial species, streaked horned lark and yellow-billed cuckoo. Specific reasons for not including these species in the BE analysis are as follows:

- The Southern DPS of Pacific eulachon are not expected to occur in Puget Sound (Wydoski and Whitney 2003). The majority of the population resides in the Columbia River basin (Emmett et al. 1991; Willson et al. 2006).
- Streaked horned lark suitable habitat does not exist in the action area. Streaked horned lark are small, ground-dwelling songbirds that nest in short-grass habitats, preferring large, open patches (i.e., 300 acres or more) with sparse trees. Their current range in Washington includes the south Puget Sound prairies, the Washington coast, and dredged material spoils sites along the Columbia River.
- Yellow-billed cuckoo suitable habitat does not exist in the action area. Yellow-billed cuckoos are migratory birds that breed in North America and winter in Central and South America. They nest within and use willow and cottonwood riparian forests with a dense closed canopy (Csuti et al. 2001).

To determine what listed or proposed species may occur in the action area, contact NOAA Fisheries at the address listed below and obtain a county list of federally listed/ designated and proposed species and critical habitat from the U.S Fish and Wildlife Service at: http://westernwashington.fws.gov/se/SE_List/Endangered_Species.asp

National Marine Fisheries Service (NMFS)
510 Desmond Dr., SE # 103
Lacey, WA 98503
(360) 753-9530
<http://www.nwr.noaa.gov>

To determine what listed or proposed species may occur in the action area, contact NOAA Fisheries at the address listed below and obtain a county list of federally listed/ designated and proposed species and critical habitat from the:

U.S Fish and Wildlife Service at: http://westernwashington.fws.gov/se/SE_List/Endangered_Species.asp

National Marine Fisheries Service at:
510 Desmond Dr., SE # 103
Lacey, WA 98503
(360) 753-9530
<http://www.nwr.noaa.gov>

The following species are listed as of May, 2012:

USFWS SPECIES

BIRDS

Marbled murrelet
Northern spotted owl
Short-tailed albatross
Western snowy plover

MAMMALS

Canada lynx
Columbia white-tailed deer
Gray wolf (western WA)
Gray wolf (eastern WA)

Grizzly bear

Woodland caribou
Pygmy rabbit (Columbia Basin DPS)

INSECTS

Oregon silverspot butterfly

PLANTS

Bradshaw's desert parsley
Marsh sandwort
Showy stickseed
Wenatchee Mtns. Checker-mallow

Golden paintbrush
 Kincaid's lupine
 Nelson's checker-mallow
 Water howellia
 Spalding's catchfly
 Ute ladies'-tresses

FISH

Bull trout, Columbia River
 Bull trout, coastal-Puget Sound
 Dolly varden, coastal-Puget Sound

NMFS SPECIES

FISH

Chum, Columbia River
 Chum, Hood Canal summer
 Chinook, lower Columbia River
 Chinook, upper Columbia River spring
 Chinook, Puget Sound
 Chinook, Snake River fall
 Chinook, Snake River spring-summer
 Chinook, upper Willamette River
 Coho, lower Columbia River
 Sockeye, Ozette Lake

Sockeye, Snake River
 Steelhead, upper Columbia River
 Steelhead, middle Columbia River
 Steelhead, lower Columbia River
 Steelhead, Snake River
 Steelhead, upper Willamette River
 Steelhead, Puget Sound
 Sturgeon, Green (southern DPS)
 Eulachon, Pacific (southern DPS)
 Bocaccio (Georgia Basin DPS)
 Rockfish, canary (Georgia Basin DPS)
 Rockfish, yelloweye (Georgia Basin DPS)

MARINE MAMMALS

Humpback whale
 Blue whale
 Fin whale
 Sei whale
 Sperm whale
 Southern resident killer whale
 Steller sea lion

REPTILES-AMPHIBIANS

Leatherback sea turtle
 Loggerhead sea turtle
 Green sea turtle
 Olive Ridley sea turtle

9. Existing Environmental Conditions:

Describe existing environmental conditions for the following:

A. Shoreline riparian vegetation and habitat features

The shoreline is defined by the downtown Seattle waterfront and is completely developed with no riparian vegetation, with the exception of occasional planter boxes with landscape vegetation. The Seattle waterfront is also dominated by piers that extend out into Elliott Bay along the length of the action area. Upland construction will occur in developed areas with existing impervious surfaces. Elliott Bay provides some aquatic habitat opportunities for species such as salmon and other fish, birds, marine mammals, and other wildlife; however, conditions in the vicinity of the action area are highly modified from natural habitat conditions.

B. Aquatic substrate and vegetation (include information on the amount and type of eelgrass or macroalgae present at the site)

The action area is highly developed and modified from natural habitat conditions. There is no known aquatic vegetation and no known eelgrass communities in or adjacent to the action area (WDNR 2021).

T-46 is constructed on a filled former tideland area of Elliott Bay and the Duwamish River estuary. Fill at the site consists of sediments imported from adjacent upland locations and off-site aquatic area sites excavated in the first two decades of the last century to create deep draft navigational access in south Elliott Bay. The subtidal substrate in the T-46 vessel berth area consists of sand and mud sediments. Limited amounts of fine-grained sediments have accumulated in the interstitial areas in the riprap slope since container pier construction was completed in 1979.

The majority of installed submarine cable will be placed in waters deeper than 40 feet, which is typically too deep to support aquatic vegetation in Puget Sound. In addition, the slope under T-46 is shaded by the pier apron and armored with riprap, providing poor growing conditions for vegetation.

C. Surrounding land/water uses

The adjacent properties include downtown Seattle waterfront commercial, industrial, and residential uses. The piers in the vicinity of the action area support multiple boat and vessel operations including cargo handling, tourism, and Washington State Ferries. In addition to industry, Elliott Bay is used for fishing, recreation, and wildlife habitat.

D. Level of development

The action area includes the waters of Elliott Bay and the developed shorelines of T-46 and P66.

E. Water quality

Elliott Bay in the vicinity of the action area is listed on the Washington State Department of Ecology 303(d) List for the following parameters (Ecology 2021):

Category 5: Polluted Waters/303(d) List:

- Bacteria
- Polychlorinated Biphenyls (PCBs)
- 2, 3, 7, 8-TCDD (Dioxin)

F. Describe use of the action area by listed salmonid fish species.

Chinook Salmon

Chinook salmon presence is documented within Elliott Bay, and juveniles and adults migrate in the action area (WDFW 2021a, 2021b). Chinook salmon in the action area would primarily be of Green River (Duwamish) stock, although fish from other stocks do use the same area (Nelson et al. 2004). Puget Sound is a migratory corridor for adult Chinook salmon and provides habitat for outmigrating juvenile Chinook salmon from rivers into Puget Sound before their eventual oceanic phase as adults. Juvenile Chinook salmon habitat in the vicinity of the action area includes nearshore and estuarine areas.

