No-Build Alternative

The No-Build Alternative would have an adverse effect on the Mukilteo Shoreline Site, but would avoid effects on any of the other historic properties. The replacement of the passenger building would likely require below-ground seismic and utility upgrades, which could intrude upon the northern edge of the Mukilteo Shoreline Site. The Mukilteo Shoreline Site has been identified at the intersection of Front Street and SR 525 at a shallow depth.

Preferred Alternative

The Preferred Alternative moves the terminal and its facilities to the Mukilteo Tank Farm parcel, which coincides in part with the east end of the Mukilteo Shoreline Site (45SN393). The Preferred Alternative places all project elements requiring excavation outside the midden. Some smaller buildings, paved roadways, holding lanes, and other parts of the multimodal facility would be constructed above the midden. All project elements above the midden will be built on a protective layer of fill to avoid intersecting the archaeological site. Because the project could still encounter unidentified archaeological resources, WSDOT and FTA have consulted under Section 106 to define the measures the project will take to protect the resource and resolve any adverse effects to the midden site, should they occur.

Through the Section 106 consultations, WSDOT and FTA defined a collaborative planning and cultural design process to guide further development of the project in collaboration with affected Native American tribes. This process will help define potential design features and themes to help commemorate the Mukilteo Shoreline Site as well as the Point Elliott Treaty Site. During final design, the project will continue a collaborative process to further develop the project’s commemorative and interpretive features, which include potential viewpoints, a “long house” design concept for the passenger building, and other design concepts to be considered for project facilities. However, the Preferred Alternative would not alter any of the characteristics that make the Point Elliott Treaty Site eligible for the NRHP, and aside from the geographic setting, there are no remaining features related to the site’s historic significance.

The Preferred Alternative overlaps the known limits of the Old Mukilteo Townsite (45SN404). Maximum depth of excavation in this area will be approximately 7 feet below finished grade for the installation of utilities. The mechanically stabilized earth walls along First Street within the site boundary will require 2 to 3 feet of excavation, and an approximate maximum width of 11 feet at each footing. A stormwater treatment pond will be located near First Street and Park Avenue, intersecting the Old Mukilteo Townsite. The size and depth of this pond has not yet been determined, but could intersect the Old Mukilteo Townsite.

FTA and WSDOT determined excavation will have an adverse effect on the Old Mukilteo Townsite and may have an adverse effect on the Mukilteo Shoreline Site. DAHP concurred with an adverse effect finding for the project under Section 106. FTA and WSDOT then undertook consultations under Section 106 to develop a Memorandum of Agreement (MOA) defining the measures the project will take to resolve adverse effects.
By limiting excavation and using fill to establish a protective layer, the Preferred Alternative would avoid or minimize adverse effects to the Mukilteo Shoreline Site, and this also reduces potential effects to portions of Mukilteo Shoreline Site. The MOA describes the measures and commitments the project will make to resolve adverse effects to historic properties, which include a resource management plan to guide actions during future design and construction activities. The Draft MOA is included as Appendix J to this EIS.

**Existing Site Improvements Alternative**

The Existing Site Improvements Alternative has the potential to damage the Mukilteo Shoreline Site because the replacement ferry passenger/maintenance building at the northern edge of the site is expected to exceed the dimensions of the foundations for the existing building or Ivar’s restaurant, and additional utility connections and upgrades would be needed. Excavation for utilities and stormwater features is anticipated near the intersection of Front Street and Park Avenue, where parts of the Mukilteo Shoreline Site and the Old Mukilteo Townsite are located.

New roadways and holding lanes would likely be built on fill and so are not expected to adversely affect subsurface material, but retaining walls would be needed for the First Street extension and the south end of the employee parking area, which could adversely affect historic archaeological material associated with the Old Mukilteo Townsite. The transit center, stormwater facilities, or other utilities could also be in areas with archaeological materials.

**Elliot Point 1 Alternative**

The Elliot Point 1 Alternative would move the terminal east of the boundaries of the Mukilteo Shoreline Site and the Old Mukilteo Townsite, with several of the associated facilities built over water. An adverse effect on the Old Mukilteo Townsite could result from excavation for a stormwater pond, utilities, and the retaining wall needed for the First Street extension. The Japanese Gulch Site could be adversely affected by daylighting Japanese Creek, installing a nearby sanitary sewer pump station/generator, and extending First Street.

The alternative would place fill and a roadway above the eastern edge of the Mukilteo Shoreline Site, and the site layout allows most utilities to be routed around the midden. The alternative’s footprint overlaps the least with the boundaries of the site. Similar to the Preferred Alternative, fill would be used to avoid disturbing the midden.

**4.6.5 Indirect and Secondary Impacts**

Indirect and secondary impacts are project activities or plans that could change the qualities for which historic resources are listed or considered eligible for the NRHP, but are not direct impacts (such as right-of-way acquisitions). These are caused by the project, but later in time or farther removed in distance from the APE, and are reasonably foreseeable. For historic resources, these impacts may include visual, air quality, noise, or traffic impacts that could cause changes to the historic setting or use of the historic resources. The existing terminal site would be available for
redevelopment with the Preferred Alternative and the Elliot Point 1 Alternative. The redevelopment of some portions of the existing terminal site could encounter identified archaeological sites.

4.6.6 Cumulative Impacts

Cumulative impacts result from the incremental effect of the proposed action when added to those of other past, present, and reasonably foreseeable future actions, regardless of the agency (federal or non-federal) or person that undertakes other such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

Past and present development has removed or altered the character of many cultural resources in the central Puget Sound region during the last 150 years. The development and subsequent loss of character or integrity of historic properties follows a national trend, which lead to the passage of federal and state regulations to protect these resources. In 1966, Congress passed the NHPA to slow the trend of loss. Washington State and Snohomish County also have regulations to protect cultural resources and to consider effects on properties eligible for listing in the Washington Historic Register or in the Snohomish County Register of Historic Places. Although many resources have already been lost, the rate of attrition is slowing because of federal, state, and local protections and an increasing public interest in preserving the nation’s cultural heritage for future generations.

Although the mitigation measures described below would greatly minimize this project’s impacts on historic resources, this project and future development along the Mukilteo shoreline could contribute to cumulative impacts on historic resources in the area. As discussed in Chapter 2 Alternatives, the U.S. Air Force may transfer ownership of the Mukilteo Tank Farm to the Port of Everett. The U.S. Air Force land conveyance is independent of the Mukilteo Multimodal Project. It is permitted by Section 2866 of the Military Construction Authorization Act for Fiscal Year 2001 (division B of the Spence Act; 114 Stat. 1654A-436, as amended by Section 2858 of the National Defense Authorization Act for Fiscal Year 2002 [PL 107-107]). Thus, regardless of the alternative selected for this project, a portion of the Mukilteo Tank Farm may be available for redevelopment. This redevelopment could cause impacts to historic and cultural resources, although a preservation covenant would be included with the conveyance of property to the Port of Everett.

4.6.7 Mitigation Measures for Adverse Effects

FTA has determined that construction and operation of this project could cause adverse effects on historic properties and with WSDOT has consulted with DAHP, ACHP, affected tribes, and other interested parties, pursuant to the NHPA. The project’s MOA and an associated resource management plan will dictate the specific commitments and approach to resolve adverse impacts on historic properties for the Preferred Alternative. While this Final EIS addresses impacts under all of the alternatives, the MOA applies specifically to the Preferred Alternative. Should a different alternative be advanced, FTA and WSDOT and the consulting parties would develop an MOA specific to that alternative.
Preferred Alternative

A signed MOA would need to be in place before the project can be approved by FTA. The draft that is currently under consideration by the consulting parties is provided in Appendix J. It calls for the continued participation of the consulting parties in the development of the project, and it defines measures to:

- Guide the design and construction of the project to avoid excavation with the limits of the Mukilteo Shoreline Site
- Develop the project with cultural design elements to recognize the importance of the Point Elliott Treaty Site as a traditional place and a site of historic and cultural significance
- Guide project design and archaeological research for areas affecting the Old Mukilteo Townsite, and address the Preferred Alternative’s unavoidable excavation impacts
- Develop and implement an archaeological monitoring plan, a data recovery plan, a curation plan, an inadvertent discovery plan, and a plan specific to the potential recovery of human remains
- Make public findings of archaeological investigations conducted under the resource management plan
- Allow interested and affected tribes to participate in the project’s archaeological monitoring activities
- Document compliance with the terms of the MOA

No-Build Alternative

For this alternative, impacts would be avoided or minimized if the project would maintain the same foundation location for the passenger building, and if seismic and utility upgrades can be accomplished without excavating into the midden area. If this is not possible, the project would apply avoidance, minimization, and data recovery measures for the affected resources, in consultation with DAHP and other interested parties.

Existing Site Improvements Alternative

For areas where excavation or other construction is expected to encounter archaeological materials, the Existing Site Improvements Alternative would apply similar avoidance, minimization, and data recovery measures as those described for the Preferred Alternative. New building construction, trenches, drains, and underground utilities would be sized and located to minimize impacts. All in-ground work would be monitored within the boundaries of identified archaeological sites or where pre-construction surveys identify that archaeological deposits may be encountered. To the extent possible, subsurface work in archaeological sites would take place in previously disturbed areas.
Elliot Point 1 Alternative

The Elliot Point 1 Alternative would apply similar avoidance, minimization, and data recovery measures as described for the Preferred Alternative. New building construction, trenches, drains, and underground utilities would be sized and located to minimize impacts. All in-ground work would be monitored in areas within the identified archaeological sites or where pre-construction surveys indicate archaeological deposits may be encountered. To the extent possible, subsurface work in archaeological sites would take place in previously disturbed areas.

4.7 Air Quality

Air quality refers to the level of pollutants in the atmosphere. Air pollution is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, and/or harming human or animal health. Federal and state regulations prohibit air pollution and require an analysis of air quality impacts for proposed projects.

Vehicle emissions from traffic congestion in the Puget Sound area contribute several air pollutants. Air pollutants affect public health, especially the health of the young, the elderly, and those with sensitive respiratory conditions. The major pollutants of concern in the Puget Sound region include carbon monoxide (CO), oxides of nitrogen (NOx), particulate matter less than 10 microns in size (PM10), particulate matter less than 2.5 microns in size (PM2.5), and ozone (O3).

4.7.1 Overview of Analysis and Regulatory Context

Several state and federal regulations provide for the protection of air quality.

The Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants determined harmful to public health and the environment. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, as well as damage protection for animals, crops, vegetation, and buildings.

Under the CAA, the EPA has set NAAQS for six “criteria pollutants”: CO, PM10, PM2.5, O3, sulfur dioxide (SO2), lead, and nitrogen dioxide (NO2). The NAAQS specify maximum allowable concentrations for these criteria pollutants. The standards applying to transportation projects are summarized in Table 4.7-1.

Federal regulations require that projects conform to and do not exceed the NAAQS. These standards were established to protect human health and welfare. “Maintenance areas” are locations that previously did not meet the NAAQS, but with air quality improvement these areas now meet the standards.

Other regulations direct the EPA to implement policies and regulations that will ensure acceptable levels of air quality.
The CAA and the Final Transportation Conformity Rule apply to proposed transportation projects. The CAA requires federally funded transportation projects to conform to applicable State Implementation Plans.

Table 4.7-1. Summary of National Ambient Air Quality Standards

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Primary Standards</th>
<th>Secondary Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level</td>
<td>Averaging Time</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>9 ppm</td>
<td>8-hour</td>
</tr>
<tr>
<td></td>
<td>(10 mg/m³)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35 ppm</td>
<td>1-hour</td>
</tr>
<tr>
<td></td>
<td>(40 mg/m³)</td>
<td></td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>0.15 µg/m³</td>
<td>Rolling 3-Month Average</td>
</tr>
<tr>
<td></td>
<td>1.5 µg/m³</td>
<td>Quarterly Average</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td>53 ppb</td>
<td>Annual (Arithmetic Average)</td>
</tr>
<tr>
<td></td>
<td>100 µg/m³</td>
<td>1-hour</td>
</tr>
<tr>
<td>Particulate Matter (PM₁₀)</td>
<td>150 µg/m³</td>
<td>1-hour</td>
</tr>
<tr>
<td>Particulate Matter (PM₂.₅)</td>
<td>15.0 µg/m³</td>
<td>Annual (Arithmetic Average)</td>
</tr>
<tr>
<td></td>
<td>35 µg/m³</td>
<td>24-hour</td>
</tr>
<tr>
<td>Ozone (O₃)</td>
<td>0.075 ppm</td>
<td>8-hour</td>
</tr>
<tr>
<td></td>
<td>0.12 ppm</td>
<td>1-hour</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO₂)</td>
<td>0.03 ppm</td>
<td>Annual (Arithmetic Average)</td>
</tr>
<tr>
<td></td>
<td>0.14 ppm</td>
<td>24-hour</td>
</tr>
<tr>
<td></td>
<td>75 ppb</td>
<td>1-hour</td>
</tr>
</tbody>
</table>

Notes:
(1) Not to be exceeded more than once per year.
(2) The official level of the annual NO₂ standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
(3) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb.
(4) Not to be exceeded more than once per year on average over 3 years.
(5) To attain this standard, the 3-year average of the weighted annual mean PM₂.₅ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
(6) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³.
(7) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.
(a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.
(8) To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.
ppm = parts per million; ppb = parts per billion
The Final Conformity Rule requires that projects do not:

- Cause or contribute to any new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

**Air Toxics**

EPA regulates air toxics, which are pollutants known or suspected to cause cancer or other serious health effects. The CAA identified 188 air toxics, 21 of which result from mobile sources. EPA has not established ambient standards for Mobile Source Air Toxic (MSAT) levels, so non-attainment areas have not been designated and conformity requirements for MSAT emissions have not been promulgated.

Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

EPA has identified seven hazardous MSATs that have significant contributions from mobile sources: acrolein; benzene; 1,3-butadiene; diesel particulate matter, formaldehyde, naphthalene, and polycyclic organic matter. The health risk from MSAT exposure is related to cancer and long-term ailments, not emergent disease, like asthma attacks. Unlike pollutants such as ozone and carbon monoxide that have emission limits and are subject to transportation conformity, there are no emission standards for MSATs. While modeling tools can estimate MSAT emissions from a project, information regarding MSATs is still evolving and there are limited tools for determining project-specific health outcomes (cancer risk) from MSAT exposure.

### 4.7.2 Affected Environment

**Puget Sound Regional Air Quality Trends**

For air quality purposes, the study area for the project encompasses the four-county urban area. Air quality in the study area is managed by EPA, Ecology, and the Puget Sound Clean Air Agency (PSCAA).

The Puget Sound area encompasses a large portion of the Everett-Seattle-Tacoma urban area, including surrounding communities such as Mukilteo. Prior to 1996, the Puget Sound area was classified as a non-attainment area for CO because monitoring sites showed that CO concentrations had exceeded the NAAQS. In 1996, it was reclassified as a maintenance area for CO, meaning that the area met NAAQS and a maintenance plan was implemented to prevent the area from being reclassified to non-attainment.

Another pollutant of interest in the Puget Sound region is particulate matter or dust. Standards regulate the portion of dust that is less than 10 microns in size; stricter standards apply to particles less than 2.5 microns. Particles of these sizes are small enough to enter the lungs when inhaled. The region is in attainment (meets NAAQS).
for both sizes of particulate matter; therefore, no project-level analysis for particulate matter is required.

Over the past 20 years, air quality in the region has improved, even with increases in both population and vehicle miles traveled. Much of the improvement in air quality is due to improvements made to emission controls on motor vehicles, the vehicle Inspection and Maintenance (I&M) program administered by Ecology, and the retirement of older, more polluting vehicles. However, over the past several years, levels of emissions of fine particulates and ozone have been on the rise, and new concerns such as air toxics, visibility, and climate change have grown.

NO\textsubscript{x} are a concern in the region due to their role in the formation of ozone (along with volatile organic compounds in the presence of sunlight); however, emissions of this pollutant have been dramatically reduced in the region.

Because of EPA’s more stringent standards for both ozone and fine particulates, the region could soon be designated as non-attainment for these pollutants.

Emissions of carbon monoxide, sulfur oxides, and lead are below levels of concern in the region. The National Air Toxic Assessment is an ongoing comprehensive evaluation of air toxics conducted by EPA. It indicates that air toxics risk in the Puget Sound region is similar to other major urban areas. Voluntary programs, such as the local Diesel Solutions Program and Ecology’s Clean Cities Program, seek to reduce toxic diesel emissions by encouraging public and private fleet operators to use ultra-low sulfur diesel and/or to install retrofit devices to filter or oxidize vehicle exhaust (PSCAA 2005). Ecology and EPA support other voluntary programs that encourage diesel emission reductions.

**Existing Meteorological Conditions**

Ambient air quality is a function of many factors, including climate, topography, meteorological conditions, and the production of airborne pollutants by natural or artificial sources.

The project site is subject to the same meteorological conditions that affect the Puget Sound. This region has a marine climate, dominated by cool, moist winds coming off the ocean. Temperature inversions are common throughout the Puget Sound area in the fall and winter, and these conditions tend to trap and concentrate pollutants. In most cases, inversions have an upper lid at an altitude between 1,000 and 3,000 feet, occur during the night, and break up by early afternoon. The project is close to sea level, less than 1,000 feet elevation, and is therefore within an area subject to inversions.

During the summer, winds typically tend to be light and variable (less than 10 miles per hour). Persistent high-pressure cells often dominate summer weather, creating stagnant air conditions. This weather pattern sometimes contributes to the formation of photochemical smog. Because of its location north of the major urban centers of Seattle and Tacoma and the northerly winds during the summer months, the Mukilteo area generally experiences fewer instances of stagnant air conditions.

Although the Puget Sound lowland is the most densely populated and industrialized area in Washington, there is sufficient wind most of the year to disperse air.
pollutants. Air pollution is usually most noticeable in the late fall and winter, under conditions of clear skies, light wind, and a sharp temperature inversion, when particulates and CO from wood stoves and vehicle sources can be trapped close to the ground. If poor dispersion persists for more than 24 hours, PSCAA can declare an air pollution episode or local impaired air quality.

Ecology issues a daily Air Quality Index (AQI) using forecast meteorology and real-time pollutant monitoring. There have been several instances of air quality advisories categorizing air pollution in the region as moderate or unhealthy for sensitive groups.

Attainment Status and Regional Air Quality Conformity

The State Implementation Plan (SIP) directs that transportation activities may not produce new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. As detailed below, the project is not expected to create any new violations or increase the frequency of an existing violation of the CO standard; it would conform with the SIP and the requirements of the federal CAA and the Washington Clean Air Act. As a regionally significant project, the proposed project is included in the current regional transportation plan (RTP), and in the Central Puget Sound Regional 2007-2010 Transportation Improvement Program (TIP), which lists all current transportation projects (PSRC 2009). The RTP and the TIP meet the conformity requirements identified by federal regulators.

4.7.3 Long-Term Environmental Impacts

Regional Impacts

For all alternatives, the project conforms with the SIP because it does not:

- Cause or contribute to any new violations of the NAAQS
- Increase the frequency or severity of any existing violation of the NAAQS
- Delay the timely attainment of the NAAQS

Improvements to the transportation system that are independent of this project would reduce emissions from vehicles and improve air quality in the study area. Programs and trends, such as the Puget Sound I&M program, stricter vehicle emission standards and higher fuel efficiency for new cars, and gradual replacement of older, more polluting vehicles with newer, cleaner cars, are expected to continue to reduce vehicle emissions.

Voluntary programs also are expected to contribute to emissions reductions. The WSDOT Ferries Division participates in voluntary emission reduction programs, such as the PSCAA "Diesel Solutions" Program. WSDOT has switched its fleet to low-sulfur diesel fuel and biodiesel to reduce emissions and is evaluating methods for reducing fuel consumption, including reducing travel speeds and performing engine retrofits. WSDOT also plans to replace the current 124-vehicle vessels operating on the Mukilteo-Clinton route with 144-vehicle vessels, which would result in shorter queues and help reduce the amount of idling in the holding areas. Newer generation ferries also have engines that reduce emissions, which will also help to improve future air quality.
According to PSRC’s *Vision 2040*, “regional air pollution trends have generally followed national patterns over the last 20 years, with the level of criteria air pollutants decreasing over the last decade to levels below the federal standards” (PSRC 2010). In general, the air quality in the central Puget Sound region has either remained steady or improved over the last 5 years. Cleaner cars, industries, and consumer products have contributed to cleaner air throughout much of the United States, including in the central Puget Sound region, and this trend is likely to continue.

All Build alternatives will change the location of the ferry terminal, but the number of sailings will remain the same as today. The cumulative effects of the ferry emissions will also remain the same as today or get better over time. The same is true for emissions from vehicles waiting for the ferry. In the worst-case scenario, about 20 percent of the vehicles will idle while waiting for the ferry. These emissions will be reduced as WSDOT adds larger capacity vessels and as vehicles become cleaner over time.

The predominant wind direction in this area is from the southwest in the summer and northwest in the winter. This means that emissions from the new terminal location would typically be dispersed away from local residents.

As described in more detail below, worst-case operational CO concentrations were modeled for the No-Build Alternative and the Build alternatives. No exceedance of the 35 ppm 1-hour average or the 9 ppm 8-hour average NAAQS for CO would occur at any receptor location.

Regional impacts were considered for the Central Puget Sound CO maintenance area. Impacts during construction were evaluated on a regional scale, including the Central Puget Sound CO maintenance area.

As a regionally significant project, the proposed project is included in the current RTP and in the TIP, which meet the conformity requirements identified by federal and state regulations for CO.

Ozone concentration was not modeled for this project because it is modeled on a regional scale by the PSRC, and is not likely to be an impact. The primary source of air pollution in the project area is vehicle emissions. The presence of traffic queues at the existing toll booths and vehicles traveling to the ferry may result in short-term periods of high vehicle emissions and elevated CO concentrations. However, the low-rise residential and commercial structures do not trap emissions, reducing the likelihood of elevated pollutant concentrations.

**Localized Impacts**

Because the project area is in a maintenance area for CO, a project-level analysis must verify that no localized impacts would cause, contribute to, or worsen a violation of the NAAQS. The analysis calculates CO concentrations around selected intersections, which are chosen based on their high levels of traffic volumes and delay.

Potential long-term air quality impacts were estimated according to the guidelines provided in the EPA’s *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (EPA 1992a). This analysis (called a hot-spot analysis) predicts CO concentrations
and compares air quality conditions under various scenarios to the NAAQS for CO at selected locations. The NAAQS provide two types of standards for CO: an 8-hour standard of 9 ppm and a 1-hour average standard of 35 ppm.

The analyzed sites were the signalized intersections that would be directly affected by this project, as well as those indirectly affected and within the project vicinity. Air quality was modeled for the existing conditions in 2010, the year of opening (2019), and the horizon year (2040) for all the alternatives.

Five intersections were analyzed for CO impacts:

- SR 525/5th Street (all alternatives)
- SR 525/First Street (all Build alternatives)
- West Driveway/First Street (Elliot Point 1 Alternative)
- East Driveway/First Street (Elliot Point 1 Alternative)
- Toll booth and First Street (Preferred Alternative)

As shown in Table 4-7.2, the results for the worst-case receptor are below the 1-hour average NAAQS for CO of 35 ppm and below the 8-hour average standard of 9 ppm. This confirms that the air quality would improve within the vicinity of the project area, resulting in no exceedance of the CO air quality standards in 2040.

### Table 4-7.2. Maximum Predicted CO Concentrations (ppm)

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>SR 525/5th Street</th>
<th>SR 525/First Street</th>
<th>West Driveway/First Street</th>
<th>East Driveway/First Street</th>
<th>Toll Booths and First Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 hr</td>
<td>1 hr</td>
<td>8 hr</td>
<td>1 hr</td>
<td>8 hr</td>
<td>1 hr</td>
</tr>
<tr>
<td>2010 (Existing)</td>
<td>5.1</td>
<td>4.5</td>
<td>4.3</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>2019 No-Build</td>
<td>4.2</td>
<td>3.8</td>
<td>4.3</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>2019 Existing Site Improvements</td>
<td>4.2</td>
<td>3.8</td>
<td>4.3</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>2019 Elliot Point 1</td>
<td>4.2</td>
<td>3.8</td>
<td>4.3</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>2019 Preferred Alternative</td>
<td>4.2</td>
<td>3.8</td>
<td>3.9</td>
<td>3.6</td>
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<tr>
<td>2040 No-Build</td>
<td>4.8</td>
<td>4.3</td>
<td>4.3</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>2040 Existing Site Improvements</td>
<td>4.8</td>
<td>4.3</td>
<td>4.3</td>
<td>3.9</td>
<td>4.2</td>
</tr>
<tr>
<td>2040 Elliot Point 1</td>
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<td>4.3</td>
<td>4.3</td>
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<tr>
<td>2040 Preferred Alternative</td>
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<td>4.3</td>
<td>4.3</td>
<td>3.9</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Note: Gray cells indicate that the intersection does not exist under a given alternative.

### Mobile Source Air Toxic Emissions in the Project Area

MSAT emissions are discussed qualitatively for the project because operations are not expected to change among alternatives. For each alternative in this EIS, the amount of MSATs emitted would be proportional to the vehicle miles traveled...
(VMT), assuming that other variables such as fleet mix are the same for each alternative. Because the estimated VMT under each of the alternatives is the same, there would be no appreciable difference in overall MSAT emissions among the alternatives. Also, regardless of the alternative chosen, MSAT emissions would be lower than present levels in the design year as a result of EPA’s national control programs that are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050.

Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future.

Some public comments on the Draft EIS expressed concerns that areas beyond the holding area would be negatively affected by air quality changes due to the project. However, the standards used to assess emissions of any kind, including criteria pollutants such as carbon monoxide, as well as MSATs, are based on locations with the highest concentrations of operating vehicles. For areas that are more removed from the emissions sources (such as the surrounding inland areas of Mukilteo), the effects would be even lower than the worst case “hot spot” locations modeled.

Similarly, some comments also expressed concerns for workers who may be exposed to higher levels of emissions in their daily work, due to vehicle emissions during loading and unloading, as well as from the ferries themselves. Since the volume of vehicles and the ferries operations remain the same under the No-Build Alternative and the Build alternatives, there would be no additional impact for any of the Build alternatives. As part of its ongoing programs at an agency-wide level, WSDOT’s health and safety plans will continue to incorporate best practices to help reduce potential negative effects to workers. As cleaner ferry and vehicle engines continue to replace older models, the potential exposure to emissions will also continue to be reduced.

### 4.7.4 Construction Impacts

Construction activities typically associated with roadway projects can temporarily generate particulate matter (mostly dust) and small amounts of other pollutants. These emissions are often associated with earthwork and demolition activities. If uncontrolled, particulate matter would also be generated by construction trucks entering roadways, and depositing dust and mud on paved streets.

Heavy trucks, barges, and construction equipment powered by gasoline and diesel engines would generate CO and NOx in exhaust emissions. If construction traffic were to reduce the speed of other vehicles in the area, emissions from traffic would increase slightly while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site. In addition, people near asphalt paving operations may detect temporary odors. These odors would decrease with increased distance from the source.

Construction activities would include demolition of pavement and bridge structures, earthwork, new bridge construction, and new paving. Equipment to be used for construction would include pile-driving equipment, truck cranes, vibratory oscillator, dump trucks, loaders, excavators, and typical paving equipment such as graders, asphalt
pavers, and rollers. The air emissions from these types of construction projects would be slightly greater for the Elliot Point alternatives because they require more fill and other materials than the No-Build and the Existing Site Improvements alternatives.

PM$_{10}$ emissions may be associated with project construction, particularly for earthwork or demolition activities. PM$_{10}$ emissions can vary from day to day, depending on the level of activity, specific operations, and weather conditions. PM$_{10}$ emissions depend on soil moisture, silt content of soil, wind speed, and amount and type of equipment in operation. Larger dust particles settle near the source, while fine particles are dispersed over greater distances from the construction site.

PM$_{10}$ emission from construction activities is noticeable if uncontrolled. Mud and particulates from trucks can be noticeable, particularly if construction trucks travel on local streets.

Burning would not be allowed in the project area, so there would be no contribution of particulate matter from burning.

4.7.5 Indirect and Secondary Impacts

The project would produce indirect impacts on air quality from two sources: 1) primarily from trucks hauling construction materials to and from the SR 525 corridor, and 2) particulate release from excavation and trucking of fills from borrow sites outside the project’s construction zone.

4.7.6 Cumulative Impacts

Historical Trend

According to PSRC’s Transportation 2040, “regional air pollution trends have generally followed national patterns over the last 20 years, with the level of criteria air pollutants decreasing over the last decade to levels below the federal standards” (PSRC 2010). In the same document, PSRC points out that CO levels have decreased substantially in the region, in large part because of federal emission standards for new vehicles and the gradual replacement of older, more polluting vehicles. Additionally, improvements in fuels, inspection programs, and traffic control measures have also helped to decrease CO emissions. The central Puget Sound region has designated maintenance areas for CO and particulate matter. The region is in attainment for all other criteria pollutants. In general, the air quality in the central Puget Sound region has either maintained or seen improvements over the last 5 years. Cleaner cars, industries, and consumer products have contributed to cleaner air throughout much of the United States, including in the central Puget Sound region; this trend is likely to continue.

Impacts of the Project Alternatives

The air quality analysis for PSRC’s Transportation 2040 considers the long-term cumulative impacts of air pollutant emissions by incorporating traffic forecasts for regionally significant projects in the region. This analysis includes traffic from this project, as well as future development such as the Sound Transit Mukilteo Station improvements and both residential and commercial development in the downtown
core. By including these projects in its RTP, PSRC has analyzed possible cumulative impacts associated with the project, and has not identified long-term regional cumulative air quality impacts.

Localized cumulative air quality impacts could result if other construction projects occur concurrently with construction for this project, and if construction detours and material haul routes are not well coordinated.

### 4.7.7 Mitigation Measures

#### Mitigation for Long-Term Impacts

The operation of the Build alternatives would not generate additional traffic, but would better serve the traffic that is expected to increase whether this project is built or not. The air quality analysis indicates that the Mukilteo Multimodal Project would not result in any significant adverse air quality impacts in the study area. Consequently, no operational impact mitigation measures are warranted or proposed.

#### Mitigation for Construction Impacts

**Preferred Alternative**

For the Preferred Alternative, WSDOT would require contractors to develop a construction management plan to identify measures to mitigate air quality impacts. The plan would attempt to minimize roadway congestion and would be designed to conserve energy and reduce air emissions by limiting idling equipment, encouraging construction workers to carpool, and locating staging areas near work sites.

The construction management plan would encourage contractors to apply EPA’s National Clean Diesel Campaign emission reduction strategies, including:

- Replace old vehicles or equipment with newer, cleaner models
- Maintain engines properly to burn fuel more efficiently
- Install diesel particulate filters, diesel oxidation catalysts, crankcase emission control devices, and/or new engine components
- Use technologies that provide amenities such as cabin heat and air conditioning without operating the main engine, allowing for reduced idling
- Use fuels such as ultra-low sulfur diesel, biodiesel, liquid petroleum gas, compressed natural gas, or liquefied natural gas

Fugitive dust emissions would be reduced by incorporating mitigation measures specified in the *Associated General Contractor of Washington Guidelines* into the construction specifications for the project. Possible mitigation measures to control fugitive dust emissions during construction are listed below (Associated General Contractors of Washington 1997).

- Spray exposed soil with water to reduce emissions of PM$_{10}$ and the deposition of particulate matter
- Minimize dust emissions during transport of fill material or soil by wetting down or covering the load
- Promptly clean up spills of transported material on public roads
- Locate construction equipment and truck staging areas away from residences, as practicable, and in consideration of potential impacts on other resources
- Provide wheel washers to remove particulate matter that would otherwise be carried off site by construction vehicles
- Cover dirt, gravel, and debris piles, as needed, to reduce dust and wind-blown debris
- Minimize on-site odors by covering loads of hot asphalt

Other Alternatives

Construction mitigation for the No-Build, Existing Site Improvements, and Elliot Point 1 alternatives would be similar to the measures identified for the Preferred Alternative.

4.7.8 Conformity Determination

This project meets project-level air quality conformity in accordance with state and federal regulations as follows:

- The project is included in PSRC’s RTP.
- The project is included in the current TIP.
- The project meets the local hot-spot conformity requirements. Because the project has been included in the RTP and TIP modeling, it demonstrates conformity to the SIP. The project meets project-level conformity requirements because it would not cause any new NAAQS exceedance or worsen any existing one, and would not delay the timely attainment of any standard.

4.8 Hazardous Materials

Hazardous material is a term describing a substance that may harm humans or the environment. Hazardous materials may be classified in different categories based on the laws and regulations that define their characteristics and uses. These classifications include hazardous waste, dangerous waste, hazardous substances, and toxic substances. Hazardous materials contamination refers to soil, sediment, or water that carry some level of toxic substance not normally found in the natural environment, typically due to an uncontrolled release of hazardous materials.

This section evaluates the impacts that existing or future hazardous materials could have on people and the environment, and discusses how the potential presence of existing hazardous materials could affect the construction or implementation of project alternatives. The section also describes measures to avoid or mitigate impacts.
4.8.1 Overview of Analysis and Regulatory Context

Numerous federal, state, and local laws; regulations; guidance documents; and policies govern the handling and disposal of hazardous materials and the remediation of media contaminated with hazardous materials. The most common federal and state laws and regulations pertaining to hazardous materials that apply to WSDOT projects are listed in Table 4.8-1. A detailed description of each law and regulation in this list is provided in the Hazardous Materials Discipline Report, which is an appendix to this EIS. Ecology’s Model Toxics Control Act (MTCA) cleanup regulations (Chapter 173-340 WAC) and the Sediment Management Standards (SMS) (Chapter 173-204 WAC) regulate management and disposal of contaminated soil, groundwater, surface water, and sediment.