It is expected that adult and juvenile Chinook salmon may be present in the vicinity of the action area as follows: adults could be present in deeper waters of Elliott Bay and in Central Puget Sound year-round and are expected to occur in the deepwater areas of the action area and surrounding vicinity during the summer and fall during their upstream spawning migration, and juveniles may occur in the shallow nearshore during typical outmigration periods between February and July.

Steelhead

Steelhead that would be present in the action area are winter or summer run steelhead from the Green River (Duwamish) stock (WDFW 2021a, 2021b). Run timing for adult Green River winter steelhead is generally from December through mid-March, with spawning generally from early March through mid-June. Run timing for Green River summer steelhead is generally from August through December with spawning generally from mid-January through mid-March. Juvenile steelhead would

be expected to outmigrate between mid-March and early June, and would not be anticipated in the nearshore of the action area in large numbers because the majority of steelhead smolts migrate directly to the open ocean and do not rear extensively in the estuarine or coastal environments (Burgner et al. 1992).

For these reasons, it is expected that adult and juvenile steelhead may be present in the action area as follows: adults are expected to occur in the deepwater areas in the action area and surrounding vicinity during the summer, fall, and winter of their upstream spawning migration, and juveniles may occur in the shallow nearshore during typical outmigration periods in the spring and early summer. The general steelhead life history and available research suggest that steelhead use of the action area is lowest in the winter. In addition, by the time juvenile steelhead reach marine waters, they would be much larger in size and would tend to move rapidly to offshore habitat.

Bull Trout

Coastal-Puget Sound bull trout use of the Green/Duwamish River basin is very limited (Goetz et al. 2004), and they may use the action area as foraging, migrating, and overwintering habitat. However, there is no indication that there is a spawning population of bull trout in the Green/Duwamish basin (WDFW 1998). Bull trout have been documented in Elliott Bay (Goetz et al. 2004), but are likely from nearby populations in the Stillaguamish River, Snohomish/Skykomish River, or Puyallup River. Based on the available information, it is expected that bull trout use of the action area is likely very low.

- G. Is the project located within designated / proposed bull trout or Pacific salmon critical habitat? If so, please address the proposed projects’ potential direct and indirect effect to primary constituent elements (Critical habitat templates can be found on the Corps website at: <http://www.nws.usace.army.mil/Missions/CivilWorks/Regulatory/PermitGuidebook/EndangeredSpecies.aspx>, select Forms, Tools and References; Forms and Templates; Critical Habitat Assessment Forms.

Critical habitat in the action area has been designated for the Puget Sound ESU of Chinook salmon and the Coastal-Puget Sound DPS of bull trout considered in this Biological Evaluation (NMFS 2021a; USFWS 2021a). Critical habitat for Puget Sound DPS of steelhead only includes freshwater rivers and streams and not nearshore marine areas. Tables 7 and 8 summarize the potential project effects on Chinook salmon and bull trout primary constituent elements (PCEs).

**Table 7
Potential Project Effects on Chinook Salmon Primary Constituent Elements**

Chinook Salmon PCE	PCE Present	Potential Project Effects
1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	Not present	N/A
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	Not present	N/A

Chinook Salmon PCE	PCE Present	Potential Project Effects
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	Not present	N/A
4. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh-and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels, and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.	Not present	N/A
5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	Present	<p>Most of the in-water work will occur outside of nearshore habitat in water deeper than 40 feet and more than half of the installation will occur in water depths more than 150 feet deep. Some temporary, localized turbidity will occur during the cable installation.</p> <p>The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate.</p> <p>In-water work will occur during the allowable in-water work window, which is when salmonids are less likely to be present.</p> <p>No long-term adverse effects to water quality will result from the Project.</p> <p>No vegetation is located where upland construction will occur.</p> <p>Proposed construction will not result in loss of shoreline habitat features.</p>
6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	Not present	Most of the in-water work will occur outside of nearshore habitat in water deeper than 40 feet and more than half of the installation will occur in water depths more than 150 feet deep.

Chinook Salmon PCE	PCE Present	Potential Project Effects
		<p>Some temporary, localized turbidity will occur during the cable installation.</p> <p>The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate.</p> <p>No impacts to water quality will result from the project. Forage fish spawning habitat is not located within the project footprint. No long-term modifications of prey species habitats are expected.</p>

The PCEs for Chinook salmon that are present within the action area, as discussed in Table 7, are PCEs 5 and 6. The Project is located in Elliott Bay along the shoreline of downtown Seattle waterfront, which lacks riparian vegetation and shoreline habitat features. Some temporary, localized turbidity may occur during cable installation. Most of the cable installation will occur in water deeper than 40 feet, and more than half in deepwater habitat greater than 150 feet. No significant long-term effects to the above-mentioned PCEs will result from the Project.

**Table 8
Potential Project Effects on Bull Trout Primary Constituent Elements**

Bull Trout Primary Constituent Element	PCE Present	Potential Project Effects
1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	Not present	N/A
2. Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including, but not limited to permanent, partial, intermittent or seasonal barriers.	Present	<p>Most of the in-water work will occur outside of nearshore habitat in water deeper than 40 feet and more than half of the installation will occur in water depths more than 150 feet deep. Some temporary, localized turbidity will occur during the cable installation.</p> <p>In-water work will occur during the allowable in-water work window, which is when salmonids are less likely to be present.</p> <p>The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate.</p>

Bull Trout Primary Constituent Element	PCE Present	Potential Project Effects
		No long-term adverse effects to migratory habitat or water quality will result from the Project.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Present	<p>Substrate disturbance and water column disturbance will occur during in-water work. This effect will be short-term and temporary due to expected rapid recovery of the benthic community following this work, and no long-term modifications of prey species habitats are expected.</p> <p>No native vegetation is located where upland construction will occur.</p> <p>Proposed construction will not result in loss of shoreline habitat features.</p>
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.	Present	The shoreline is developed with no riparian vegetation or shoreline habitat features. Construction of the Project will not result in loss of shoreline habitat features.
5. Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.	Not present	N/A
6. Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.	Not present	N/A
7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.	Not present	N/A

Bull Trout Primary Constituent Element	PCE Present	Potential Project Effects
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	Present	Most of the in-water work will occur outside of nearshore habitat in water deeper than 40 feet and more than half of the installation will occur in water depths more than 150 feet deep. Some temporary, localized turbidity will occur during the cable installation. No long-term adverse effects to water quality will result from the Project.
9. Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.	Not present	N/A

The PCEs for bull trout that are present within the action area, as discussed in Table 8, include PCEs 2, 3, 4, and 8. Elliott Bay, where the project is located, may serve as a migratory corridor for transient subadult and adult bull trout from other watersheds (as discussed in the preceding section); however, PCEs are impeded by modifications to the aquatic environment that support surrounding commercial and industrial uses. The Project is located in Elliott Bay along the shoreline of downtown Seattle waterfront, which lacks riparian vegetation and shoreline habitat features. Some temporary, localized turbidity may occur during cable installation. Most of the cable installation will occur in water deeper than 40 feet, and more than half in deepwater habitat greater than 150 feet. No significant long-term effects to the above-mentioned PCEs will result from the Project.

H. Describe use of the action area by other listed fish species (*green sturgeon*, *eulachon*, *bocaccio*, *canary rockfish* and *yelloweye rockfish*).

As described in Section 8, Southern DPS Pacific eulachon are not expected to occur in Puget Sound and are therefore not addressed in this BE.

Portions of the Project action area are within the designated deepwater critical habitat for the Puget Sound/Georgia Basin DPS bocaccio and yelloweye rockfish. The Project action area is not located within the designated nearshore critical habitat for bocaccio. Designated deepwater critical habitat for bocaccio and yelloweye rockfish is located in the water of Elliott Bay deeper than 98 feet (NMFS 2021b).

The presence of adults of these species within the Project action area is unlikely because they are more likely to occur in much deeper water than is present in the action area. Yelloweye rockfish are most common in water from 300 to 600 feet in depth (NMFS 2009). Bocaccio inhabit deep waters from 160 to more than 800 feet (ranging as deep as 1,500 feet; NMFS 2009). The shoreline of the downtown Seattle waterfront is developed with no natural features, which is not attractive habitat for adults since they require complex bathymetric environments.

Essential nearshore habitat features, such as substrates composed of sand, rock, and/or cobble that also support kelp, are absent or very limited within the Project action area. The substrate in Elliott Bay includes silt, sand, riprap, and angular rock. The water quality conditions may be compromised due to active commercial, transportation, and recreational vessel traffic. In addition, any potential nearshore

habitat is lacking any eelgrass, kelp, or other aquatic vegetation preferred by the species. As it is very unlikely that adults would be present within or in the vicinity of the action area, and essential nearshore habitat conditions are not located within the action area, the presence of larval or small juveniles would be incidental. The well-developed larvae are born with limited abilities to swim, maintain buoyancy in the water column, and feed. These larvae are pelagic for several months and occur in the water column from near the surface to depths of 328 feet or more. Larvae and small juveniles located within the greater Puget Sound during the spring and summer months are subject to currents that may potentially drift the fish into the Project action area, but they are not expected to intentionally utilize the action area.

- I. Is the project located within designated/proposed critical habitat for any of the species listed below? If so please address the proposed projects’ potential direct and indirect effect to primary constituent elements. Please see the NOAA-Fisheries and US Fish and Wildlife websites (www.nwr.noaa.gov and www.fws.gov/pacific respectively) for further information.

Southern resident killer whale *Marbled murrelet*
Northern spotted owl *Western snowy plover*
Green sturgeon *Eulachon*

Designated or proposed critical habitat located in the project vicinity for the above-mentioned species includes Southern Resident killer whale. Areas with water less than 20 feet deep are not designated for critical habitat. Water depth within the action area includes water deeper than 20 feet; therefore, there are potential project effects on killer whale PCEs. Table 9 summarizes the potential project effects on killer whale PCEs.

**Table 9
 Potential Project Effects on Southern Killer Whale Primary Constituent Elements**

Chinook Salmon/Steelhead PCE	PCE Present	Potential Project Effects
1. Water quality to support growth and development.	Present	In-water work will result in some temporary, localized turbidity during the cable installation. No long-term adverse effects to water quality will result from the Project.
2. Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth.	Present	Chinook and other salmonids are known key prey species of killer whales, and occur within the project action area. However, no long-term modifications of prey species habitats are expected to result from the Project.
3. Passage conditions to allow for migration, resting, and foraging.	Present	The Project will not obstruct killer whale migration or result in long-term loss of habitat.

In summary, no measurable long-term habitat effects to the above-mentioned PCEs for killer whale will result from the Project.

- J. Describe use of action area by marbled murrelets. How far to the nearest marbled murrelet nest site or critical habitat? Some information is available on the Fish and Wildlife Service website: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08C>.

The project is located in an urban environment that does not include suitable nesting habitat for marbled murrelets. The WDFW Priority Habitats and Species (PHS) maps do not document marbled murrelets in the vicinity of the project (WDFW 2021a). According to USFWS critical habitat maps (USFWS 2021b), the nearest critical habitat for marbled murrelet is approximately 30 miles from the project area in the Olympic National Forest. Marbled murrelets could forage in the marine environment of Elliott Bay within and in the vicinity of the action area.

- K. Describe use of action area by the spotted owl. How far to the nearest spotted owl nest site or critical habitat? Some information is available on the Fish and Wildlife Service website: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08B>.

The project is located in an urban-industrial environment that does not include suitable nesting and foraging habitat for northern spotted owls (*Strix occidentalis caurina*). The WDFW PHS maps do not document northern spotted owls in the vicinity of the project (WDFW 2021a). According to USFWS critical habitat maps (USFWS 2021c), the nearest critical habitat for northern spotted owl is approximately 30 miles from the project area in the Olympic National Forest.

- L. **For marine areas only:** Describe use of action area by Southern Resident killer whales. How often have they been seen in the area and during what months of the year? For information on noise impacts on killer whales and other marine mammals, please see the National Marine Fisheries website: <http://www.nwr.noaa.gov/Marine-Mammals/MM-consults.cfm>.

Southern Resident killer whales occur in the main channel of Puget Sound and occasionally enter the waters of Elliott Bay. Southern Resident killer whales, if present in the vicinity of the action area, are unlikely to occur in the deeper waters of the action area where there is ongoing commercial, transportation, and recreational vessel traffic.

- M. **For marine areas and Columbia River:** How far is the nearest steller sea lion haulout site from the action area? Describe their use of the action area. See the National Marine Fisheries website: <http://www.nwr.noaa.gov/Marine-Mammals/MM-consults.cfm> for information on the steller sea lion and location of their haulout sites.

There are no Steller sea lion haul-out sites near the action area.

- N. **For marine areas only: Forage Fish Habitat** – only complete this section if the project is in tidal waters.

Check box if Washington Department of Fish and Wildlife (WDFW) documented habitat is present. Go to the WDFW website for this information: <http://wdfw.wa.gov/fish/forage/forage.htm>, then search for each species under the link to Biology, then the link to Documented Spawning Grounds (if available, please attach a copy of the Hydraulic Project Approval from WDFW):

Surf Smelt: **Pacific Herring:** **Sand Lance:**

Check box if the proposed action will occur in potentially suitable forage fish spawning habitat:

If no boxes are checked, please explain why site is not suitable as forage fish spawning habitat.

Please describe the type of substrate and elevation and presence of aquatic vegetation at the project area. For example:

At +10 to +5 feet above MLLW, there is no aquatic vegetation, the substrate consists of large cobbles.

At +5 to +1 foot above MLLW, there is eelgrass and the substrate consists of fine sand.

Not applicable. No suitable forage fish habitat is documented in the Project action area (WDFW 2021c).

10. Effects Analysis

Describe the direct and indirect effects of the action on the proposed and listed species as well as designated and proposed critical habitat within the action area. Consider the impact to both individuals and the population.

Discuss the short-term, construction-related, impacts as well as the long-term and permanent effects.