Table 4.8-1. Laws, Regulations, Guidance Documents, and Policies Governing Handling, Disposal, and Remediation of Hazardous Materials

<table>
<thead>
<tr>
<th>Federal Laws and Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Air Act (CAA)</td>
</tr>
<tr>
<td>Clean Water Act (CWA)</td>
</tr>
<tr>
<td>Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 USC §§ 9601 - 9675), the Superfund Amendments and Reauthorization Act (SARA), and All Appropriate Inquiries (AAI) (40 CFR Part 312)</td>
</tr>
<tr>
<td>National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Parts 61 to 71)</td>
</tr>
<tr>
<td>Occupational Safety and Health Act of 1970</td>
</tr>
<tr>
<td>Toxic Substances Control Act (TSCA)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State Laws and Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Air Act and Local Air Agency Regulations</td>
</tr>
<tr>
<td>Dangerous Waste Regulations (WAC 173-303)</td>
</tr>
<tr>
<td>Dredged Material Management Program (RCW 79.105.510 and 520, WAC 332.30.166)</td>
</tr>
<tr>
<td>Model Toxics Control Act (MTCA) (RCW 70.105D) and MTCA regulations (WAC 173-340)</td>
</tr>
<tr>
<td>Sediment Management Standards (WAC 173-204)</td>
</tr>
<tr>
<td>Solid (Non-Dangerous) Waste Disposal (RCW 70.95, WAC 173-304)</td>
</tr>
<tr>
<td>Underground Storage Tank Statute (RCW 90.76) and Regulations (WAC 173-360)</td>
</tr>
<tr>
<td>Underground Utilities (RCW 19.122)</td>
</tr>
<tr>
<td>Washington Industrial Safety and Health Act (WISHA, RCW 49.17) and implementing regulations</td>
</tr>
<tr>
<td>Lead-Based Paint and Asbestos Work (WAC 296-62 Part I-1; WAC 296-65; WAC 296-155)</td>
</tr>
<tr>
<td>Hazardous Waste Operations and Treatment, Storage, and Disposal Facilities (WAC 296-62 Part P)</td>
</tr>
<tr>
<td>Safety Standards for Construction Work (WAC 296-155)</td>
</tr>
<tr>
<td>Wastewater Discharges to Ground (WAC 173-216)</td>
</tr>
<tr>
<td>Wastewater Discharges to Surface Waters (WAC 173-220)</td>
</tr>
<tr>
<td>Water Pollution Control Act (RCW 90.48), Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A), and Water Quality Standards for Groundwater of the State of Washington (WAC 173-200)</td>
</tr>
</tbody>
</table>
4.8.2 Affected Environment

The project area is defined as the footprint of all four project alternatives taken together. The hazardous materials study area surrounds and includes the project area and is the area within which hazardous materials, if released, might affect the project area. Figure 4.8-1 shows the boundaries of the project area and the study area and identifies sensitive receptors, which are areas with populations particularly sensitive to potential project-related releases of hazardous materials.

A total of 14 hazardous materials sites were identified in the study area, one of which is the Mukilteo Tank Farm. Figure 4.8-2 shows and Table 4.8-2 describes the sites and lists documented releases of hazardous materials based on past uses of hazardous materials at the sites and on remaining structures or facilities.

Mukilteo Tank Farm

The Mukilteo Tank Farm straddles the city limits of Mukilteo and Everett. The property is bounded by Possession Sound to the north, Park Avenue to the west, the BNSF tracks to the south, and the Port of Everett Mount Baker Terminal to the east.

The Mukilteo Tank Farm consists of nearly 20 acres of upland property and the associated Tank Farm Pier. The upland portion of the site, about 12 feet above mean sea level, is graded and flat. A protective riprap wall, approximately 10 feet high, separates the site from Possession Sound, with tidal flats and intertidal beaches exposed north of the site during low tide. The site is enclosed in some places by an 8-foot-high fence topped with barbed wire and in others by 10-foot-high concrete secondary tank containment walls. A gated entrance to the site is located on Front Street.

Major stages in the development of the property that is now the Mukilteo Tank Farm are summarized in Table 4.8-3. The site was originally developed as a lumber mill at the turn of the 20th century. During World War II, the mill property was sold to the U.S. Army, which established the Mukilteo Explosives Loading Terminal for loading ammunition onto ships bound for the Pacific theater. On-site structures at the time included administration buildings, facilities for vehicle maintenance (using oil, diesel, gasoline, and lubricating oils), an ammunition repair shop, several railroad spurs running the length of the property, coal-fired equipment, a pile-retaining wall, and two piers used for ammunition loading.

In 1951, the U.S. Air Force acquired the Mukilteo Tank Farm and constructed a bulk fuel storage and transfer facility, which included modifying the western pier (now known as the Tank Farm Pier) to load and unload fuel from vessels to rail cars. The U.S. Air Force later demolished the eastern trestle pier. Fill material was added to much of the site. The facility began operating, in association with McChord Air Force Base, in 1953 and continued until 1973, supplying jet propellant and aviation gasoline fuels to military installations in the Pacific Northwest.
Figure 4.8-1. Environmental Characteristics, Project Area, Sensitive Receptors, and Study Area

a. Stillpoint Osteopathic Center
b. Sound Acupuncture of Mukilteo
c. Serenity Adult Family Home
d. Art Workshop
e. Boys & Girls Club of Mukilteo
f. Rosehill Community Center
g. Little Orca Learning Center
h. Possession Sound
i. Japanese Creek
Figure 4.8-2. Hazardous Materials Site Locations
Table 4.8-2. Hazardous Materials Sites

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Description</th>
<th>Documented Releases or Past Uses of Hazardous Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>City of Mukilteo</td>
<td>Waterfront property west of current terminal</td>
<td>Potential presence of lead-based paint, asbestos, polychlorinated biphenyls (PCBs), mercury, creosote-treated timber and piles, and sediment contaminated with creosote.</td>
</tr>
<tr>
<td>2</td>
<td>Port of Everett</td>
<td>Mukilteo terminal is currently located here</td>
<td>Potential presence of lead-based paint, asbestos, PCBs, mercury, creosote-treated timber and piles, and sediment contaminated with creosote.</td>
</tr>
<tr>
<td>3</td>
<td>Ivar’s Real Estate</td>
<td>Property occupied by Ivar’s restaurant</td>
<td>Potential presence of lead-based paint, asbestos, PCBs, mercury, creosote-treated timber and piles, and sediment contaminated with creosote.</td>
</tr>
<tr>
<td>4</td>
<td>Silver Cloud Inn</td>
<td>Hotel immediately adjacent to the project area</td>
<td>Previously remediated site. Two gasoline underground storage tanks existed on the property. The western tank was closed in place in 1983. The eastern tank was removed in 1998. Ecology issued a No Further Action determination for the site in 1999.</td>
</tr>
<tr>
<td>5</td>
<td>WSDOT</td>
<td>Paved area already owned by WSDOT; primarily used for ferry holding</td>
<td>Potential presence of lead-based paint, asbestos, PCBs, and mercury.</td>
</tr>
<tr>
<td>6</td>
<td>A &amp; J Enterprises</td>
<td>Paved area currently being used for ferry holding</td>
<td>Diesel fuel releases encountered in 2009. This property was a gas station from the late 1940s to the mid-1950s. Underground storage tanks are the likely source of the petroleum hydrocarbon contamination.</td>
</tr>
<tr>
<td>7</td>
<td>Ivar’s Real Estate</td>
<td>Parking lot</td>
<td>Underground PCBs detected in 2009 at southern edge.</td>
</tr>
<tr>
<td>8</td>
<td>James Mongrain</td>
<td>Glass blowing manufacturing shop</td>
<td>Potential lead-based paint, asbestos, PCBs, and mercury.</td>
</tr>
<tr>
<td>9</td>
<td>BNSF Railway Corridor</td>
<td>Tracks adjacent to the project area</td>
<td>No available information indicates whether loading of hazardous materials, including petroleum products from the Mukilteo Tank Farm, occurred along BNSF tracks.</td>
</tr>
<tr>
<td>10</td>
<td>City of Mukilteo Public Works Shop</td>
<td>Building located about 260 feet south of the project area</td>
<td>Previously remediated site. Two underground storage tanks were located on the property. The tanks were removed in 1999 and all reasonably accessible contaminated soil was removed. Ecology issued a No Further Action determination for the site in 2006.</td>
</tr>
<tr>
<td>11</td>
<td>Mukilteo Garage</td>
<td>Repair shop and former gasoline service station located about 300 feet south of the project area</td>
<td>The automotive repair service operated from at least the late 1940s through the early 1970s. Two fuel dispensers were observed in front of the garage in December 2002 but were gone by May 2011.</td>
</tr>
<tr>
<td>12</td>
<td>Mukilteo Water District</td>
<td>Office building located about 1,250 feet south of the project area</td>
<td>The site had a gasoline underground storage tank that has been removed. No release has been reported for the site.</td>
</tr>
<tr>
<td>13</td>
<td>Mukilteo Tank Farm</td>
<td>Property occupies much of project area</td>
<td>Previously remediated site (see Table 4.8-3).</td>
</tr>
<tr>
<td>14</td>
<td>WSDOT</td>
<td>Part of property lies within the project area; WSDOT leases remainder to the Port of Everett for the Mount Baker Terminal facility</td>
<td>Asbestos and PCBs.</td>
</tr>
</tbody>
</table>

Site No.: Site number on Figure 4.8-2

¹ No Further Action is the determination used by Ecology to signify that a site cleanup achieved all site-specific cleanup standards.
Table 4.8-3. Mukilteo Tank Farm Hazardous Materials Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Property Owner/Operator</th>
<th>Event/Activity</th>
<th>Documented Releases or Past Uses of Hazardous Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1903</td>
<td>Crown Lumber Company</td>
<td>Lumber mill constructed.</td>
<td>Fuel oil, lubricating oil, coal storage</td>
</tr>
<tr>
<td>1930</td>
<td>Crown Lumber Company</td>
<td>Lumber mill closed.</td>
<td></td>
</tr>
<tr>
<td>1938</td>
<td>Unknown</td>
<td>Mill destroyed by fire.</td>
<td></td>
</tr>
<tr>
<td>Early 1940s</td>
<td>U.S. Army</td>
<td>Mukilteo Explosives Loading Terminal established, including two piers.</td>
<td>Vehicle maintenance (gasoline, diesel, lubricating oils); coal-fired power plant</td>
</tr>
<tr>
<td>1951</td>
<td>U.S. Air Force</td>
<td>Property acquired and converted to bulk fuel storage and transfer terminal, in association with McChord Air Force Base in Tacoma; fuel delivered to facility by barge, stored in 10 large aboveground tanks, and distributed by barge, rail car, and tanker truck.</td>
<td>Aviation gasoline, jet propellant</td>
</tr>
<tr>
<td>Mid-1960s</td>
<td>U.S. Air Force</td>
<td>Demolished trestle pier (east portion of property) used during World War II for loading ammunition onto ships; small pier added adjacent to the administration building (later the NOAA Mukilteo Research Station building).</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>Defense Logistics Agency (DLA)</td>
<td>Operation transferred; facility eventually designated as Defense Fuel Support Point (DFSP) Mukilteo. By the late 1970s, the pier was no longer used for loading fuel.</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>DLA</td>
<td>Fuel-contaminated soil discovered within bulk fuel storage tank containment structures.</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>DLA</td>
<td>First fuel oil recovery well installed north of and between Tanks 2 and 3.</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>DLA</td>
<td>Soil and groundwater in northeast portion of property found to be contaminated.</td>
<td>Chloroform; lead; methylene chloride; tetrahydrofuran; total petroleum hydrocarbons (TPHs), including benzene, toluene, ethylbenzene; jet propellant</td>
</tr>
<tr>
<td>1983-1984</td>
<td>DLA</td>
<td>Floating petroleum product observed on groundwater north of Tank 10 and in another recovery well.</td>
<td>Aviation gasoline product</td>
</tr>
<tr>
<td>1986-1987</td>
<td>DLA</td>
<td>Damaged section of underground pipeline north of Tank 9 led to estimated loss of 6,700 gallons of jet propellant to the ground, fuel seeps on the beach, and a sheen on Possession Sound.</td>
<td>Jet propellant</td>
</tr>
<tr>
<td>1986-1987</td>
<td>DLA</td>
<td>U.S. Navy divers recovered World War II-era ammunition shells from sediments beneath the Tank Farm Pier.</td>
<td>Ammunition shells</td>
</tr>
<tr>
<td>1989</td>
<td>DLA</td>
<td>Fuel storage and transfer operations ceased on the property.</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>DLA</td>
<td>Washington State Attorney General and DLA entered into a Remedial Action Order requiring DLA to complete a Remedial Investigation/Feasibility Study (RI/FS) for clean-up of the Mukilteo Tank Farm.</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>DLA</td>
<td>At least six underground and aboveground fuel, heating oil, waste fuel, and waste oil tanks were removed, and approximately 3,000 gallons of floating petroleum product were recovered.</td>
<td>TPHs, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), PCBs, and heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc) detected in soils during tank removal</td>
</tr>
<tr>
<td>1991-1994</td>
<td>DLA</td>
<td>Preliminary site investigation and remedial investigation performed at the site.</td>
<td>Jet propellant and aviation gasoline product floating on groundwater; contamination of soil, groundwater, surface water, and sediments by</td>
</tr>
</tbody>
</table>
Table 4.8-3. Mukilteo Tank Farm Hazardous Materials Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Property Owner/Operator</th>
<th>Event/Activity</th>
<th>Documented Releases or Past Uses of Hazardous Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993-1994</td>
<td>DLA</td>
<td>U.S. Navy underwater ordnance survey conducted in areas surrounding the Tank Farm Pier and the trestle pier; no ordnance were found.</td>
<td>previously documented chemicals</td>
</tr>
<tr>
<td>1994</td>
<td>Defense Fuel Supply Center (DFSC)</td>
<td>Ecology issues Enforcement Order to DFSC to address the documented releases of hazardous substances. The order replaced the previous remidal action order from 1990.</td>
<td></td>
</tr>
<tr>
<td>1995-1997</td>
<td>DFSC</td>
<td>Ecology approved site-specific cleanup standards using Washington State MTCA Method B practices in effect at the time. DFSC initiated collection and treatment of contamination by installation of remedial systems, including fuel product recovery, oil/water separation, soil vapor extraction, and air sparging.</td>
<td></td>
</tr>
<tr>
<td>1997-2002</td>
<td>DFSC (in 1998, renamed Defense Energy Support Center [DESC])</td>
<td>Remediation systems installed and operated to remove free product, product vapors, and contaminated groundwater. Remediation systems shut down in November 2000 on the east end of the property and in November 2002 on the west end of the property after performance monitoring indicated that contaminants were not detected or were found at concentrations below the cleanup levels negotiated with Ecology for the property.</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>DESC</td>
<td>Ecology issued written notification to DESC that the provisions of the Enforcement Order of 1994 had been satisfied, and no future remediation action was required.</td>
<td></td>
</tr>
<tr>
<td>2006-2007</td>
<td>DESC</td>
<td>WSDOT’s archaeological trenching and borings found contaminants of concern in excess of the site’s approved cleanup levels in soils in the west and central portions of the property, at depths of 9 to 12 feet below ground surface (see Figure 4.8-2), and petroleum hydrocarbons in excess of MTCA Method A cleanup levels, at depths of 8 to 12 feet below ground surface.</td>
<td>Benzene, toluene, ethylbenzene, and xylenes (BTEX), cPAHs, and gasoline-, diesel- and lube oil-range petroleum hydrocarbons</td>
</tr>
<tr>
<td>2010</td>
<td>U.S. Air Force</td>
<td>Development of an Environmental Baseline Survey assessing conditions on the site and updating information on current status of underground and aboveground storage tanks and other buildings.</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>U.S. Air Force</td>
<td>WSDOT sediment sampling in support of the EIS review and to address public and agency comments about contamination showed limited levels of contamination for an array of potential contaminants, but encountered contaminants of concern in excess of Dredged Material Management Program (DMMP) Screening Levels and SMS Sediment Quality Levels in the upper 8 feet of sediment around the pier perimeter. Contaminants of concern were also encountered from 8 to 12 feet below the mudline near the northeast corner of the former fuel pier.</td>
<td>Chlordanes, and polycyclic aromatic hydrocarbons (PAHs)</td>
</tr>
</tbody>
</table>

Fuel was delivered to the property by barge and was distributed by barge, railcar, and tanker trucks. Barge and railcar deliveries were transferred to and from 10 aboveground bulk fuel storage tanks; tanker truck deliveries were transferred at two truck-loading racks. In 1973, the U.S. Air Force transferred the Mukilteo Tank Farm land and facility to the Defense Logistics Agency (DLA), which, through the agency now known as the Defense Energy Support Center (DESC), continued operating the facility as a government-owned, contractor-operated fuel storage and transfer terminal. By the late 1970s, the Tank Farm Pier had fallen into disrepair and was no
longer used for loading fuel onto railcar tankers. In 1987, the government decided to close the Mukilteo Tank Farm facility and consolidate its mission with a facility in Manchester, Washington. Fuel storage and transfer operations on the property ceased in 1989.

In the late 1970s through the 1980s, hazardous materials were found in the soil, groundwater, surface water, and sediment on the Mukilteo Tank Farm. In 1979, soil contaminated with fuel oil was found in a number of bulk fuel storage tank containments. By 1982, a fuel recovery well had been installed between what was known as the main oil/water separator and the U.S. Air Force Aviation Fuels Laboratory (fuels laboratory), located on the north side of the property. In 1982, soil and groundwater in the northeastern portion of the property was found to be contaminated with chloroform, methylene chloride, tetrahydrofuran, benzene, ethylbenzene, toluene, and total petroleum hydrocarbons. Lead was also found in the groundwater. Several unknown compounds were also encountered. In 1983, 1984, 1986, and 1987, floating contaminants were found in the groundwater in several locations. The suspected sources were leaks from underground storage tanks and damaged underground distribution pipelines, including some that led to seeps to the beach and were visually observed as a sheen on Possession Sound.

In 1990 and 1994, the Washington State Office of the Attorney General, DLA, and Ecology developed remedial action agreements and enforcement orders for the Mukilteo Tank Farm. The DLA installed remedial treatment systems and operated them through 2002, and continued compliance monitoring through 2006. In 2006, Ecology issued written notification to DLA’s DESC, stating that the provisions of Enforcement Order No. DE 93TC-N268 had been satisfied, that no further monitoring was required, and that remaining monitoring wells could be abandoned (Brian Sato, Ecology; dated May 22, 2006). No environmental covenant or deed restriction has since been entered against the property, and the property was given a site cleanup status of “Removal from Hazardous Sites List Completed” in Ecology’s 2008 Sediment Cleanup Status Report.