Direct Impacts

Short-term direct impacts to listed species as a result of the proposed Project include temporary disturbances below MHHW that may result in temporary, localized turbidity increases in the action area during the placement of the cable and accessory cable material on the bottom substrate. Most of the cable installation will occur in water deeper than 40 feet and more than half in deepwater habitat greater than 150 feet. The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate. The placement of the cable material on the bottom substrate of Elliott Bay would have insignificant or discountable in-water noise impacts in an area with high ambient noise levels associated with regular commercial, ferry, and recreational boat traffic.

EMF emitted from submarine cables has the potential to affect species that use the magnetic field to navigate, or that use the fields behaviorally. Electrosensitive species primarily include elasmobranchs (sharks, rays, skates, and sawfish). Magnetosensitive include migratory fish and marine mammals, both of which have listed species in Elliott Bay. A 2006 literature review on the impacts of submarine cables from the Institute of Applied Ecology found “experimental evidence to determine whether migrating salmon can detect and/or could be affected by anthropogenic magnetic fields of a magnitude comparable to the earth’s geomagnetic field is inconclusive.” A literature review from Taorimina et al. (2018) also concluded that studies on the impacts of EMF emitted by submarine cables on several elasmobranch species showed that the response was not predictable and seemed to be species specific, maybe even specific to individuals. Electrosensitive elasmobranchs are considered the most sensitive to these fields, as compared to magnetosensitive species. It is suggested by the literature to date that submarine cables do not emit powerful enough EMF to have a measurable impact on listed magnetosensitive marine species in the area, as these species are even less sensitive to the fields than the elasmobranchs.

As previously described, the submarine cable type and design were selected to attenuate EMF impacts to the extent practicable. With a three-phase power cable, such as the submarine cable, the three conductors are in close proximity to each other. Because the three phases’ alternating currents are electrically 120 degrees apart, the magnetic fields of a three-phase power cable tend to partially cancel each other out. Bundling the neutral conductor close to the three phase conductors helps to further mitigate magnetic fields. This means that the magnetic field from a three-phase submarine power cable is much less than from three single-phase cables that are physically separated.

Magnetic fields drop rapidly with distance. Furthermore, typical magnetic fields will be far less than those occurring at peak load.

Electrical fields also drop off rapidly with distance and they can be blocked or partially blocked by many objects, from vegetation, soils, or conducting metals. Cable design features such as copper tape shields, semi-conducting conductor jackets, and steel armor wire reduce the electric fields from a submarine power cable. An ideal Faraday cage is a metallic or conducting structure that surrounds an electric field source. It will (depending on the design) drop the electric fields on the other side of the Faraday cage to trivial values. The various conducting and semiconducting features of a typical three-phase submarine cable act as a Faraday cage.

The Project will result in unavoidable impacts to Elliott Bay from installation of the approximately 6,110-lf submarine cable and associated protection features. A mitigation plan has not been prepared to compensate for the adverse impacts to non-wetland waterbodies. However, the Port will apply mitigation credits generated from other nearby Port projects to adequately offset impacts in coordination with the U.S. Army Corps of Engineers and other agencies through the permit consultation process.

No potential direct impacts to aquatic habitat associated with the upland construction activities are identified. Impacts to critical habitat were discussed in Section 9.G. of this BE.

Indirect Impacts

No long-term effects to water quality from the Project are identified. The Project will not create new impervious or pollution-generating surfaces.

Effects from Interdependent Activities

Interdependent actions have no independent utility apart from the proposed action. Seattle City Light (SCL) SCL will need to upgrade its feeder system leading up to T-46 in order to support the proposed Project. This work will be completed under SCL's existing agreements for electrical infrastructure upgrades. The effects of this interdependent activity are expected to be similar to those for the upland construction work discussed in this BE.

Effects from Interrelated Activities

Interrelated actions are part of a larger action and though they rely upon that action for their justification, the action could occur as part of another project. For this Project, there are no interrelated activities and thus no impacts will occur from interrelated activities.

11. Conservation measures:

Conservation measures are measures that would reduce or eliminate adverse impacts of the proposed activity (examples: work done during the recommended work window (to avoid times when species are most likely to be in the area), silt curtain, erosion control best management practices, percent grating on a pier to reduce shading impacts).

Proposed work window:

The in-water work window for fish in Elliott Bay is between August 1 and February 15.

Other conservation measures:

As described in Section 5, BMPs have been incorporated into the Project design in order to avoid or minimize environmental effects and the exposure of sensitive species to potential effects from cable installation .

12. Determination of Effect:

Provide a summary of impacts concluding with statement(s) of effect, by species. Even projects that are intended to benefit the species might have short-term adverse impacts and those must be addressed. Only the following determinations are valid for listed species or designated critical habitat:

No effect. Literally no effect. No probability of any effect. The action is determined to have ‘no effect’ if there are no proposed or listed salmon and no proposed or designated critical habitat in the action area or downstream from it. This effects determination is the responsibility of the action agency to make and does not require NMFS review.

May Affect, Not Likely to Adversely Affect (NLAA) – Insignificant, discountable, or beneficial effects. The effect level is determined to be ‘may affect, not likely to adversely affect’ if the proposed action does not have the potential to hinder attainment of relevant properly functioning indicators and has a negligible (extremely low) probability of taking proposed or listed salmon or resulting in the destruction or adverse modification of their habitat. An insignificant effect relates to the size of the impact and should never reach the scale where take occurs. A ‘discountable effect’ is defined as being so extremely unlikely to occur that a reasonable person cannot detect, measure, or evaluate it. This level of effect requires informal consultation, which consists of NMFS and/or USFWS concurrence with the action agency’s determination.

May Affect, Likely to Adversely Affect (LAA) This form is not appropriate for use with a project that is LAA listed species. Please see the Biological Assessment (BA) template on the Corps website:

http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=mainpage_ESA

Analysis of Effects to Species

Work below MHHW will be performed during submarine cable installation and appurtenances. Potential effects to listed species include physical and behavioral impacts from temporary turbidity when the cable and cable accessory materials are placed on the bottom substrate of Elliott Bay. No in-water trenching or dredging to install the cable will be included. Potential permanent loss of benthic food resources as a result of placing the cable on the bottom substrate is anticipated to be insignificant or discountable because the cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate over time.

The placement of the cable material on the bottom substrate will have insignificant or discountable in-water noise impacts in an area with high ambient noise levels associated with regular commercial, ferry, and recreational boat traffic. No measurable impact to listed species from in-air noise associated with construction activity is anticipated. No potential direct impacts to aquatic habitat associated with the upland site development construction activities are identified.

Chinook Salmon, Steelhead, and Bull Trout

Potential adverse effects on juvenile and adult salmonids and bull trout are expected to be negligible. Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination for these species is that the Project **may affect, but is not likely to adversely affect** Puget Sound Chinook salmon, Puget Sound steelhead, and Coastal-Puget Sound bull trout. Justification for these determinations is as follows:

- Turbidity effects (such as direct mortality, gill damage, stress, and behavioral changes) are not generally seen at the suspended sediment concentrations generated from placement of cable material on bottom substrate.
- Turbidity generated by cable placement below MHHW is expected to be temporary and insignificant and, if present, will disseminate to background levels within 150 feet of the work area below MHHW, in compliance with Washington State water quality standards. These effects are therefore considered insignificant.
- Substrate disturbance and disturbance of benthic and epibenthic prey habitat will occur below MHHW. This effect will be short term and temporary. The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate over time. The

benthic community is expected to recover rapidly following Project completion, and no long-term modifications of salmonid prey species habitats are expected. These effects are therefore considered insignificant.

- Work below MHHW will be restricted to the work window.
- No long-term impacts to water quality due to the cable installation are identified.
- No potential long-term impacts associated with the EMF effects of the cable are identified.
- No potential direct impacts to aquatic habitat associated with the upland construction activities are identified.

Chinook Salmon, Steelhead, and Bull Trout Critical Habitat

Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination for species likely to be present in Elliott Bay is that the Project will have **no effect** on designated critical habitat for Puget Sound steelhead and the Project **may affect, but is not likely to adversely affect** designated critical habitat for Puget Sound Chinook salmon and Coastal-Puget Sound bull trout. Justification for these determinations is as follows:

- Steelhead designated critical habitat does not include marine areas.
- Work below MHHW will include placement of the cable and protective features on the bottom substrate and will not include trenching or dredging of substrate material.
- Work below MHHW will be restricted to the work window as described previously.
- Short-term changes in water column turbidity and suspended sediment could occur during cable placement. Impacts to water column habitat are expected to be temporary and localized, and no long-term water quality effects are expected. Any increase in turbidity beyond background is expected to be localized and temporary in nature, and water quality effects are not expected to be at a level that would affect the abundance of water column prey species.
- Substrate disturbance and disturbance of benthic and epibenthic prey habitat will be short term and temporary. The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate over time. The benthic community is expected to recover rapidly following Project completion. These effects are therefore considered insignificant.
- There will be no effect on fish migration.
- There will be no effect on water quantity or flows.
- There will be no long-term effect on availability of natural cover. No potential direct impacts to aquatic habitat associated with the upland construction activities are identified.

Bocaccio and Yelloweye Rockfish

Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination for these species is that the Project **may affect, but is not likely to adversely affect** bocaccio and yelloweye rockfish. Justification for these determinations is as follows:

- The two ESA-listed rockfish species are present in various basins of Puget Sound. The level of use by adults or juveniles of these species in the action area is expected to be low year-round, and particularly during most construction activities.
- The possibility of some presence of juvenile or adult individuals from these species in the action area during construction cannot be discounted.
- Turbidity generated by cable placement below MHHW is expected to be temporary and insignificant and, if present, will disseminate to background levels within 150 feet of the work area below MHHW, in compliance with Washington State water quality standards. These effects are therefore considered insignificant.
- Due to topographic preferences, it is unlikely that bocaccio (adult, juvenile, and larval) rockfish would occur in the action area. Due to depth, geographic, and habitat preferences,

the likelihood that adult, juvenile, and larval yelloweye rockfish would occur in the action area is also low. Adult rockfish generally inhabit deep water associated with rock outcroppings or coarse substrate, which is not found in the project area.

- Rockfish could potentially occur at deeper elevations near the submarine cable. EMF effects are anticipated to be insignificant and discountable based on existing literature and conservation measures incorporated into the design.
- No impacts are identified to eelgrass, kelp, or other aquatic vegetation preferred by the species.
- No potential direct impacts to aquatic habitat associated with the upland construction activities are identified.

Bocaccio and Yelloweye Rockfish Critical Habitat

Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination for these species is that the Project **may affect, but is not likely to adversely affect** bocaccio and yelloweye rockfish critical habitat. Justification for these determinations is as follows:

- Work below MHHW will include placement of the cable and protective measures on the bottom substrate and will not include dredging or excavation of substrate material.
- Substrate disturbance and disturbance of benthic and epibenthic prey habitat will occur below MHHW. This effect will be short term and temporary. The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate over time, and the benthic community is expected to recover rapidly. These effects are therefore considered insignificant.
- Short-term changes in water column turbidity and suspended sediment could occur during cable placement. Impacts to water column habitat are expected to be temporary and localized, and no long-term water quality effects are expected.
- Turbidity effects (such as direct mortality, gill damage, stress, and behavioral changes) are not generally seen at the suspended sediment concentrations generated from placement of cable material on bottom substrate.
- There will be no effect on fish migration.
- There will be no effect on water quantity or flows.
- There will be no long-term effect on availability of natural cover. No potential direct impacts to aquatic habitat associated with the upland construction activities are identified.

Southern Resident Killer Whale

No potential adverse effects on killer whale are identified. Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination is that the Project will have **no effect** on killer whale. Justification for this determination is as follows:

- Killer whales will not occur in the shallow nearshore habitat of the action area and are very unlikely to occur in the deeper water of the action area where there is ongoing commercial, transportation, and recreational vessel traffic. The proposed construction activities would not create water quality effects that would temporarily displace killer whales. Therefore, no potential effects to killer whale are identified.
- Construction of the Project will not occur when juvenile and adult Chinook salmon (primary killer whale prey items) are likely to be present. Project effects to Puget Sound Chinook salmon, the killer whales' favored food source, are insignificant or discountable.
- No potential direct impacts to aquatic habitat associated with the upland construction activities are identified.

Southern Resident Killer Whale Critical Habitat

Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination is that the Project will have **no effect** on designated critical habitat for killer whale. Justification for this determination is as follows:

- Work below MHHW will include placement of the cable and protective measures on the bottom substrate and will not include dredging or excavation of substrate material.
- Substrate impacts will be short term and temporary. The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate over time.
- No disturbance to killer whale feeding habits within critical habitat is identified, and the potential effects to prey species are considered discountable.
- Potential impacts to water column habitat are limited to temporary, localized turbidity increases. No permanent water quality effects to areas where killer whales occur are identified.
- No passage limitations will occur from the Project.

Humpback Whale

No potential adverse effects on humpback whale are identified. Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination is that the Project will have **no effect** on humpback whale. Justification for this determination is as follows:

- Humpback whales are infrequent visitors to Elliott Bay.
- Humpback whales will not occur in the shallow nearshore habitat of the action area and are very unlikely to occur in the deeper water of the action area, where there is ongoing traffic from commercial, transportation, and recreational. The proposed construction activities would not create water quality effects that would temporarily displace humpback whales. Therefore, no potential effects to humpback whale are identified.

Marbled Murrelet

Potential adverse effects on marbled murrelets are not expected. Based on the guidance and definitions provided above and the previously discussed Project effects, the effect determination for this species is that the Project will have **no effect** on marbled murrelets. Justification for this determination is as follows:

- The likelihood is extremely low that marbled murrelets will occur in the action area during the Project or be temporarily displaced subject to construction activity.
- No underwater noise-producing activity above ambient levels is proposed. Potential impacts to marbled murrelets from in-air noise levels associated with construction activity are not anticipated.
- The Project is also expected to have discountable effects on marbled murrelet prey species (e.g., small fish and invertebrates) during construction.
- No potential direct impacts to aquatic habitat associated with the upland construction activities are identified. Therefore, no effects on marbled murrelets are identified.