Although the U.S. Air Force satisfied the terms of Ecology’s order, and Ecology determined no further action was needed, WSDOT’s archaeological field work for the Mukilteo project encountered areas with soil contamination on the Mukilteo Tank Farm in 2006 and 2007. Soil contamination was identified by sampling and analysis, photo-ionization detector measurements, and visual/odor observations.

Indications of contaminated soil were observed throughout the west and west-central portions of the property as shown in Figure 4.8-3. Site-specific cleanup levels were used to screen the analytical results from the 2006/2007 archaeological investigations for the analytes for which site-specific cleanup levels were identified (some metals, polycyclic aromatic hydrocarbons, and volatile organic compounds). The analytes for which site-specific cleanup levels were promulgated are discussed in detail in the Hazardous Materials Discipline Report. MTCA Method A cleanup levels were used to screen the analytical data results for the analytes for which site-specific cleanup levels were not promulgated (including petroleum hydrocarbons). Petroleum hydrocarbons (gasoline-, diesel-, and lube oil-range) were encountered at concentrations in excess of MTCA Method A cleanup levels for industrial and unrestricted land use in soil samples collected in these areas from 8 to 12 feet below ground surface (bgs).
Figure 4.8-3. Tank Farm Property Features

Polycyclic aromatic hydrocarbons, volatile organic compounds, and metals were detected at concentrations greater than the site-specific cleanup levels and/or MTCA Method A cleanup levels for unrestricted land use in soil samples collected in these areas from 8 to 12 feet bgs. Archaeological borings elsewhere on the site revealed localized residual contamination at lower levels.

The depth of affected soil coincides with the groundwater level “smear zone” at the site. The groundwater smear zone is the tidally influenced groundwater fluctuation range, which is from approximately 8 feet to 12 feet bgs at the property. There is the potential that affected soil may remain at these depths throughout the site. Remnant contamination also could affect groundwater. Additional sampling of soil and groundwater is needed to characterize the existing conditions at the site. The Hazardous Materials Discipline Report provides more information about measures to address remnant contamination as identified by the U.S. Air Force in its Final Environmental Assessment and resulting Finding of No Significant Impact in 2012. The U.S. Air Force has stated that it will retain environmental and public safety responsibilities associated with “the discovery of significant contaminants attributable to legacy DOD operations on the property” (U.S. Air Force 2012).

Slag material is suspected to be present in the riprap material armoring the shoreline. Material that appears to be slag was observed in the riprap during a 2012 site visit. The source of this material is unknown but slag produced at the former Everett Asarco copper smelter was historically used in riprap armoring throughout the Puget Sound. Heavy metals associated with slag from copper smelters may be present in the soil beneath the riprap at the site.

In March and April 2012, sediment samples were collected in six locations around the perimeter of the pier and in three locations beneath the pier. The samples were analyzed for Dredged Material Management Program (DMMP) and SMS contaminants of concern. Pesticides were detected in perimeter sediment samples collected from the surface to 8 feet below the mudline at concentrations greater than DMMP Screening Levels and/or SMS Sediment Quality Standards. Polycyclic aromatic hydrocarbons were detected in one discrete sample collected near the northeast corner of the pier from 8 to 12 feet below the mudline. No exceedances were encountered in the surface to 4-foot-interval samples collected from beneath the pier. Dioxin concentrations measured in surface sediments around the pier ranged from 4.09 parts per trillion (ppt) toxic equivalents (TEQs) to 1.9 ppt TEQ. Open-water disposal is allowed as long as the volume-weighted average concentration of dioxins in material from the entire dredging project does not exceed the Disposal Site Management Objective of 4 ppt TEQ.

Deeper sediment (greater than 4 feet below the mudline) beneath the Tank Farm Pier may be affected by the 3,900 creosote-treated piles. Deeper sediments under the pier could also be contaminated with petroleum hydrocarbons from the pier’s nearly 30-year use as a bulk fuel storage and transfer facility.

4.8.3 Long-Term Environmental Impacts

This section discusses potential impacts that could occur during project operation, including effects associated with the permanent facilities that would be in place and effects from ongoing operations of the multimodal facility. Potential adverse operational
impacts include hazardous material leaks and spills by the traveling public, leaks due to the operation and maintenance of the terminal, dispersal of contaminated sediment, and groundwater contamination due to stormwater infiltrating through landscape features and into contaminated soils, which could cause migration of hazardous materials. Beneficial operational impacts include reduction of exposure to hazardous materials because of project-related improvements or longer-term site management measures.

All project alternatives would use hazardous materials similarly due to the types and intensities of activities that occur at ferry terminals. There is the potential for leaks or spills from vehicles in holding areas, area roadways, transit centers, or other terminal operation and maintenance activities. However, as described in more detail in Section 4.11 Water Resources, the Build alternatives would develop stormwater retention and treatment facilities to meet current standards, which would reduce the effects of potential spills and their transport to receiving waters.

Both the Preferred Alternative and Elliot Point 1 Alternative include stormwater facilities and landscaping in potentially contaminated areas. The Elliot Point 1 Alternative also includes daylighting of Japanese Creek, with grading changes that could affect the flow of groundwater in the area. Infiltrating water or changing groundwater flow could spread existing contamination if such contamination exists.

All alternatives would result in long-term benefits by removing the existing terminal structures, including in-water and landside structures, some of which contain hazardous materials. The likely contaminants in the existing structures are described in more detail under Section 4.8.4 Construction Impacts below. All Build alternatives would create additional long-term benefits by removing existing contaminants in soil or groundwater as necessary during construction. Over time, if left in place, these materials could migrate or become exposed due to groundwater movement.

The most environmental benefits would be expected from the Preferred and Elliot Point 1 alternatives, which would remediate hazardous materials associated with the Mukilteo Tank Farm and the pier as needed.

### 4.8.4 Construction Impacts

The potential short-term impacts during project construction include impacts to the natural environment or to people if the project encounters or causes the spread of hazardous materials. They also include the potential for construction activities to cause a new release of hazardous materials. Table 4.8-4 summarizes by alternative the common effects anticipated.

#### Table 4.8-4. Construction Activities Involving Areas with Potential Hazardous Materials

<table>
<thead>
<tr>
<th>Construction Activities Potentially Affected by Hazardous Materials</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No-Build</td>
</tr>
<tr>
<td>Acquire property with potential hazardous materials releases</td>
<td>X</td>
</tr>
<tr>
<td>Renovate, remove, or excavate structures and equipment that could contain asbestos, lead-based paint, PCBs, and mercury</td>
<td>X</td>
</tr>
<tr>
<td>Remove storage tanks and/or associated contaminated soil</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 4.8-4. Construction Activities Involving Areas with Potential Hazardous Materials

<table>
<thead>
<tr>
<th>Construction Activities Potentially Affected by Hazardous Materials</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No-Build</td>
</tr>
<tr>
<td>Decommission underground oil/water separators, bulk fuel distribution facilities, remediation wells, and all associated piping</td>
<td>X</td>
</tr>
<tr>
<td>Remove creosote-treated timber and piles from structures being renovated or removed</td>
<td>X</td>
</tr>
<tr>
<td>Disturb, dredge, or excavate sediment and soil that has been in contact with creosote-treated timber or piles</td>
<td>X</td>
</tr>
<tr>
<td>Grade or excavate potentially contaminated soil</td>
<td>X</td>
</tr>
<tr>
<td>Dewater excavations or pits in the vicinity of potentially contaminated groundwater</td>
<td>X</td>
</tr>
<tr>
<td>Construct stormwater facilities in areas with potential contamination</td>
<td>X</td>
</tr>
</tbody>
</table>

**No-Build Alternative**

The No-Build Alternative would require the continued leasing or the acquisition of all or part of Site 6—a portion of the area currently used for vehicle holding. The existing facility has areas where hazardous materials may be present.

The No-Build Alternative would remove the creosote-treated timber piles used for the existing terminal, which could disturb nearby sediments. It would also replace structures or equipment that could contain asbestos, lead-based paint, PCBs, or mercury.

Upland grading, excavation, or dewatering could encounter contaminated soil or groundwater because some migration from a previously contaminated site under the vehicle holding area may have migrated toward the No-Build Alternative’s area of construction.

**Preferred Alternative**

For this alternative, WSDOT would acquire a property interest in three sites with previous contamination. All structures, equipment, and other existing surface features will be removed from the Mukilteo Tank Farm site (including the pier). Some of the existing features and equipment to be removed from the Mukilteo Tank Farm may contain hazardous materials. A U.S. Air Force survey of current and past fuel or other hazardous material storage tanks found that nearly all of them have been removed or drained of hazardous materials. Tanks with product remaining would be a source of contamination if they were ruptured during construction.

Construction for this alternative would occur on the west and west-central portions of the Mukilteo Tank Farm where contaminated soils and groundwater were encountered in 2006 and 2007.

Underground oil/water separators, bulk fuel distribution facilities, remediation wells, and associated piping could still exist within the Preferred Alternative footprint. Such
structures could contain residual petroleum products and other hazardous materials that could be spread during project construction.

The removal of the existing ferry structures and the Tank Farm Pier, as well as dredging the 500-foot-wide navigation channel, would disturb sediment and soil that have been in contact with creosote-treated timber or piles. Creosote contains polycyclic aromatic hydrocarbons, which often leach into the surrounding sediments and could be released during pile removal when those sediments are disturbed. If contamination is present in the sediments, exposure to currents and wave action could spread contamination over a larger area.

A dredge material characterization study would be completed to evaluate the suitability of the material in the proposed dredge prism for open-water disposal. The Dredged Material Management Office (DMMO) will evaluate the analytical results from the samples that will be collected for the study and make a determination regarding the suitability of the material for open-water disposal.

During and after pier removal and dredging for the Preferred Alternative, exposed sediments could be vulnerable to minor levels of disturbance or dispersal by wave action and ferry propeller scour. Sampling information indicates that contaminants of concern could be present in surfaces that would be exposed by the Preferred Alternative. WSDOT conducted additional analysis (Coast & Harbor 2013) of the 2012 sediment sampling results. The study indicates that propeller scour will affect a small and localized scour area with a maximum sediment depth of 1.4 feet for the Preferred Alternative (with no detectable shoreline impact). The maximum volume of material that would be mobilized during a 25-year storm event is approximately 1,050 cubic yards, resulting in an average of 0.08 inch of surface sediment material settling in the basin on the east side of the existing pier. The majority of this material would be deposited within 1,800 feet of the pier. These levels of dispersion would be unlikely to result in contaminants exceeding Washington State’s SMS in these areas.

Much of the construction of this alternative is designed to avoid excavation within the tank farm site, particularly in the western portion where archaeological resources may also be present. The alternative proposes placing fill and pavement over large portions of the site, which would reduce the potential for construction activities to encounter or cause the spread of hazardous materials. Excavation or stormwater infiltration features with soil or groundwater sampling and testing would occur on less than 20 percent of the project site. However, the project could encounter hazardous materials when excavating for utilities, stormwater systems, and structural foundations or grading. Dewatering could alter groundwater flow in the excavation dewatering area, which could result in hazardous materials migration.

The potential presence of remnant contamination would require additional plans, procedures, and permitting approvals to construct the Preferred Alternative. This would include plans for the handling or disposal of hazardous materials in accordance with applicable regulations. However, with appropriate plans in place, it is unlikely that the alternative’s construction activities would result in further impacts on people or the environment; moreover, the removal or containment of contamination would improve environmental conditions.
Existing Site Improvements Alternative

The Existing Site Improvements Alternative would result in impacts related to removal of the existing terminal structures, creosote-treated timber and piles, and sediment near creosote-treated timber and piles. These impacts would also apply to the Port of Everett fishing pier and day moorage.

This alternative would require acquisition of all or part of six additional sites located in the central waterfront area of Mukilteo and associated demolition and removal of structures or equipment that could contain asbestos, lead-based paint, PCBs, or mercury. The alternative includes the construction of a transit center on a property that has been previously identified with a hazardous material release. It also includes acquiring property that was once used as a gasoline service station. These sites may require additional plans, procedures, and approvals for their construction, including the handling or disposal of hazardous materials, but it is unlikely that the alternative’s grading, excavation, or dewatering activities would result in an increased spread of contaminated soil or groundwater.

Elliot Point 1 Alternative

The Elliot Point 1 Alternative would have a similar potential to encounter hazardous materials during project construction as the Preferred Alternative. There may be some localized differences during construction due to the different footprints. This alternative has a larger footprint than the Preferred Alternative, which increases the extent of construction. It has a longer extension of First Street and includes the daylighting of Japanese Creek.

After pier removal and dredging for Elliot Point 1, exposed sediments could be vulnerable to minor levels of disturbance or dispersal by wave action and ferry propeller scour, with potential effects that are similar to those described for the Preferred Alternative. The scour effects would extend several feet deeper into the sediments than for the Preferred Alternative, but with no serious impacts (Coast & Harbor 2013).

As with the Preferred Alternative, much of the construction of this alternative is designed to avoid excavation within the tank farm site, particularly in the western portion where archaeological resources may be present. The alternative’s proposed fill and paved areas would also reduce the potential for construction activities to encounter or cause the spread of hazardous materials. However, the Elliot Point 1 Alternative could encounter hazardous materials during excavation for utilities, stormwater systems, structural foundations, or grading activities, and when daylighting Japanese Creek. As with the Preferred Alternative, dewatering activities associated with construction could locally alter groundwater flow, which could result in hazardous materials migration.

4.8.5 Indirect and Secondary Impacts

No indirect or secondary impacts are anticipated for any of the project alternatives.
4.8.6 Cumulative Impacts

This project and future projects in the area would support increased environmental protection and appropriate cleanup and mitigation of any hazardous materials in accordance with existing regulations and future regulations, which are likely to be more stringent. This project would not result in an accumulation of hazardous materials. The Preferred Alternative and the Elliot Point 1 Alternative would remove contamination encountered on the Mukilteo Tank Farm, whereas the No-Build and Existing Site Improvements alternatives would not. Therefore, if contamination is present at the Mukilteo Tank Farm, it could remain there longer under the No-Build and Existing Site Improvements alternatives.

4.8.7 Mitigation Measures

Preferred Alternative

Mitigation measures for all project activities would be defined through a project-specific Hazardous Materials Management Plan developed in consultation with Ecology. WSDOT has a spill plan that the Ferries Division would use to respond to spills or leaks that may occur during project operation.

Long-term impacts for the Preferred Alternative were identified due to the potential for migration of potentially contaminated sediments beneath the Tank Farm Pier, and for the possible migration of contamination due to infiltrating stormwater in areas with potentially contaminated soils or groundwater.

The Hazardous Materials Management Plan would include measures for dredging and disposal of contaminated sediments, and capping, armoring, or otherwise minimizing the potential for migration due to wave action, currents, or propeller scour. Many of these activities would be defined through the DMMP process and other state and federal water quality and aquatic lands permitting and management programs; the project would comply with all terms and conditions defined through those required regulatory processes. Mitigation measures to manage the potential for contaminated sediment migration would be addressed as part of these required regulatory approvals, which are further discussed under construction mitigation. Potential measures may include sediment capping, near shore armoring, and clean sand and gravel in areas where piles are removed.

Stormwater facilities would be developed in accordance with the applicable permit requirements identified for water resources. If WSDOT and permitting authorities conclude that infiltrating stormwater facilities are appropriate for the Preferred Alternative, mitigation would include placing infiltration stormwater facilities only in areas where there is no contamination. Alternatively, if infiltration is necessary in contaminated areas, WSDOT would clean up the soil beneath and downgradient of the facilities to prevent the spread of contamination into Possession Sound.

No-Build and Existing Site Improvements Alternatives

Some contaminated sediments could still be encountered or exposed during implementation of the No-Build and Existing Site Improvements alternatives but sediment migration would be less likely with these alternatives. The mitigation
measures would be similar to those discussed for the Preferred Alternatives if contaminated sediment is encountered or exposed for these alternatives.

**Elliot Point 1 Alternative**

The long-term impacts and mitigation measures for the Elliot Point 1 Alternative are similar to those identified for the Preferred Alternative. The identified long-term impacts include the potential for migration of potentially contaminated sediments beneath the Tank Farm Pier, and for the possible migration of contamination due to infiltrating stormwater in areas with potentially contaminated soils or groundwater.

The mitigation measures discussed for the Preferred Alternative would also be implemented for the Elliot Point 1 Alternative.

**Mitigation for Construction Impacts**

**Preferred Alternative**

Mitigation measures for all project activities will be defined through a project-specific Hazardous Materials Management Plan developed in consultation with Ecology. The site-specific Hazardous Materials Management Plan would include the following elements and procedures:

- State requirements for appropriately trained hazardous waste operations and response personnel
- A site-specific health and safety component regarding contaminated material exposure and personal protective equipment
- Defined site-specific measures to minimize exposure to contaminants through both airborne and direct contact routes
- Plan for appropriate space to stockpile graded and excavated soil that shows evidence of being contaminated or that is to be disposed of off site
- Require characterization of the bedding material beneath the bottom pad of each steel tank bottom located on the Mukilteo Tank Farm
- Require pre-demolition surveys of any structures to be removed to identify the presence of hazardous materials and to determine appropriate management procedures.
- Require careful removal of the granular asphalt bedding material beneath the bottom pad of each welded steel tank bottom that is removed for project construction
- Require characterization of soil in any areas where project excavation will encounter it, and the definition of management remediation measures if any are identified.
- Require characterization of site soil in any areas identified for stormwater ponds or infiltration
• Prepare a Creosote-Treated Timber Removal and Disposal Plan to address how piles and adhered sediments will be removed, managed, and disposed of in accordance with state laws and regulations. WSDOT would coordinate with EPA, Ecology, DNR, and others to develop and employ BMPs for creosote timber removal. WSDOT would also prohibit the reuse of these timbers.