13. EFH Analysis

Essential Fish Habitat (EFH) is broadly defined by the Act (now called the Magnuson-Stevens Act or the Sustainable Fisheries Act) to include “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”. This language is interpreted or described in the 1997 Interim Final Rule [62 Fed. Reg. 66551, Section 600.10 Definitions] -- Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include historic areas if appropriate; substrate includes

sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Additional guidance for EFH analyses can be found at the NOAA Fisheries web site under the Sustainable Fisheries Division.

A. Description of the Proposed Action (may refer to BA project description)

See description of proposed work in Section 5 of this BE.

B. Addresses EFH for Appropriate Fisheries Management Plans (FMP)

The waters of Puget Sound, including the action area, are designated as EFH for the three EFH composite groups of groundfish, coastal pelagic fish, and Pacific salmon (NMFS 1998; PFMC 1998a, 1998b, 1999). The Pacific salmon composite includes Chinook, coho, and pink salmon (PFMC 1999).

C. Effects of the Proposed Action

- i. Effects on EFH (groundfish, coastal pelagic, and salmon EFH should be discussed separately)

Groundfish

Forty-six groundfish species are known to occur in the vicinity of central Puget Sound, including two ESA-listed species (yelloweye rockfish and bocaccio). Potential Project effects on essential groundfish habitat will be minimal and discountable. Work below MHHW will include placement of the cable and protective features on the bottom substrate and will not include dredging or excavation of substrate material. Substrate disturbance will be short term and temporary. The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate over time, and the benthic community is expected to recover rapidly after Project completion. These effects are therefore considered insignificant. No eelgrass habitat or forage fish spawning areas are located within the proposed Project site. Therefore, it is concluded that the proposed Project will not adversely affect groundfish EFH.

Coastal Pelagic

Managed coastal pelagic species found in waters of central Puget Sound include northern anchovy (*Engraulis mordax*), Pacific mackerel (*Scomber japonicas*), Pacific sardine (*Sardinops sagax*), and market squid (*Loligo opalescens*). Potential Project effects on coastal pelagic habitat will be minimal and discountable. Coastal pelagic fish use deeper water than the action area. Work below MHHW will include placement of the cable and protective features on the bottom substrate and will not include dredging or excavation of substrate material. Substrate disturbance will be short term and temporary. No eelgrass habitat or forage fish spawning areas are located within the proposed Project activities below MHHW. Therefore, it is concluded that the proposed Project will have no effect on coastal pelagic EFH.

Salmon

Managed salmon species found in waters of Puget Sound include Chinook salmon, coho salmon (*Oncorhynchus kisutch*), and Puget Sound pink salmon (*O. gorbuscha*). Potential Project effects on salmon habitat will be minimal and discountable, as discussed in Section 9.G of the BE. Work below MHHW will include placement of the cable and protective features on the bottom substrate and will not include dredging or excavation of substrate material. Substrate disturbance will be short term and

temporary. The cable and articulated mats will mold and settle into the existing native substrate and infill with native substrate over time, and the benthic community is expected to recover rapidly. No eelgrass habitat or forage fish spawning areas are located within the area of proposed Project activities below MHHW. The availability of waters and substrate necessary to support the contribution of these managed species to a healthy ecosystem will not be changed. Therefore, it is concluded that the proposed Project will not adversely affect salmon EFH.

- ii. Effects on Managed Species (unless effects to an individual species are unique, it is not necessary to discuss adverse effects on a species-by species basis)

There are no unique effects to an individual species as a result of this Project.

- iii. Effects on Associated Species, Including Prey Species

No impacts on the health or availability of forage fish and other prey species are anticipated.

- iv. Cumulative Effects

This Project includes construction in previously developed areas on the downtown Seattle waterfront. Cumulative effects from the Project are insignificant.

D. Proposed Conservation Measures

Project conservation measures to minimize Project impacts are described in Section 5 of the BE.

E. Conclusions by EFH (taking into account proposed conservation measures)

This Project will **not adversely affect** groundfish or managed salmon species EFH. This Project will **have no effect on** coastal pelagic species EFH.

14. References:

Include any studies or papers that support statements made in this form (example: reference the source for the listed species that are covered).

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15. Appendices:

As needed include mitigation, revegetation plans, monitoring plans, results of studies, water quality information, etc

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO ₂ e)			Lifespan Emissions (MTCO ₂ e)
			Embodied	Energy	Transportation	
Single-Family Home.....	0		98	672	792	0
Multi-Family Unit in Large Building	0		33	357	766	0
Multi-Family Unit in Small Building	0		54	681	766	0
Mobile Home.....	0		41	475	709	0
Education		0.0	39	646	361	0
Food Sales		0.0	39	1,541	282	0
Food Service		0.0	39	1,994	561	0
Health Care Inpatient		0.0	39	1,938	582	0
Health Care Outpatient		0.0	39	737	571	0
Lodging		0.0	39	777	117	0
Retail (Other Than Mall).....		0.0	39	577	247	0
Office		0.0	39	723	588	0
Public Assembly		0.0	39	733	150	0
Public Order and Safety		0.0	39	899	374	0
Religious Worship		0.0	39	339	129	0
Service		0.0	39	599	266	0
Warehouse and Storage		0.0	39	352	181	0
Other		0.0	39	1,278	257	0
Vacant		0.0	39	162	47	0

Section II: Pavement.....

Pavement.....		18.30				915
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Total Project Emissions:

915 lifespan emissions

15 annually, with life span of 62.5 years

Definition of Building Types

Type (Residential) or Principal Activity (Commercial)	Description
Single-Family Home.....	Unless otherwise specified, this includes both attached and detached buildings
Multi-Family Unit in Large Building	Apartments in buildings with more than 5 units
Multi-Family Unit in Small Building	Apartments in building with 2-4 units
Mobile Home.....	
Education	Buildings used for academic or technical classroom instruction, such as elementary, middle, or high schools, and classroom buildings on college or university campuses. Buildings on education campuses for which the main use is not classroom are included in the category relating to their use. For example, administration buildings are part of "Office," dormitories are "Lodging," and libraries are "Public Assembly."
Food Sales	Buildings used for retail or wholesale of food.
Food Service	Buildings used for preparation and sale of food and beverages for consumption.
Health Care Inpatient	Buildings used as diagnostic and treatment facilities for inpatient care.
Health Care Outpatient	Buildings used as diagnostic and treatment facilities for outpatient care. Doctor's or dentist's office are included here if they use any type of diagnostic medical equipment (if they do not, they are categorized as an office building).
Lodging	Buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.
Retail (Other Than Mall).....	Buildings used for the sale and display of goods other than food.
Office	Buildings used for general office space, professional office, or administrative offices. Doctor's or dentist's office are included here if they do not use any type of diagnostic medical equipment (if they do, they are categorized as an outpatient health care building).
Public Assembly	Buildings in which people gather for social or recreational activities, whether in private or non-private meeting halls.
Public Order and Safety	Buildings used for the preservation of law and order or public safety.
Religious Worship	Buildings in which people gather for religious activities, (such as chapels, churches, mosques, synagogues, and temples).
Service	Buildings in which some type of service is provided, other than food service or retail sales of goods
Warehouse and Storage	Buildings used to store goods, manufactured products, merchandise, raw materials, or personal belongings (such as self-storage).
Other	Buildings that are industrial or agricultural with some retail space; buildings having several different commercial activities that, together, comprise 50 percent or more of the floorspace, but whose largest single activity is agricultural, industrial/ manufacturing, or residential; and all other miscellaneous buildings that do not fit into any other category.
Vacant	Buildings in which more floorspace was vacant than was used for any single commercial activity at the time of interview. Therefore, a vacant building may have some occupied floorspace.

Sources:

Residential 2001 Residential Energy Consumption Survey
 Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

Commercial Commercial Buildings Energy Consumption Survey (CBECS),
 Description of CBECS Building Types
<http://www.eia.doe.gov/emeu/cbeecs/pba99/bldgtypes.html>

Embodied Emissions Worksheet

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# thousand sq feet/ unit or building	Life span related embodied GHG missions (MTCO2e/ unit)	Life span related embodied GHG missions (MTCO2e/ thousand square feet) - See calculations in table below
Single-Family Home.....	2.53	98	39
Multi-Family Unit in Large Building	0.85	33	39
Multi-Family Unit in Small Building	1.39	54	39
Mobile Home.....	1.06	41	39
Education	25.6	991	39
Food Sales	5.6	217	39
Food Service	5.6	217	39
Health Care Inpatient	241.4	9,346	39
Health Care Outpatient	10.4	403	39
Lodging	35.8	1,386	39
Retail (Other Than Mall).....	9.7	376	39
Office	14.8	573	39
Public Assembly	14.2	550	39
Public Order and Safety	15.5	600	39
Religious Worship	10.1	391	39
Service	6.5	252	39
Warehouse and Storage	16.9	654	39
Other	21.9	848	39
Vacant	14.1	546	39

Section II: Pavement.....

All Types of Pavement.....			50
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	Columns and Beams	Intermediate Floors	Exterior Walls	Windows	Interior Walls	Roofs	Total Embodied Emissions (MTCO2e)	Total Embodied Emissions (MTCO2e/ thousand sq feet)
Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building	5.3	7.8	19.1	51.2	5.7	21.3		
Average Materials in a 2,272-square foot single family home	0.0	2269.0	3206.0	285.0	6050.0	3103.0		
MTCO2e	0.0	8.0	27.8	6.6	15.6	30.0	88.0	38.7

Sources

All data in black text

King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

Floorspace per building

EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building

Athena EcoCalculator
Athena Assembly Evaluation Tool v2.3- Vancouver Low Rise Building
Assembly Average GWP (kg) per square meter
<http://www.athenasmi.ca/tools/ecoCalculator/index.html>
Lbs per kg 2.20
Square feet per square meter 10.76

Average Materials in a 2,272-square foot single family home

Buildings Energy Data Book: 7.3 Typical/Average Household
Materials Used in the Construction of a 2,272-Square-Foot Single-Family Home, 2000
http://buildingsdatabook.eren.doe.gov/?id=view_book_table&TableID=2036&t=xls
See also: NAHB, 2004 Housing Facts, Figures and Trends, Feb. 2004, p. 7.

Average window size

Energy Information Administration/Housing Characteristics 1993
Appendix B, Quality of the Data. Pg. 5.
<ftp://ftp.eia.doe.gov/pub/consumption/residential/rx93hcf.pdf>

Pavement Emissions Factors
MTCO₂e/thousand square feet of asphalt
or concrete pavement

50 (see below)

Energy Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	Energy consumption per building per year (million Btu)	Carbon Coefficient for Buildings	MTCO2e per building per year	Floorspace per Building (thousand square feet)	MTCE per thousand square feet per year	MTCO2e per thousand square feet per year	Average Building Life Span	Lifespan Energy Related MTCO2e emissions per unit	Lifespan Energy Related MTCO2e emissions per thousand square feet
Single-Family Home.....	107.3	0.108	11.61	2.53	4.6	16.8	57.9	672	266
Multi-Family Unit in Large Building	41.0	0.108	4.44	0.85	5.2	19.2	80.5	357	422
Multi-Family Unit in Small Building	78.1	0.108	8.45	1.39	6.1	22.2	80.5	681	489
Mobile Home.....	75.9	0.108	8.21	1.06	7.7	28.4	57.9	475	448
Education	2,125.0	0.124	264.2	25.6	10.3	37.8	62.5	16,526	646
Food Sales	1,110.0	0.124	138.0	5.6	24.6	90.4	62.5	8,632	1,541
Food Service	1,436.0	0.124	178.5	5.6	31.9	116.9	62.5	11,168	1,994
Health Care Inpatient	60,152.0	0.124	7,479.1	241.4	31.0	113.6	62.5	467,794	1,938
Health Care Outpatient	985.0	0.124	122.5	10.4	11.8	43.2	62.5	7,660	737
Lodging	3,578.0	0.124	444.9	35.8	12.4	45.6	62.5	27,826	777
Retail (Other Than Mall).....	720.0	0.124	89.5	9.7	9.2	33.8	62.5	5,599	577
Office	1,376.0	0.124	171.1	14.8	11.6	42.4	62.5	10,701	723
Public Assembly	1,338.0	0.124	166.4	14.2	11.7	43.0	62.5	10,405	733
Public Order and Safety	1,791.0	0.124	222.7	15.5	14.4	52.7	62.5	13,928	899
Religious Worship	440.0	0.124	54.7	10.1	5.4	19.9	62.5	3,422	339
Service	501.0	0.124	62.3	6.5	9.6	35.1	62.5	3,896	599
Warehouse and Storage	764.0	0.124	95.0	16.9	5.6	20.6	62.5	5,942	352
Other	3,600.0	0.124	447.6	21.9	20.4	74.9	62.5	27,997	1,278
Vacant	294.0	0.124	36.6	14.1	2.6	9.5	62.5	2,286	162

Sources

All data in black text

King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Energy consumption for residential buildings

2007 Buildings Energy Data Book: 6.1 Quad Definitions and Comparisons (National Average, 2001)
 Table 6.1.4: Average Annual Carbon Dioxide Emissions for Various Functions
<http://buildingsdatabook.eren.doe.gov/>
 Data also at: http://www.eia.doe.gov/emeu/recs/recs2001_ce/ce1-4c_housingunits2001.html

Energy consumption for commercial buildings and Floorspace per building

EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
 Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Note: Data in plum color is found in both of the above sources (buildings energy data book and commercial buildings energy consumption survey).