• Remove, manage, and dispose of residual petroleum products and petroleum-contaminated soil that is encountered would be done in accordance with applicable regulations. Any wells requiring abandonment would need to be abandoned by a licensed well driller in accordance with state regulations.

• Decommission any remaining storage tanks onsite according to tank decommissioning and site assessment regulations. Any contaminated soil associated with the removed tanks would be tested in accordance with regulatory or permit specifications.

• Develop a Groundwater Management Plan to address any contaminated groundwater that may be dewatered from areas with potentially contaminated soils during project construction. The plan would require groundwater characterization in locations where excavations would encounter groundwater, where infiltration or stormwater ponds would be located, or where the location is downgradient from any contaminated soil areas.

• Develop a Spill Prevention, Control and Countermeasures (SPCC) Plan and a Temporary Erosion and Sediment Control (TESC) Plan. The SPCC Plan would identify and include measures to protect sensitive receptors, describe any pre-existing contamination and contaminant sources, and identify the equipment and work practices that would be used to prevent the release of contamination.

Mitigation for Impacts due to Removal of Contaminated Sediment or Dredged Sediment

WSDOT will manage and dispose of contaminated sediment in accordance with applicable permits and regulations, including permits or plans required by Ecology and DNR. The DMMP Process and related permits such as the Section 401 Water Quality permit would define construction as well as post-construction requirements for the management of hazardous materials that maybe present in sediment. A DMMP-approved dredge material characterization would be completed to identify any contaminants of concern that may be present within the dredge prism. As would be specified in the project permits (including Section 401 Water Quality), BMPs will be implemented during dredging to minimize sediment transport and increased turbidity. Anticipated BMPs include:

• Controlling the speed of the dredging bucket
• Controlling the depth of the dredging bucket “bites”
• Using an enclosed dredging bucket
• Monitoring water quality (turbidity and chemical analyses) during dredging
• Defining periods when dredge activity would be allowed.

Work would be stopped immediately and additional BMP implementation will be evaluated if exceedances of 401 Water Quality criteria are observed during construction period water quality monitoring. Additional BMPs may include (but are not limited to) the use of silt curtains, sheet pile enclosures, removable dams, silt screens, or pneumatic (bubble) curtains.

WSDOT would comply with the results of the DMMP process and permits to evaluate that dredge spoils are clean and eligible for open-water disposal at a site already permitted by the DMMP agencies, or if material is contaminated and required to be disposed at an approved upland facility. The DMMP has jurisdiction over the final decision and permitting for open-water disposal suitability of the dredge material. BMPs and DMMP-approved methodology will be used for open-water disposal of dredge material, if any.

As anticipated in permits and approval conditions, WSDOT would conduct testing to determine if contaminated sediments are present at depths that would be exposed after dredging. If contamination exceeds applicable regulatory criteria, WSDOT would work with permitting agencies to develop protective measures to reduce the potential for erosion and transport of contaminated sediment. The detailed measures and the data requirements necessary to define the measures would be guided by the project’s permitting process and associated requirements.

Mitigation for Indirect or Cumulative Impacts

No adverse indirect or cumulative impacts were identified because past practices involving hazardous materials are already being addressed by the project; therefore, no additional mitigation is necessary.

4.9 Energy and Climate Change

This section reviews both operational and construction energy use and the potential for climate change effects either as a result of the project or potentially affecting the project.

4.9.1 Overview of Analysis and Regulatory Context

Energy

SEPA regulations recommend reviews of effects on natural resources, while NEPA regulations more specifically cite the need to consider energy requirements and conservation potential (40 CFR 1502.16). This energy analysis includes a building energy analysis, as required by 49 CFR 622.301, which instructs FTA to consider the energy consumption of buildings that are constructed as part of transit projects receiving federal funding.

According to USDOT guidance, large-scale projects with potentially substantial energy impacts should discuss the major direct and/or indirect energy impacts and conservation potential of each alternative.
Climate Change

The assessment of the project’s potential to increase greenhouse gas emissions and contribute to climate change follows WSDOT’s Guidance for Project-Level Greenhouse Gas and Climate Change Evaluations. Section 4.7 Air Quality provides more detailed discussions of other emissions and pollutants related to air quality and Clean Air Act requirements for the project.

Vehicles emit a variety of gases during their operation; some of these are greenhouse gases. The greenhouse gases associated with transportation are water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Any process that burns fossil fuel releases CO₂ into the air. CO₂ makes up the majority of the emissions from transportation. Vehicles are a primary source of greenhouse gas emissions and contribute to climate change primarily through the burning of gasoline and diesel fuels. National estimates show that the transportation sector (including on-road vehicles, construction activities, airplanes, and boats) accounts for almost 30 percent of total domestic CO₂ emissions. However, in Washington State, transportation accounts for nearly half of greenhouse gas emissions because the state relies heavily on hydropower for electricity generation, unlike other states that rely on fossil fuels such as coal, petroleum, and natural gas to generate electricity. The next largest contributors to total greenhouse gas emissions in the state are fossil fuel combustion in the residential, commercial, and industrial sectors at 20 percent; and electricity consumption, also 20 percent. Figure 4.9-1 shows the gross greenhouse gas emissions by sector, nationally and for Washington State. Figure 4.9-2 compares Washington’s per capita transportation emissions to the national average and high and low jurisdictions. By this metric, Washington’s emissions are just above average.


Figure 4.9-1.
Efforts to Reduce Greenhouse Gas Emissions in Washington State

In 2007, Washington State set the following greenhouse gas reduction goals:

- 1990 greenhouse gas levels by 2020
- 25 percent reduction below 1990 levels by 2035
- 50 percent reductions below 1990 levels by 2050

Also in 2007, a Climate Advisory Team was formed in response to the Governor’s Executive Order 07-02 to find ways to reduce greenhouse gas emissions. The final report included 13 broad recommendations, many of which are now being implemented.

In March 2008, the Governor signed Washington’s Climate Change Framework/Green-Collar Jobs Act (HB 2815). This law includes, among other elements, statewide per capita VMT reduction goals as part of the state’s greenhouse gas emission reduction strategy.

WSDOT is working with regional jurisdictions to develop transportation plans for reducing greenhouse gas emissions. In addition, WSDOT is among the six agencies that lead the development of the state’s integrated climate change response strategy, now published, titled Preparing for a Changing Climate (Ecology 2012).

Delivering well-planned transportation improvements further contributes to greenhouse gas reduction. The 2005 Transportation Partnership Act is an integrated local, regional, and state effort to ensure that system improvements work in concert with ongoing programs to reduce the miles that vehicles need to travel each year.

4.9.2 Affected Environment

The proposed alternatives, adjacent streets, and SR 525 queue lane comprise the study area for evaluating energy and greenhouse gas emissions.
4.9.3 Long-Term Environmental Impacts

Table 4.9-1 compares the energy and greenhouse gas effects of all alternatives. While some alternatives offer the potential for energy and emission reductions, these reductions would be negligible compared to the total emissions emitted by the ferry users at the Mukilteo ferry terminal.

As required by RCW 39.35, WSDOT would design all terminal buildings with occupied space to meet the United States Green Building Council Leadership in Energy and Environmental Design (LEED) silver standard. LEED-certified buildings are more energy efficient than conventional buildings, and incorporate a variety of conservation measures.

4.9.4 Construction Impacts

Energy is required for project construction, both on site to operate construction equipment and off site to create and transport the materials used during construction.

Construction energy use was calculated using the CalTrans methodology that correlates project cost information to project energy use by using energy factors developed by CalTrans (CalTrans 1983). These factors take into account the energy used to obtain the raw materials, manufacture and transport the supplies, and construct the facility.

Construction emissions originate primarily from the combustion of fuel used to construct the facility. The greenhouse gas emissions analysis assumed all construction energy will be provided by diesel and used the diesel CO₂ emission factors provided by The Climate Registry’s General Reporting Protocol. Nitrous oxide and methane emissions were estimated to be 5 percent of the CO₂ emissions—the approximate proportion of the emissions typical from transportation sources. This approach is also consistent with recent EPA inventories of greenhouse gases from construction sources, which show nitrous oxide at about 3 percent of projected CO₂ emissions per gallon, and methane at about 5 percent (EPA 430-R-12-001).

Alternatives Comparison

All alternatives would require energy for construction and produce greenhouse gas emissions during the construction process, including the No-Build Alternative, which includes maintenance and preservation projects to maintain the functionality of the existing structures. Estimated construction energy and greenhouse gas effects for all alternatives are listed in Table 4.9-2 and construction greenhouse gas emissions are compared in Figure 4.9-3.
## Table 4.9-1. Operational Impacts Comparison

<table>
<thead>
<tr>
<th></th>
<th>No-Build</th>
<th>Preferred Alternative</th>
<th>Existing Site Improvements</th>
<th>Elliot Point 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local traffic volumes</td>
<td>The project does not affect ferry holding area vehicle capacity or vessel capacity; therefore, no change in traffic volumes is expected between project alternatives.</td>
<td>Energy and greenhouse gas emissions would be similar to those today, and less than the No-Build Alternative.</td>
<td>A ferry queue would continue to form on the shoulder of SR 525—no change in emissions or energy use.</td>
<td>The ferry queue would be less likely to extend onto SR 525, helping to reduce conflicts and decrease energy use and greenhouse gas emissions.</td>
</tr>
<tr>
<td>Ferry queue (outside ferry terminal)</td>
<td>A ferry queue would continue to form on the shoulder of SR 525—no change in emissions or energy use.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toll booths</td>
<td>Similar to existing conditions, the No-Build Alternative would include three toll booths—no change in emissions or energy use.</td>
<td>All Build alternatives include four toll booths. If all four booths are staffed and operating, the ferry queue may be processed more quickly, thereby removing traffic from the street and allowing drivers to turn off their vehicles—possible slight reduction in energy use and greenhouse gas emissions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front Street conflicts</td>
<td>Similar to existing conditions, as ferry vessels would load and unload; traffic on Front Street would still need to stop to allow ferry traffic to cross the intersection. Gaps would continue to be inserted during the unloading and loading processes to allow cross traffic to proceed. Current conditions would continue—no change in emissions or energy use.</td>
<td>The conflict with traffic on Front Street would be removed. Eliminating cross traffic waiting for ferry traffic and ferry traffic waiting for cross traffic would slightly reduce energy requirements and greenhouse gas emissions because vehicles would not sit idling while waiting for cross traffic to clear.</td>
<td>Similar to existing conditions, as ferry vessels would load and unload; traffic on Front Street would still need to stop to allow ferry traffic to cross the intersection. Gaps would continue to be inserted during the unloading and loading processes to allow cross traffic to proceed. Current conditions would continue—no change in emissions or energy use.</td>
<td>The conflict with traffic on Front Street would be removed. Eliminating cross traffic waiting for ferry traffic and ferry traffic waiting for cross traffic would slightly reduce energy requirements and greenhouse gas emissions because vehicles would not sit idling while waiting for cross traffic to clear.</td>
</tr>
<tr>
<td>Terminal bus loading areas</td>
<td>Current conditions would continue—no change in emissions or energy use.</td>
<td>Six bus bays are included in the Build alternatives. This should allow buses to remain in place during layovers, slightly reducing energy requirements and greenhouse gas emissions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger loading</td>
<td>Similar to existing conditions, vehicles would wait while walk-on passengers load and unload from the ferry. Some vehicles would be idle during this wait. The current loading and unloading process would continue—no change in emissions or energy use.</td>
<td>Overhead passenger loading would allow passengers to load and unload simultaneously with vehicles—possible reduction in energy use and greenhouse gas emissions because vehicles would not idle while waiting for passenger loading and unloading.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal buildings</td>
<td>All alternatives would replace the current passenger and terminal supervisor's buildings. The project team will determine the specific methods to achieve LEED silver certification, as required by state law, during final project design.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.9-2. Construction Impacts Comparison

<table>
<thead>
<tr>
<th></th>
<th>No-Build</th>
<th>Preferred Alternative</th>
<th>Existing Site Improvements</th>
<th>Elliot Point 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (MBtu)</td>
<td>807,000</td>
<td>1,203,000</td>
<td>1,564,000</td>
<td>1,516,000</td>
</tr>
<tr>
<td>Greenhouse Gas Emissions (MT CO₂eq)</td>
<td>62,000</td>
<td>91,000</td>
<td>120,000</td>
<td>115,000</td>
</tr>
</tbody>
</table>

Note: Total energy is expressed in million Btus, and greenhouse gases in metric tons of carbon dioxide equivalents.

4.9.5 Indirect and Secondary Impacts

Energy

Energy consumption can cause indirect impacts if construction or operation of the project causes measurable impacts on other sectors of the economy, such as utilities, or affects the ability of Washington State to meet the energy demands for this project, requiring expansion of existing energy sources.

Project operations would not cause a measurable change in energy use patterns or quantities in other sectors of the economy for any alternative. In addition, vehicles using the facility would become more efficient over the coming years as older, less efficient vehicles are replaced with newer vehicles meeting increased fuel economy requirements. Increased transit connectivity from the Build alternatives can also be expected to shift some passenger vehicle use to more efficient transit modes.

Likewise, energy requirements for project construction would not affect area energy supplies.

Greenhouse Gas Emissions

Greenhouse gas emissions are an indirect consequence of transportation energy consumption using petroleum fuels. Because the project alternatives would not modify operational energy use patterns, there would not be any indirect change in emission patterns from any of the project alternatives associated with operational energy use. However, if the increased transit connectivity provided by the project...
produces a shift to more efficient transit modes, greenhouse gas emissions could be reduced.

4.9.6 Cumulative Impacts

The regional-scale analysis methods used for energy use and greenhouse gas emissions is largely a cumulative impact assessment because it already considers past and future trends, conditions, activities, and projects in the region. The long-range transportation forecasts that form the basis for the energy and greenhouse gas conditions predicted for the project already incorporate other transportation projects and regional travel growth through 2040. Other localized projects could also affect conditions in some locations. The other present and reasonably foreseeable activities in the area include:

- Mukilteo Tank Farm transfer from the U.S. Air Force to Port of Everett ownership
- Sound Transit Mukilteo Station Phase II program
- NOAA Fisheries Mukilteo Research Station expansion
- Port of Everett access road to Mount Baker Terminal
- Japanese Creek restoration

For any of the alternatives, construction and operation of the proposed project, along with these present and reasonably foreseeable future projects, would make up a negligible part of regional energy consumption or statewide greenhouse gas emissions.

In general, the cumulative impacts would not differ from the conditions predicted for the project alternatives, or differ among the alternatives.

4.9.7 Energy and Greenhouse Gas Reduction Measures

Operational Energy Reduction Measures

WSDOT and its transportation partners are working to reduce energy consumption and greenhouse gas emissions from the transportation sector throughout the state, including the ferry system. For any of the Build alternatives, examples of these activities would be providing an alternative to driving alone (such as carpooling, vanpooling, and transit); developing a transportation facility that encourages transit, HOV users, bicycle and pedestrian modes; and supporting land use planning and development that encourage such travel modes (such as concentrating growth within urban growth areas). Improving efficiency in loading and unloading ferry vessels, and shorter queues, would also reduce idling time and therefore energy consumption and greenhouse gas emissions. WSDOT also has switched its fleet to low-sulfur diesel fuel and biodiesel to reduce emissions.

The largest reduction in transportation energy use and greenhouse gas emissions would come from vehicle and fuel improvements. Current corporate average fuel economy (CAFE) standards require the average efficiency of new cars and light trucks sold in 2016 to be 34.1 miles per gallon. In August 2012, the federal government set the goal of 54.5 miles per gallon for new passenger cars and trucks starting in 2025. The National Highway Traffic Safety Administration (NHTSA)
and EPA are now working on additional light-duty vehicle standards for the years 2017 to 2025. The agencies are also establishing the first medium- and heavy-duty vehicle efficiency standards (NHTSA 2010), which are expected to improve new truck efficiency by up to 25 percent between 2014 and 2018.

The project will determine the specific methods to achieve LEED silver certification, as required by state law, during final project design. LEED-certified buildings are more energy efficient than conventional buildings. Building operations from new LEED-certified terminal buildings would use less energy on a per square foot basis than the current structures.

**Construction Energy Reduction Measures**

Construction practices that minimize roadway congestion and encourage efficient energy use would be implemented. Measures that reduce energy use and air quality impacts (see Section 4.7 Air Quality) would also reduce greenhouse gas emissions. As in the mitigation for air quality impacts, WSDOT would require a construction management plan that would include:

- Limiting equipment idling
- Encouraging carpooling of construction workers
- Locating staging areas near work sites
- Scheduling the delivery of materials during off-peak hours to allow trucks to travel to the site with less congestion and at fuel-efficient speeds

**Indirect and Secondary Impacts**

The increased efficiency of the transportation system, due to more people using transit to reach the ferry, would reduce energy use. WSDOT is also implementing a more efficient vessel fleet, which will reduce energy use. Direct energy use and greenhouse gas emissions would also reduce indirect impacts.

**Cumulative Impacts**

Measures taken to address direct energy use and greenhouse gas emissions would also reduce cumulative impacts.

**4.9.8 Effects of Changing Climate on the Project**

WSDOT acknowledges that effects of climate change may alter the function, sizing, and operations of its facilities; therefore, in addition to mitigating greenhouse gas emissions, WSDOT must also ensure that its transportation facilities can adapt to the changing climate. To ensure that WSDOT facilities can function as intended for their planned 50- to 100-year lifespan, they must be designed to perform under the variable conditions expected as a result of climate change.

Climate projections for the Pacific Northwest are available from the Climate Impacts Group at the University of Washington (UW Climate Impacts Group 2009). The climate projections indicate that Washington State is likely to experience some or all of the following effects over the next 50 to 100 years:
Increased temperature leading to more frequent extreme heat events, worsened air quality, and glacial melting

- Sea-level rise, coastal erosion, and salt water intrusion
- Changes in the volume and timing of precipitation resulting in reduced snow pack, increased erosion, and more frequent and severe flooding
- Ecological effects of a changing climate including the spread of disease, altered plant and animal habitats, and negative impacts on human health and well-being

WSDOT has been working with other state agencies to develop the state’s integrated climate response strategy focusing on how state-funded capital projects can incorporate future climate conditions. The strategy, *Preparing for aChanging Climate* (Ecology 2012), looked at the complex interplay between climate variables and communities. As the Mukilteo Multimodal Project continues toward funding, final design, and other implementation steps, WSDOT will continue to incorporate the state’s latest guidance.

For example, inundation from rising sea levels and heavy surface flow from storms would challenge the capacity of storm drains, creeks, rivers, and water treatment facilities. Rising sea levels could inundate or disrupt numerous nearshore facilities, including:

- Transportation infrastructure
- Public ports
- Private business and industry
- Drinking water, wastewater, and stormwater facilities
- Agriculture
- Housing

The Mukilteo project team considered the potential impacts of climate change during preliminary design and the potential for changes in the surrounding natural environment. The current projected medium change in Puget Sound sea level is 13 inches by 2100, with a range of 6 inches to 50 inches (Mote et al. 2008). Overall, recent studies appear to be converging on projected increases in the range of 2 to 4 feet.

With help from PSRC, WSDOT developed maps showing a 2- and 4-foot sea-level rise in the project area. WSDOT then evaluated the potential for projected design measures to withstand the projected sea-level rise and increased storm intensity. Compared to the No-Build and Existing Site Improvements alternatives, the Preferred Alternative and Elliot Point 1 Alternative would provide more opportunities to accommodate sea-level rise by using fill to modify terminal elevation, locating access roads in upland areas, and locating facilities outside the 100-year floodplain. Both the No-Build Alternative and Existing Site Improvements Alternative are located within the 100-year Federal Emergency Management Agency (FEMA) floodplain, as are many of the surrounding land uses and connecting streets. This would make it more difficult to use fill to modify the terminal’s elevation to be above floodplain elevation.
Other adaptive measures may be needed to address sea-level rise (additional details on floodplains are provided in Section 4.11 Water Resources). Other forecasted climate variables such as temperature and precipitation are within the wide range of climate conditions currently experienced in the project area.

4.10 Geology

This section identifies, describes, and evaluates long-term and short-term impacts from geologic hazards (steep slopes, landslides, liquefaction, earthquake prone areas) to the proposed No-Build and Build alternatives. If ignored, geologic hazards could adversely affect the project in terms of construction worker and public safety; availability and/or quality of natural resources; project schedule and costs; and risk for future facility users. Identifying and mitigating geologic hazards could prevent or reduce these impacts. This section also identifies potential impacts on geologic conditions and resources that may result from construction and operation of the project.

4.10.1 Overview of Analysis and Regulatory Context

NEPA and SEPA require the consideration of impacts on the environment, which includes geologic conditions, hazards, and resources. The Washington State GMA mandates that local jurisdictions adopt ordinances that classify, designate, and regulate land use to protect critical areas. Critical areas include geologically hazardous areas. Critical area ordinances protect locally designated critical areas, and may identify areas susceptible to erosion, sliding, earthquake, or other geological events that pose a threat to incompatible development.

4.10.2 Affected Environment

Regional Geology and Seismicity

This region was shaped by glaciers that carved deep north-south trending channels filled with glacial till and other sandy soils, sediments, and river deposits. This region is also subject to earthquakes (seismic activity) due to the Juan de Fuca Plate diving under the North American Plate at the Cascadia Subduction Zone. This resulted in the northwest-southeast trending Southern Whidbey Island Fault Zone, which is up to 7 miles wide and contains numerous concealed faults. The nearest fault line is approximately one-third of a mile south of the project area (Johnson et al. 2004). The Southern Whidbey Island Fault Zone is capable of producing crustal earthquakes in excess of surface-wave magnitude 7 (Johnson et al. 1996) and the Cascadia Subduction Zone is capable of producing earthquakes up to moment magnitude 9 (Atwater et al. 2005). This suggests that substantial ground motion may occur in the project area.

Site Topography, Landforms, and Beach Composition

The project site is located in a flat shoreline area along Possession Sound. Its protective seawall rises from sea level to approximately 10 to 15 feet above mean sea level (MSL) along a 1 horizontal:1 vertical (1H:1V) slope. Prior to the seawall, the original landform was a spit that enclosed a lagoon. This lagoon was filled during
waterfront property development as early as the 1900s. Significant cut-and-fill work occurred in the 1950s as part of historical operations of the Mukilteo Tank Farm.

Inland from the project site and parallel to the shoreline is a bluff that rises to a broad upland plateau along a 1.5H:1V slope to an approximate height of 54 feet MSL. The bluff is bisected by Japanese Gulch and Brewery Creek. A culvert at the base of the bluff conveys this stream under the BNSF corridor and the Mukilteo Tank Farm to Possession Sound. Brewery Creek is enclosed within a pipe system as it passes through the downtown waterfront area before reaching Possession Sound. Streams provide a source of sediment to the beach. The bluff’s ability to supply sediment to the beach has been greatly reduced by the presence of the BNSF line. These conditions have resulted in sediment-starved beaches consisting of cobble and gravel in a sand matrix. The natural migration of beach sediment along the shoreline is hindered by the Tank Farm Pier. The net shore drift is north and northeast with wave action predominantly from the southwest (City of Mukilteo 2011).

Site Geologic Units

Surface soils in the project area include urban soils with moderate infiltration rates, and gravelly sandy loams derived from the underlying glacial till. Alternating layers of fine and coarse material result in low to moderate infiltration rates, respectively.

Much of the project area is underlain with up to 22 feet of dredge fill, construction debris, and/or local backfill materials. The fill material consists of unconsolidated sand and small to medium gravel with various amounts of organics. Zones of fill material, consisting of wood, brick, scrap metal, and other debris occur near the shoreline and in locations throughout the project area. These zones are unsuitable for construction. Below the fill are beach deposits that are approximately 40 feet thick at the rail lines and more than 90 feet thick offshore. Below the beach deposits are underlying geologic units of the Vashon Till, Transitional Beds, and the Whidbey Formation. Pressure from overlying ice sheets during glacial events resulted in compaction of these units. The Vashon Till is a dense, non-sorted mixture of clay, silt, sand, gravel, cobbles, and boulders. The Transitional Beds consist of glacial and non-glacial deposits of clays, silts, fine sands, and peaty sand and gravels, and can become unstable in steep slope areas resulting in slope failure and landslides. Clay layers in the lower portion of the Whidbey Formation can restrict vertical movement of groundwater, which could lead to an erosion bowl along the bluff fence and result in slope failure.

Geologic Hazards

Geologic hazards are natural geologic processes that can create environmental conditions that endanger human lives and threaten property. Geologic hazards in the project area are discussed below.

Erosion

Erosion can adversely affect surface water quality and/or undermine structures. Soil erosion in the project area can occur from wind and/or improper surface water drainage when soils are exposed during construction. Soil erosion is of
concern along bluffs adjacent to the project area due to soil type, slope inclination, and underlying hardpan.

Erosion of in-water sediment can reduce the lateral capacity for foundations of pier structures, wingwalls, and bulkheads. It also can suspend sediments into the water column, diminishing water quality.

**Landslides**

Landslides can damage structures and threaten public safety. These hazards result from a combination of slope inclination (>25 percent), soil type, geologic structure, vegetation, human alteration, and occurrence of water. Steep slopes and high landslide hazards have been identified adjacent to the project area (see Figure 4.10-1).

The potential for landslides in the immediate vicinity of project improvements is low; however, the larger project area could be affected by potential landslides from the bluff. Several small shallow landslides were identified along the bluff area during a landslide survey after the heavy storms in 1996 and winter 2010–2011. These events indicate the bluffs are susceptible to landslides, and additional hazard areas that are not mapped may be present along the bluff.

Offshore landslides have the potential to occur in the project area due to the relatively loose nature of the submarine beach deposits and steep slope inclination in the area. A potential large submarine landslide has been identified offshore near the project area (Karlin 2011; Gonzalez 2003). Earthquake events have the potential to trigger onshore and offshore landslides.

**Non-Seismic Settlement**

Settlement hazards can result in damage to building and structure foundations and cause cracks in roadways. Settlement hazards in the project area could occur from unsuitable fill material in the project area. Several parts of the project area have been found to contain unsuitable fill materials as evidenced by pavement collapses at the existing terminal and near SR 525 in the past 5 years. Not all of the areas of unsuitable fill material have been completely delineated; therefore, exact locations are not fully known. More information on the extent of these areas will be developed in later design stages of the project.

**Earthquakes**

Earthquakes can cause adverse effects from: 1) ground motion, 2) soil liquefaction and settlement, 3) tsunamis, and 4) earthquake-induced landslides (discussed above). The project area is within an active earthquake region. The Southern Whidbey Island Fault Zone is within one-third of a mile of the project area (see Figure 4.10-2).
Figure 4.10-1. Landslide Susceptibility and Steep Slopes

Data Sources: (WSDOT, LiDAR Puget Sound 2005, City of Mukilteo, Karlin unpublished 2011)
Figure 4.10-2. Seismic Hazards

Liquefaction Susceptibility

- Moderate
- Low
- Very Low

- Southern Whidbey Fault Zone
- Tsunami Inundation Area (Tsunami data shown only for City of Mukilteo)
- Streams
- City Boundary
- Shoreline

Data Sources: (City of Mukilteo, Snohomish County, WSDOT)
Ground Motion

Ground motion is the movement that occurs during an earthquake as soil particles move in response to passing seismic waves. Certain soil types can amplify ground motion. The U.S. Geological Survey (USGS) seismic hazard maps and database were used to estimate ground motion parameters for the site at 500-year and 1,000-year events. The results from the evaluation indicate a risk of an earthquake of magnitude greater than 7 from the Southern Whidbey Island Fault Zone.

Ground motion (or shaking) during an earthquake can result in damage or structural collapse to buildings and structures. It also can severely damage roadways, railroads, and utility lines.

Liquefaction and Settlement

Liquefaction from an earthquake can damage buildings or structures, and pose a threat to public safety. Liquefaction is a phenomenon where saturated soils lose their strength during seismic activity, causing the soil to behave like a fluid. It is most likely to occur in saturated, loose (unconsolidated) sandy soils. Significant adverse impacts may occur to structures and buildings as a result of settlement from the loss of strength and bearing capacity of the soil. Buckling may occur to structures supported by pile foundations. Irregular settlement may break utility lines, resulting in loss of power and water. Adverse impacts may also occur from liquefaction-induced lateral spreading, which can pull apart building foundations, and apply damaging pressure on retaining walls and terminal piles.

Potentially liquefiable soils have been identified throughout the project area and are similar in character for each alternative; however, geotechnical evaluations and studies in the project area suggest the soils are likely to have localized variations.

Tsunamis

Tsunamis generated from earthquakes, volcanic eruptions, or landslides can devastate coastal regions. A tsunami is a series of waves caused by the displacement of a large volume of water. Damage from a tsunami is caused by the smashing force of tall, fast-moving waves, and the drainage of water receding to the sea.

The potential impacts from tsunami inundation on the existing structures are dependent on wave run-up elevation. Critical factors are the degree of displacement at the source of the wave, the distance of the wave source to the site, and the characteristics of offshore and onshore topography. Modeling indicates the potential for a minor tsunami (1.6-foot wave height) in Mukilteo if an earthquake with a magnitude greater than 7 occurs along the Southern Whidbey Island Fault Zone. The height of the incoming wave could be amplified by tidal stage and offshore slopes.

Other tsunami sources in the project area include large submarine landslides resulting in river delta failure at the mouths of major rivers into the Puget Sound and slope failure of steep submarine slopes. The closest major river delta to the project, the Snohomish River, is located approximately 6.5 miles northeast of the project area. A possible submarine landslide could occur near the project, as mentioned above in the Landslides discussion.
**Volcanoes**

Volcanic hazards from Mount Baker and Mount Rainier could threaten public safety and damage structures. Although a number of hazards are associated with volcanic activity, volcanic ash fall would be the most likely hazard to affect the project area, but overall there is a low potential for significant volcanic hazards in the project area.

### 4.10.3 Long-Term Environmental Impacts

Long-term impacts on the proposed alternatives may result from seismic and non-seismic geologic hazards identified in the project area. Project alternatives also have the potential to alter existing geologic or hydrogeologic conditions or resources.

**No-Build Alternative**

The No-Build Alternative would replace existing structures over time when they reach the end of their design lives, including wingwalls, towers, fixed dolphins, transfer span, bridge seat foundation, concrete trestle, and bulkhead. It would also replace piles supporting the structures. The replacement structures would reduce the likelihood of adverse impacts because new facilities would meet current building codes and standards, including seismic requirements.

**Ground Motion, Liquefaction, and Settlement**

Adverse impacts from ground motion are potentially significant because the older existing structures do not meet current seismic codes, reflect new developments in earthquake and tsunami science, or incorporate materials and construction techniques that help reduce the risks related to earthquakes or tsunamis. The existing site has a high potential for earthquake-induced liquefaction and lateral spreading. Adverse impacts include structural damage or catastrophic failure during strong ground shaking from an earthquake. Structures that would be most affected by ground motion are the bulkhead and pile-supported structures.

Adverse impacts on the No-Build Alternative are likely to be greater than impacts under the proposed Build alternatives because the Build alternatives would incorporate more updates in seismic code, engineering design, and construction techniques into new construction and operation. Potential impacts would be reduced as new structures replace older components. In addition, vulnerable older onshore structures that may not be replaced or upgraded under the No-Build Alternative would be more susceptible to damage than new structures during a seismic event.

Non-seismic settlement due to unsuitable fill material does not appear to pose adverse impacts for the No-Build Alternative. The replacement of predominantly offshore structures should not be affected by poor fill because they would be replaced using current engineering standards.

**Tsunamis**

Adverse impacts from tsunamis on the No-Build Alternative would be potentially significant. In addition to inundation, structures can be damaged by the high lateral and vertical pressure from the wave currents or from debris transported by the wave that would affect site structures. The wave action and hydraulic forces can cause
substantial scour and erosion undermining buildings and other foundations, causing collapse or other major damage. The generally deteriorated condition of the existing structures and the relatively lower standards to which they were built increase their vulnerability.

**Landslides**

Active upland landslides have not been identified near the existing terminal. A high landslide susceptibility zone has been established by the City of Mukilteo under the Critical Hazard Ordinance, but this zone is outside the project area.

A large submarine landslide has been identified in the vicinity of the existing site. The potential impacts to the No-Build Alternative may include undermining foundation structures or removing the lateral capacity of the sediments leading to damage or collapse of offshore structures.

**Preferred Alternative**

Offshore structures would be constructed to meet current seismic standards, similar to the No-Build Alternative; however, the Preferred Alternative would relocate the ferry terminal and the fishing pier/day moorage from its current location to the middle section of the Mukilteo Tank Farm. A new passenger building, new toll booths, a terminal supervisor's building, and a maintenance building would also be built, and several of these buildings would be multiple stories rather than the single-story buildings on the current terminal.

**Ground Motion, Liquefaction, and Settlement**

The Preferred Alternative would be subject to similar moderate to high seismic risks as the No-Build and Existing Site Improvements alternatives. However, stable soils at the Mukilteo Tank Farm occur at shallower depths than at the existing site. The alternative would be largely developed on a vacant site, which allows the project to apply soil strengthening and stabilization measures and foundation supports for structures. Environmental or archaeological considerations may restrict some stabilization techniques, but the major structures are outside of archaeological sites. Design and construction measures would address unsuitable fill material, or weak, compressible, and organic soil, which would help to minimize the risks from seismic effects.

**Tsunamis**

Offshore topography would help the Preferred Alternative withstand tsunami-related damage to a greater degree than the No-Build Alternative or Existing Site Improvements Alternative. As with the other Build alternatives, advances in engineering design may be applied to the design of the Preferred Alternative and could reduce impacts.

**Landslides**

On land, landslide susceptibility for the Preferred Alternative is greater than the No-Build and Existing Site Improvements alternatives. As presented in Figure 4.10-1, high landslide susceptibility has been established by the City of Mukilteo approximately 350 feet from the closest design footprint. Steep slopes are identified
within 300 feet of the design footprint. However, impacts resulting from slope failure are expected to be low because slope failures are likely to be small, and shallow landslides are unlikely to affect the project.

A large submarine landslide could affect the Preferred Alternative, although the area of the previous offshore landslide is closer to the existing facility. Design measures to stabilize soils and provide foundations for all weight bearing in-water structures would minimize potential impacts to the project. This includes stone columns and deeper foundation supports for the load-bearing offshore structures.

**Existing Site Improvements Alternative**

The Existing Site Improvements Alternative would include the construction of new wingwalls, towers, fixed dolphins, transfer span and bridge seat foundation, concrete trestle and bulkhead, and the relocation of dolphins from the current facility. New toll booths, a new passenger building, and a new transit center would also be constructed.

**Ground Motion, Liquefaction, and Settlement**

The anticipated seismic effects for this alternative would be similar to those presented for the No-Build Alternative. However, the improvements to the existing upland structures would reduce the potential damage resulting from strong ground motion, liquefaction, or settlement. The construction of new offshore structures and upland buildings would reflect current seismic design criteria and site-specific geotechnical information. These buildings would be less susceptible to damage from ground motion than unaltered older structures.

The potential for liquefaction impacts to marine structures for the Existing Site Improvements Alternative would be similar to those of the No-Build Alternative, with the exception of upland structures. There is a high liquefaction potential for near-surface soils to depths generally ranging from 10 to 20 feet onshore and to 80 feet offshore. Compliance with current design criteria would make structures safer.

**Tsunamis**

The potential impacts on the Existing Site Improvements Alternative would be similar to those presented for the No-Build Alternative, although if aging terminal facilities are replaced sooner, they would be better able to withstand lower magnitude events.

**Landslides**

The potential impacts on the Existing Site Improvements Alternative would be similar to those presented for the No-Build Alternative.

As noted above for the No-Build Alternative, a large submarine landslide has been identified to the north of the existing terminal. Potential impacts on offshore structures would be similar to those identified for the No-Build Alternative. However, with the Existing Site Improvements Alternative, more measures to address seismic risk would be applied, which would help to reduce risks.
Elliot Point 1 Alternative

This alternative would be similar to the Preferred Alternative, but it extends farther east and includes the daylighting of Japanese Creek. It also has a longer trestle and more over-water structures than the Preferred Alternative.

Ground Motion, Liquefaction, Settlement, Tsunamis, and Landslides

The anticipated seismic effects for the Elliot Point 1 Alternative would be similar to those for the Preferred Alternative except for daylighting Japanese Creek.

Daylighting Japanese Creek would alter soils and hydrology in the project area. This could affect bluffs above the project area. Because the daylighting would occur near areas where ground stabilization measures would be provided both onshore and nearshore, the additional risk of landslides would be limited. In addition, further geotechnical analyses during final design could identify other design measures to minimize impacts.

4.10.4 Construction Impacts

This section discusses potential short-term impacts during project construction to geologic and hydrologic resources, and impacts from erosion hazards during project construction.

Topsoil, fill, aggregate, quarry rock, concrete, and asphalt resources would be used for all alternatives. Some of these materials would be generated by recycling materials from the demolition of existing roads or concrete structures within the project area, while some would consist of quarried materials. Construction contractors would determine the sources of the materials they use for project construction, although WSDOT may make available specific state-owned sources as part of the construction contract bidding process.

No-Build Alternative

Erosion impacts resulting from the No-Build Alternative are not considered to be significant if they are mitigated. Potential erosion of uncovered soils would be limited by BMPs for stormwater management during construction.

Limited amounts of geological resources would be used as fill for the No-Build Alternative; consequently, appreciable impacts to geologic resources are not anticipated.

Preferred Alternative

Construction could increase erosion, especially in areas where soft and loose soil conditions exist. Erosion could occur in areas where construction occurs (both onshore and offshore). The removal of existing offshore structures may increase sediment loss for a short time by disturbing the sediments and introducing them into the water column to be transported off site.

Compared to the No-Build Alternative, a greater volume of geological resources would be used for the Preferred Alternative, particularly for fill, but this would not pose an appreciable impact on geological resources.
Existing Site Improvements Alternative

The Existing Site Improvements Alternative would not significantly increase the erosion hazard. The removal of existing offshore structures may slightly increase sediment loss for a short time by disturbing the sediments and introducing them into the water column to be transported off site.

The use of geological resources as fill for the Existing Site Improvements Alternative would not pose appreciable impacts on geological resources.

Elliot Point 1 Alternative

The erosion hazards and use of geological resources for the Elliot Point 1 Alternative would be very similar to the Preferred Alternative except for daylighting Japanese Creek.

The Elliot Point 1 Alternative would restore Japanese Creek to an open stream, which may potentially increase erosion for a period as the creek re-establishes natural conditions.

4.10.5 Indirect and Secondary Impacts

The greatest risks to the project are impacts from earthquakes. Earthquake impacts include substantial ground motion and soil liquefaction, which have a high potential to affect public safety, cause structural damage, and result in economic disruption. Based on the Hydrodynamic and Sediment Transport Modeling Study (Coast & Harbor 2013) prepared for the project, the changes in offshore structures could slightly alter sediment migration, erosion patterns, or deposition.

No-Build Alternative

Under the No-Build Alternative, the potential for major damage to the terminal from an earthquake as a result of inadequate seismic design of existing structures and buildings may affect public safety and disrupt the local economy.

Preferred Alternative

The Preferred Alternative would incorporate current seismic and other engineering standards to address the risk of earthquakes, landslides, or other geologic factors.

Based on information developed as part of the project’s design efforts and a review of wind, waves, currents, ferry wakes, and propeller scour, it is unlikely the Preferred Alternative would markedly alter sediment transport patterns.

Existing Site Improvements Alternative

Although earthquake risk is high, new and retrofitted buildings and structures would be built to current seismic safety standards, potentially increasing public safety and decreasing the likelihood of structural damage and economic disruption.

A change in the position of offshore structures under this alternative would not significantly alter sediment transport patterns from current conditions.
Elliot Point 1 Alternative

The indirect effects of the Elliot Point 1 Alternative would be similar to those discussed for the Preferred Alternative, but daylighting Japanese Creek could further alter sediment transport patterns. These changes would be minor.

4.10.6 Cumulative Impacts

Human activities since the late 19th century have substantially changed the topography in the study area. These activities primarily include grading and excavating to construct the Mukilteo Tank Farm, Mukilteo ferry terminal, and BNSF Railway corridor.

Past construction practices were less effective than today’s standards in anticipating geologic and seismic hazards, gravel depletion, and soil erosion. Cumulative development in the region has resulted in loss of topsoil and erosion. As the infrastructure has aged, more constructed projects fail to meet evolving seismic design standards. As these trends became evident, roadway and bridge design codes were updated. Development occurring on unstable soils and slopes requires that specific site preparation measures be applied to reduce hazards and to better protect the public. These measures allow facilities to be more capable of resisting seismic events without damage. BMPs are now standard practice in protecting against soil erosion and landslide potential. Construction debris can now be recycled into usable building materials.

Changes that would occur as a result of the project include reworking disturbed soil, making minor grade changes at a local level, and increasing slope stability with ground improvements. These activities are expected to provide improvements in existing geology or soils conditions, which would in turn reduce the potential for cumulative impacts from existing conditions or past actions such as unstable fill or cuts or surface water modifications near steep slopes. Any other future developments in the project area would also be expected to be built to current engineering standards, which also would minimize the potential for adverse cumulative impacts.

4.10.7 Mitigation Measures

This section describes the project’s measures to prevent, minimize, or offset long-term and short-term impacts from geologic hazards to structures and the project’s impacts to geologic resources. Some of these measures are reflected in the updated project design for the Preferred Alternative, but details will continue to be refined during the final engineering design phases of the project.

Mitigation for Long-Term Impacts

Preferred Alternative

The following long-term mitigation measures would be implemented:

- During preliminary and final design, geotechnical engineering would further characterize existing geologic hazards for incorporation into the final engineering design. These hazards would include, but not be limited to, landslides (onshore and offshore), steep-cut slopes, soil liquefaction, and settlement. Additional site-
specific assessments may include the use of geotechnical drilling, test pitting, material testing, geophysical techniques and/or inclinometers, and monitoring wells, as needed. These assessments would be based on the recommendations of the project geotechnical engineer and will comply with WSDOT geotechnical design standards.

- In the later stages of project design, WSDOT would define the specific stabilization techniques that would be used to minimize liquefaction of soils.

- The project would adhere to City of Mukilteo and City of Everett regulations regarding critical area regulations to safeguard public health, safety, and welfare, as well as protect sensitive areas and their functions and values. These regulations address protection of public health and natural resources from injury, loss or damage from landslides, steep slope failures, erosion, seismic events, liquefaction, tsunamis, and flooding.

- WSDOT would design and build facilities to meet seismic standards and other applicable federal, state, county, and city engineering and design codes or standards. Structural designs will take into consideration ground motion, liquefaction, lateral spreading caused by earthquakes, and information on tsunami risks.

Other Alternatives

The mitigation measures for the other alternatives would be similar to those described for the Preferred Alternative.

Mitigation for Construction Impacts

WSDOT would adhere to applicable local regulations regarding grading and excavation. These regulations address preserving, enhancing, or replacing understory and groundcover (Section 4.12 Ecosystems); minimizing degradation of water quality and sedimentation of creeks; minimizing impacts of increased runoff erosion and sedimentation; and protection of groundwater resources (Section 4.11 Water Resources). Grading, excavation, and/or the removal of topsoil and vegetative cover would require local permits (Section 4.2 Land Use and Economics).

4.11 Water Resources

This section discusses the potential impacts the proposed alternatives may have on marine water, surface water, and groundwater. Marine and freshwater habitats are discussed in Section 4.12 Ecosystems, and groundwater is also discussed in Section 4.8 Hazardous Materials.

4.11.1 Regulatory Context

NEPA and SEPA both identify water resources as a required area of environmental analysis. The Clean Water Act (CWA) is the primary federal law governing water quality in the United States. Numerous federal and state regulations and permits, many of which are under the authority of the CWA, control activities ranging from discharges into United States waters to construction or fill within certain waters. For instance,
Surface water quality standards are implemented through CWA Section 401 certifications and comply with the Water Pollution Control Act and Washington State’s Water Quality Standards. Groundwater standards protect existing and future beneficial uses of groundwater from contaminated discharge. WSDOT also must comply with its National Pollutant Discharge Elimination System (NPDES) permit and the WSDOT Highway Runoff Manual, which was developed to comply with Ecology’s 2007 Stormwater Management Manual for Western Washington. Ecology has updated the manual in 2012, and WSDOT will update its manual when its next NPDES permit is renewed.

### 4.11.2 Affected Environment

The study area includes all water resources within the immediate vicinity of the project alternatives. The study area is limited because the alternatives are all located along the shoreline, and upland effects on water resources would be limited to the effects occurring within the area of construction, primarily along the shoreline. Upland parts of the study area are generally one edge of the alternatives and Possession Sound is the other. Figure 4.11-1 shows the larger watershed context of the project, while Figure 4.11-2 shows the more localized features surrounding the project. The study area is located within the southern part of Water Resource Inventory Area (WRIA) 7, Snohomish River, and adjacent to WRIA 8, Cedar-Sammamish River.

The project area lies north of the BNSF tracks along the Mukilteo waterfront. Most of the area has been graded and filled for existing development and is relatively flat. Across the project area there is less than a 10-foot change in elevation. Beyond the railroad tracks is a relatively steep hillside and bluff section. SR 525 descends this hillside to the existing Mukilteo ferry terminal.

### Water Resources in the Study Area

The major water resources within the study area are Possession Sound, Japanese Creek, and Brewery Creek. Both creeks descend to the flat area within the study area and may receive some groundwater flow collected from under the surface as the topography flattens near the beachfront. There are no documented wetlands within the project area.

Possession Sound is located at the northern portion of the study area. It provides an environment for aquatic life; opportunities for recreational boating, fishing, and swimming; and tidelands that provide opportunities for beachcombing and shellfish harvesting. It also enables commerce and navigation throughout the region. The shoreline of Possession Sound in the study area is shaped by tides, wind, and wave action. Currents run parallel to the shore, moving sediment from the adjacent streams.
Figure 4.11-1. Water Resources in the Project Vicinity
Figure 4.11-2. Water Resources in the Study Area
Japanese Creek originates near Paine Field Boulevard in Everett and flows north toward the project area through a steep narrow ravine known as Japanese Gulch. After descending through Japanese Gulch, the stream flows into a culvert (that is a partial fish barrier) under the BNSF railroad tracks, and enters an underground vault on the north side of the railroad tracks. Stream flows then are diverted into two routes. The first route is a 42-inch-diameter culvert extending through the existing Mukilteo Tank Farm site and entering Possession Sound. The second route is a 48-inch-diameter pipe extending east along the railroad tracks to an outfall at the Mount Baker Terminal. There are documented cutthroat trout, Chinook salmon, and coho salmon in the creek.

Brewery Creek originates south of the project area, and its drainage basin includes most of downtown Mukilteo. The stream channel gradient in the upper basin is relatively steep, but it flattens considerably through the downtown area. The stream is enclosed within a pipe system as it passes through the downtown waterfront area before it is discharged through an outfall into Possession Sound. No fish have been documented in Brewery Creek.

**Water Quality**

Possession Sound is included on the 2012 Washington State Water Quality Assessment [303(d)] list (Ecology 2012) for not meeting necessary quality criteria for fish habitat, and for exceeding thresholds for dissolved oxygen, fecal coliform bacteria, and dioxin. A designated total maximum daily load (TMDL), which sets the maximum amount of a pollutant allowed to be released into a waterbody, is in place for dioxin.

The water quality in Japanese Creek and Brewery Creek is impaired due to urbanization in the drainage basins. Data obtained from Japanese Creek from 1994 through 2012 show that the stream does not meet the state water quality criteria for fecal coliform bacteria, lead, turbidity, pH, dissolved oxygen, cadmium, and copper.

Previous studies completed for the City of Mukilteo confirmed that oil from the existing ferry holding area is degrading the water quality in Brewery Creek (TetraTech/KCM et al. 2001). Water quality in the creek is also likely degraded by a variety of pollutants typically found in urban runoff in the Puget Sound area, including heavy metals, hydrocarbons, and synthetic organic compounds.

**Groundwater**

A former lagoon area at the base of the hillside, now covered with fill, acts as a small groundwater recharge zone, with groundwater observed 7 to 10 feet below the surface elevation. Groundwater levels are highly dependent on tidal conditions, ranging from +6.1 feet above mean lower low water (MLLW) at low tide to +11.3 feet MLLW at high tide. The study site overlies the Intercity Plateau Aquifer, which is not used for drinking water. Municipal drinking water for the city of Mukilteo comes from the Spada Reservoir. At low tide, the groundwater flows north. At high tide, the water table near the northern boundary of the site reverses direction and flows south. The groundwater is recharged by on-site and off-site infiltration of rainwater, and from the aquifer in the uplands to the south. The majority of the project area has been paved. Paved surfaces minimize the infiltration of surface water, reducing the transport of
possible contaminants migrating out of the area through the groundwater and into Possession Sound.

Soils and groundwater underlying portions of the study area were contaminated with petroleum hydrocarbons and heavy metals (Herrera 2003) as a result of past uses of the Mukilteo Tank Farm. After remediation between 1997 and 2002, monitoring results showed that soil, groundwater, surface water, and marine sediment were compliant with all provisions of the Ecology-approved compliance monitoring plan (Oasis 2006) (for additional information, see Section 4.8 Hazardous Materials). However, project-related archaeological trenching and boring conducted in 2006 and 2007 found petroleum and other contaminants in soils on the west and central portions of the property. Therefore, despite past cleanup efforts, it is possible that minor residual contamination is still present beneath the ground surface in some areas.

**Stormwater**

Currently, moderate amounts of pollutants in stormwater runoff are generated within the study area by vehicle traffic, routine business uses, and the ferry terminal operations. Additional pollutants may enter the stormwater runoff from the former Mukilteo Tank Farm operations, atmospheric deposition, and wildlife fecal matter. Multiple stormwater outfalls within the study area discharge into Possession Sound (see Figure 4.11-2).

**Flooding**

A portion of the study area is mapped by FEMA within a 100-year floodplain (see Figure 4.11-2). The 24-inch-diameter outfall for the Brewery Creek culvert is not equipped with a tide gate. At certain high tides, high waves cause water to back up in the culvert. When this occurs, the streets near the intersection of Front Street and Park Avenue in downtown Mukilteo can flood up to 18 inches, particularly when rainstorms coincide with high tides. Based on hydrologic modeling conducted by the City of Mukilteo, flooding near the Brewery Creek outfall is expected independent of tidal conditions during 25-year storm events. This flooding would occur because of the limited capacity of the stream culvert pipe. If a high tide coincides with this type of flooding event, flooding could spread to many areas along the waterfront. No other flooding is known to occur within the study area.

**Aquatic Vegetation**

Macroalgae and eelgrass surveys along the shoreline have been completed in the study area, and are discussed in Section 4.12 Ecosystems. While aquatic vegetation is present throughout the area, it is sporadic. The larger areas with vegetation are to the east of the site.

**4.11.3 Long-Term Environmental Impacts**

All alternatives may affect water resources in several ways. Possible impacts may result from stormwater runoff from impervious surfaces (roadways and parking areas) entering the water resources; shading from the ferry pier; placement of piles and buildings within the nearshore area and the vegetated shoreline; creation of new sediment patterns; and unanticipated spill of hazardous materials. Impacts on water resources would generally be similar under all alternatives.
Stormwater

The Preferred Alternative would create approximately 10.2 acres of pollution-generating impervious surface (PGIS); no PGIS would be removed, but some would be replaced or relocated.

Stormwater from the existing terminal vicinity is currently discharged untreated to Possession Sound. Runoff from the Preferred Alternative would receive enhanced treatment. Stormwater would be captured by shrub/tree vault treatment catch-basins, with piping from the catch-basins to either outfalls or to bioretention areas. The slope and depth of piping would be minimized in order to avoid deep trench excavations, which would avoid or minimize conflicts with groundwater, the shell midden, and soil contaminants. The west end of the site would be routed to an existing 24-inch pipe outfall. The center of the site would be routed to an existing 30-inch outfall. Water from the eastern portion of the site would be routed to a new outfall.

The Preferred Alternative would provide enhanced stormwater treatment for all new PGIS. Treatment would be provided by filtering cartridges installed underneath the holding area or by natural bioretention systems. Infiltration (permeable pavement) could be used for stormwater treatment at the east end of the site. Field testing during final design would be performed on any areas proposed for infiltration to confirm areas suitable for infiltration (where the surface water can be infiltrated without it combining with contaminated soil or groundwater). If field testing shows that soils or groundwater are contaminated beyond acceptable limits, infiltration would not be used, and water would be discharged via the new outfall.

Site-specific cleanup levels already established for the property would be used to determine acceptable levels for groundwater and soil contamination (see Section 4.8 Hazardous Materials).

Notwithstanding WSDOT’s intention of trying to infiltrate some of the runoff, the stormwater analysis conservatively assumes no infiltration. If infiltration issued, actual pollutant loads would be less than what is presented here. WSDOT would notify the National Marine Fisheries Service and U.S. Fish and Wildlife Service if the final design of stormwater treatment methods differs from what is discussed in this EIS and Appendix L Biological Assessment.

For all of the Build alternatives, increased land cover would generate more pollutants. The project site is exempt from current flow control requirements because stormwater runoff is discharged directly into Possession Sound; however, increased flows could exceed the capacity of the existing enclosed drainage conveyance system leading to the Sound.

The No-Build Alternative would retain nearly the same footprint as the existing condition. It would contribute the largest amount of stormwater-related pollutants to Possession Sound because only minimal stormwater retrofit requirements would be implemented.

The Existing Site Improvements Alternative would have a similar amount of impervious surface as the No-Build Alternative, but would include adequate stormwater treatment facilities.
The Elliot Point 1 Alternative would have the most impervious surface among alternatives; therefore, larger stormwater treatment facilities would be included to meet current requirements.

**Flooding and Shoreline Effects**

Because most of the existing flooding in the waterfront area is related to high tides or storm surges, none of the alternatives would generate an increased risk of flooding due to changes in stormwater runoff flows. Any new outfalls would be designed and sited to prevent occasional tidal backwater impacts from flooding the site and adjacent areas. If necessary, tide gates could be added, or larger conveyance pipes could be used for extra storage to address combined high storm and tide events.

The project’s *Hydrodynamic and Sediment Transport Modeling Study* (Coast & Harbor 2013) examined the potential for impacts from wave action or currents on the shoreline and sediments. The analysis also considered the forces generated by ferry propellers. None of the alternatives would cause shoreline erosion or notable erosion in the bottom slopes or sediments. The Preferred Alternative would have the deepest water berth, and would have limited effects due to scouring. The Existing Site Improvements Alternative is in an area that lacks sediments, in part due to the existing terminal; additional sediment scour is not expected. The nearby shoreline area and bulkheads would also be reconstructed as part of the new terminal facility, which would further protect against erosion of the shoreline particularly during storm events.

The No-Build and Existing Site Improvements alternatives are located within the FEMA 100-year floodplain (see Figure 4.11-2), which poses a risk to future terminal operations. A small portion of the Elliot Point 1 Alternative is located within the FEMA 100-year floodplain, but the future risk to terminal operations would be much lower than for the No-Build and Existing Site Improvements alternatives. The Preferred Alternative is not located within the FEMA 100-year floodplain.

**Marine Vegetation**

Water quality can be affected if nearshore aquatic vegetation is shaded. The lack of sunlight can reduce photosynthetic activity and alter dissolved oxygen levels in the immediate area.

For all alternatives, shading would generally be similar to or less than the existing conditions for the No-Build Alternative. The Existing Site Improvements Alternative would increase over-water coverage by about 12,000 feet, compared to a gain of 3,000 square feet with the No-Build Alternative. The Preferred Alternative has a shorter pier than the Elliot Point 1 Alternative, and removes the existing facility and the Tank Farm Pier for a net removal of about 129,100 square feet of over-water cover. It also removes the existing Port of Everett fishing pier and day moorage and relocates it on the Mukilteo Tank Farm site. The Elliot Point 1 Alternative has the largest pier and greatest amount of new over-water coverage, but also removes the existing facility and Tank Farm Pier, resulting in a net removal of about 116,000 square feet of over-water cover. For all alternatives, the effect on marine vegetation would be limited to the immediate project area and is not anticipated to result in
measurable impacts on aquatic life or water quality (see Section 4.12 Ecosystems for more information).

**Sediment**

Wave action and sediment drift along the shore could be altered by the bulkhead bank protection, anchor chains leading from the floating dolphin structures to seafloor anchors, new piles supporting the ferry terminal pier, and removal of piles supporting the Tank Farm Pier and the existing ferry trestle. As noted above under Flooding and Shoreline Effects, propeller-driven currents during ferry docking are not expected to notably disturb Possession Sound’s bottom slopes or sediments near the ferry terminal.

As discussed in more detail in Section 4.8 Hazardous Materials, WSDOT also assessed existing sediment quality near the Tank Farm Pier. While some of the sediment samples show traces of several contaminants, primarily pesticides, there would be a low risk of additional contamination to area sediments due to the relatively low levels of contaminates present, and because sediment transport would be limited.

**Over-Water Spills**

Under all alternatives, ferry terminal activities would occur over water and within nearshore areas. Such activities would include docking of ferries, operation of the vehicle transfer span, loading and unloading of vehicles, and collection of wastes and other activities related to increased human presence. Small fuel leaks, engine fluid releases, garbage, and spills of other harmful materials could escape containment and collection, resulting in adverse impacts on the offshore and nearshore water resources.

The pier for the Preferred Alternative is approximately the same size as the No-Build Alternative pier and the risk of spills is expected to be similar. The Existing Site Improvements Alternative has a larger over-water structure compared to the No-Build Alternative, resulting in a slightly higher risk of over-water spills. The larger pier for the Elliot Point 1 Alternative with additional over-water vehicle use and equipment operation would pose the highest potential for accidental over-water spills.

**4.11.4 Construction Impacts**

Construction impacts are short term and temporary because they are confined to the duration of construction activities. Potential impacts on water quality may result from removal of existing buildings and piers, relocation of utilities, other land-disturbing activities, dredging of sediments, construction of new buildings and trestles, and removal and installation of other in-water features, including bulkheads. Many of the construction impacts would be similar for the four alternatives being considered.

**Impacts Common to All Alternatives**

All of the alternatives have construction activities that could affect water quality. Demolition of existing features may inadvertently convey contaminants into water resources, impairing water quality. Wind-blown dust from exposed surfaces and other fugitive dust from construction materials containing contaminants could be carried to adjacent water resources. As discussed below, other sources of potential impacts include excavation in upland areas where groundwater may be encountered, construction or
demolition in-water where sediments may be disturbed, or the potential for accidental spills of fuel or other materials when construction activities are near water.

**Dewatering**

If water is encountered during excavation and construction activities, dewatering of selected areas may be required. Dewatering typically involves pumping groundwater out of a construction area to temporarily lower the water table elevation, allowing work to be done in a relatively dry condition. Within the study area shallow groundwater exists at 7 to 10 feet bgs. While few elements extend that deep, some excavation related to foundation and structural elements or removal of utilities could extend to these levels; if it does, dewatering activities may encounter contaminated groundwater, and could cause contaminated groundwater to migrate.

**Sediment, Turbidity, and Water Quality**

Upland construction activities could also result in soil erosion, which could lead to sediment entering stormwater runoff. If not handled in accordance with applicable construction procedures and permits, this runoff could enter Possession Sound through stormwater systems, culverts, and overland flow.

Water quality at the saltwater intake system for the NOAA Mukilteo Research Station is not expected to be affected by most construction activities, such as construction of an over-water platform and placement of anchors. If toxic chemicals were suspended from the marine sediment layer or from creosote piles during removal, the associated concentrations in the water column would be diluted, and sediments would be carried away by wave action or would settle back onto the bottom of Possession Sound in a relatively short time after entering the water column. The suspension of contaminants in the water column would be temporary, and no long-term degradation of intake water is expected. Even if turbidity associated with construction were to enter the intake system, water quality for the NOAA Mukilteo Research Station is not likely to be adversely affected because the intake system is filtered. Coordination with NOAA research staff before and during sediment-disturbing activities would help avoid impacts.

All of the alternatives have fixed dolphin structures, wingwalls, a trestle, and an overhead pedestrian walkway; for their construction, WSDOT would need to drive or drill steel or concrete piles into the sediment. The driving of solid-cast concrete piles into sediments would displace sediments and temporarily increase turbidity. Installing hollow steel piles would create less water column turbidity, but may require the disposal of contaminated sediment from inside the pile casing prior to concrete pouring. If displaced water within the hollow piles or drilled shafts is not removed and managed carefully, uncured concrete could make contact with marine water, locally increasing the pH and turbidity of the water.

The *Hydrodynamic and Sediment Transport Modeling Study* (Coast & Harbor 2013) addressed construction impacts from dredging, pile removal, and stone column installation. The study concluded that with the application of BMPs and other standard construction control measures, construction would not generate turbidity levels above regulatory impact criteria.
To construct new or upgraded drainage outfalls for any of the alternatives, WSDOT would need to excavate in some areas along the shoreline, and construction control measures would be needed as part of required water quality permits for the project.

For the Preferred Alternative or the Elliot Point 1 Alternative, WSDOT would remove the Tank Farm Pier and dredge a navigation channel through an existing sediment berm where the pier is currently located. While measures would be in place to minimize impacts, these activities could suspend sediments that could escape collection, and small turbidity plumes could occur in the nearshore area. Higher levels of turbidity would reduce penetration of light in the water column, and this could temporarily reduce productivity of aquatic plants and algae that form part of the food chain.

To meet seismic and other structural engineering standards for facilities such as the passenger buildings and the trestle, WSDOT may need to use stone columns to stabilize soils nearby. The stone columns would be installed by air injection or water jetting to advance the stone column probe past dense soil layers. These activities could suspend bottom sediments and create localized increases in turbidity. However, with the use of standard BMPs, the modeling study predicted turbidity levels would be lower than regulatory limits (Coast & Harbor 2013).

Dredging may also affect water quality by resuspending bottom sediments, which would increase turbidity and allow the potential movement of sediments. This is typically done by using excavation buckets to place sediments on a barge. The modeling analysis found that turbidity would increase where the dredging is occurring, but typical BMPs and other measures required by permits would limit the turbidity and sediment movement effects to within the dredging area (Coast & Harbor 2013). Section 4.8 Hazardous Materials further discusses issues related to sediment quality and potentially contaminated sediments.

**Spills**

There is an inherent risk of water quality impairment with in-water and waterside construction activities. For example, the rupture of a hydraulic fluid line on a work barge or other heavy construction equipment could cause toxic material to spill into open waters. Equipment used to construct the in-water structures may leak small amounts of fuel and engine fluids into Possession Sound. However, use of effective and required pollution prevention measures would reduce the risk of such potential spills.

If an accidental spill of fuel, lubricant, or septic material should occur during construction, shallow groundwater underlying the project area could become degraded. If a large spill occurs on exposed soil, and sufficient containment and cleanup measures are not implemented, the contamination could be significant enough to adversely affect nearshore water quality in Possession Sound. However, it is highly unlikely that a spill of this magnitude would occur during construction. Applicable spill control measures are described in Section 4.11.7.

The construction effects on water resources specific to each proposed alternative are discussed below.
No-Build Alternative

The No-Build Alternative would demolish and replace existing buildings. This action could potentially contaminate nearby water resources with construction materials if containment BMPs are not adequately implemented.

Preferred Alternative and Elliot Point 1 Alternative

The Preferred and Elliot Point 1 alternatives would have many of the same impacts, which would be greater than for the No-Build or the Existing Site Improvements alternatives. The removal of the Tank Farm Pier and its support piles would result in nearshore turbidity plumes. Dredging would result in temporary impacts from the removal and suspension of sediments. Creosote-related hydrocarbons, which are harmful to marine organisms, may have leached from the Tank Farm Pier piles into the surrounding sediment (Herrera and Mossatt & Nichol 2006). Wave action and currents could then transport the resuspended contaminants to nearby areas of Possession Sound. However, WSDOT’s modeling analysis indicates turbidity impacts would be limited to areas within 150 feet, and most of the sediment that could be moved would resettle within 1,500 feet and would not adversely alter sediment quality in adjacent areas. See Sections 4.11.2, 4.8 Hazardous Materials, and 4.12 Ecosystems for more information.

Increased stormwater infiltration into the groundwater table and adjacent open stream sections may result from pavement removal and replacement and other land changes. Water quality may be affected if runoff is conveyed through the potentially contaminated soils described in Section 4.11.2.

Dewatering may be necessary to allow for construction to be completed in relatively dry conditions. Stormwater facilities are expected to require excavation over a small portion of the site, less than 10 percent of the total area, at depths of 5 feet bgs. The proposed stormwater system would tie into an existing outfall at 10 feet bgs.

Existing Site Improvements Alternative

In comparison with the No-Build Alternative, the Existing Site Improvements Alternative would have more land-disturbing activities and excavation, which would increase the potential for erosion and construction dust that may affect water resources. The steeper slope associated with the existing holding lanes for this alternative would also increase the potential for erosion relative to the Preferred and Elliot Point 1 alternatives where the grade is flatter.

4.11.5 Indirect and Secondary Effects

Over time, creosote-treated wood in the piles at the existing terminal site and the Tank Farm Pier have likely contaminated and are still contaminating the marine sediment beneath them. All alternatives involve the removal of creosote-treated piles at the existing terminal site. In addition, the Preferred and Elliot Point 1 alternatives would include removal of the Tank Farm Pier and some underlying sediments, while the No-Build and Existing Site Improvements alternatives would not. Removal of all these sources of pollution could have a long-term beneficial impact on the water quality in the project vicinity.
4.11.6 Cumulative Effects

Population growth and resource use have contributed to degradation of water quality in the region. The polluting of Puget Sound became a controversial issue as far back as the 1920s, when shellfish growers sought protection from the pollution from early pulp mills. The Pollution Control Commission was finally established in 1945 to control pollution. Decades later, a flurry of major state and federal environmental laws was passed between 1965 and 1973 in light of growing awareness of environmental problems. In the late 1970s and early 1980s, a number of events caused broad public concern about conditions in Puget Sound, including reports of toxic contamination, closures of shellfish growing areas, sightings of dead whales, and declines in some fish stocks. The resulting public outcry produced initiatives to improve the water quality of Puget Sound, which continue to this day.

The long-term trend is the slow improvement in water quality resulting from regulatory requirements for treating discharges of water to receiving resources. As redevelopment occurs, requirements are triggered and updated methods of treating and managing discharges are implemented. For the reasonably foreseeable future, without considering the proposed terminal improvement project, several nearby projects will help improve water quality by reducing pollution and retrofitting older stormwater systems. In addition, the region has invested in public education and pollution prevention programs, which will assist in preventing contaminants from reaching the receiving water resources.

This project and several nearby projects would trigger requirements for implementing retrofit measures to ensure water quality treatment. The cumulative impact would be beneficial by improving water quality, reducing pollution, and updating aging stormwater systems, which often develop leaks and thus introduce additional pollutants to downstream resources.

Other actions planned or recently completed in the study area include:

- Transfer of the U.S. Air Force Mukilteo Tank Farm to Port of Everett and NOAA
- Port of Everett Tank Farm Master Plan
- Sound Transit Mukilteo Station South Platform Project
- NOAA Mukilteo Research Station Expansion
- Port of Everett Mount Baker Terminal
- City of Mukilteo Shoreline Master Plan—Restoration of Japanese Creek

Although WSDOT is coordinating with the sponsors of these projects, separate actions could be taken even if the Mukilteo Multimodal Project is not developed. For more information on these projects, see Chapter 2 Alternatives.

As with the Mukilteo Multimodal Project, other projects would implement required water quality treatment, provide erosion and sediment control measures, and carry out other actions to protect water resources. Therefore, the proposed project, in combination with past, present, and reasonably foreseeable future projects, would
likely contribute to an incremental improvement in stormwater runoff quality, and
decrease the pollutant loading to Possession Sound.

4.11.7 Mitigation Measures

This section describes the mitigation measures that would be required for protection
of surface water and groundwater as well as additional mitigation measures that
could be implemented to prevent, avoid, and minimize negative impacts on water
resources. These measures include BMPs implemented during construction activities
as well as long-term measures.

During design, opportunities to apply low-impact development techniques may be
identified.

Climate Change Adaptation

As the stormwater design is developed, the potential impacts of climate change will be
taken into account. Rising sea level may affect the floodplain, drainage outfalls, and
stream levels. Temperature change and storm patterns may bring higher intensity
precipitation, stronger winds, and higher storm surges. Drainage facilities, such as
conveyance pipes, may need to be enlarged to handle increased rainfall runoff and
provide storage for additional stormwater volumes that may result from water backing
up due to sea level rise. Project components at the