Carbon Coefficient for Buildings

Buildings Energy Data Book (National average, 2005)
 Table 3.1.7. 2005 Carbon Dioxide Emission Coefficients for Buildings (MMTCE per Quadrillion Btu)
http://buildingsdatabook.eere.energy.gov/?id=view_book_table&TableID=2057
 Note: Carbon coefficient in the Energy Data book is in MTCE per Quadrillion Btu.
 To convert to MTCO2e per million Btu, this factor was divided by 1000 and multiplied by 44/12.

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)
 Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

average life span of buildings,
estimated by replacement time method

	Single Family Homes	Multi-Family Units in Large and Small Buildings	All Residential Buildings
New Housing Construction, 2001	1,273,000	329,000	1,602,000
Existing Housing Stock, 2001	73,700,000	26,500,000	100,200,000
Replacement time:	57.9	80.5	62.5

(national average, 2001)

Note: Single family homes calculation is used for mobile homes as a best estimate life span.

Note: At this time, KC staff could find no reliable data for the average life span of commercial buildings.

Therefore, the average life span of residential buildings is being used until a better approximation can be ascertained.

Sources:

New Housing Construction,

2001 Quarterly Starts and Completions by Purpose and Design - US and Regions (Excel)

http://www.census.gov/const/quarterly_starts_completions_cust.xls

See also: <http://www.census.gov/const/www/newresconstindex.html>

Existing Housing Stock,

2001 Residential Energy Consumption Survey (RECS) 2001

Tables HC1:Housing Unit Characteristics, Million U.S. Households 2001

Table HC1-4a. Housing Unit Characteristics by Type of Housing Unit, Million U.S. Households, 2001

Million U.S. Households, 2001

http://www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/housunits/hc1-4a_housingunits2001.pdf

Transportation Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	# people/ unit or building	# thousand sq feet/ unit or building	# people or employees/ thousand square feet	vehicle related GHG emissions (metric tonnes CO2e per person per year)	MTCO2e/ year/ unit	MTCO2e/ year/ thousand square feet	Average Building Life Span	Life span transportation related GHG emissions (MTCO2e/ per unit)	Life span transportation related GHG emissions (MTCO2e/ thousand sq feet)
Single-Family Home.....	2.8	2.53	1.1	4.9	13.7	5.4	57.9	792	313
Multi-Family Unit in Large Building	1.9	0.85	2.3	4.9	9.5	11.2	80.5	766	904
Multi-Family Unit in Small Building	1.9	1.39	1.4	4.9	9.5	6.8	80.5	766	550
Mobile Home.....	2.5	1.06	2.3	4.9	12.2	11.5	57.9	709	668
Education	30.0	25.6	1.2	4.9	147.8	5.8	62.5	9247	361
Food Sales	5.1	5.6	0.9	4.9	25.2	4.5	62.5	1579	282
Food Service	10.2	5.6	1.8	4.9	50.2	9.0	62.5	3141	561
Health Care Inpatient	455.5	241.4	1.9	4.9	2246.4	9.3	62.5	140506	582
Health Care Outpatient	19.3	10.4	1.9	4.9	95.0	9.1	62.5	5941	571
Lodging	13.6	35.8	0.4	4.9	67.1	1.9	62.5	4194	117
Retail (Other Than Mall).....	7.8	9.7	0.8	4.9	38.3	3.9	62.5	2394	247
Office	28.2	14.8	1.9	4.9	139.0	9.4	62.5	8696	588
Public Assembly	6.9	14.2	0.5	4.9	34.2	2.4	62.5	2137	150
Public Order and Safety	18.8	15.5	1.2	4.9	92.7	6.0	62.5	5796	374
Religious Worship	4.2	10.1	0.4	4.9	20.8	2.1	62.5	1298	129
Service	5.6	6.5	0.9	4.9	27.6	4.3	62.5	1729	266
Warehouse and Storage	9.9	16.9	0.6	4.9	49.0	2.9	62.5	3067	181
Other	18.3	21.9	0.8	4.9	90.0	4.1	62.5	5630	257
Vacant	2.1	14.1	0.2	4.9	10.5	0.7	62.5	657	47

Sources

All data in black text

King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

people/ unit

Estimating Household Size for Use in Population Estimates (WA state, 2000 average)
 Washington State Office of Financial Management
 Kimpel, T. and Lowe, T. Research Brief No. 47. August 2007
<http://www.ofm.wa.gov/researchbriefs/brief047.pdf>
 Note: This analysis combines Multi Unit Structures in both large and small units into one category; the average is used in this case although there is likely a difference

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)
 Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

employees/thousand square feet

Commercial Buildings Energy Consumption Survey commercial energy uses and costs (National Median, 2003)
 Table B2 Totals and Medians of Floorspace, Number of Workers, and Hours of Operation for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbeccs/cbeccs2003/detailed_tables_2003/2003set1/2003excel/b2.xls

Note: Data for # employees/thousand square feet is presented by CBECS as square feet/employee.
 In this analysis employees/thousand square feet is calculated by taking the inverse of the CBECS number and multiplying by 1000.

vehicle related GHG emissions

Estimate calculated as follows (Washington state, 2006)_

56,531,930,000 2006 Annual WA State Vehicle Miles Traveled

Data was daily VMT. Annual VMT was 365*daily VMT.

<http://www.wsdot.wa.gov/mapsdata/tdo/annualmileage.htm>

6,395,798 2006 WA state population

<http://quickfacts.census.gov/qfd/states/53000.html>

8839 vehicle miles per person per year

0.0506 gallon gasoline/mile

This is the weighted national average fuel efficiency for all cars and 2 axle, 4 wheel light trucks in 2005. This includes pickup trucks, vans and SUVs. The 0.051 gallons/mile used here is the inverse of the more commonly known term "miles/per gallon" (which is 19.75 for these cars and light trucks).

Transportation Energy Data Book. 26th Edition. 2006. Chapter 4: Light Vehicles and Characteristics. Calculations based on weighted average MPG efficiency of cars and light trucks.

http://cta.ornl.gov/data/tedb26/Edition26_Chapter04.pdf

Note: This report states that in 2005, 92.3% of all highway VMT were driven by the above described vehicles.

http://cta.ornl.gov/data/tedb26/Spreadsheets/Table3_04.xls

24.3 lbs CO2e/gallon gasoline

The CO2 emissions estimates for gasoline and diesel include the extraction, transport, and refinement of petroleum as well as their combustion.

Life-Cycle CO2 Emissions for Various New Vehicles. RENew Northfield.

Available: <http://renewnorthfield.org/wpcontent/uploads/2006/04/CO2%20emissions.pdf>

Note: This is a conservative estimate of emissions by fuel consumption because diesel fuel, with a emissions factor of 26.55 lbs CO2e/gallon was not estimated.

2205

4.93 lbs/metric tonne

vehicle related GHG emissions (metric tonnes CO2e per person per year)

average life span of buildings, estimated by replacement time method

See Energy Emissions Worksheet for Calculations

Commercial floorspace per unit

EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)

Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003

http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls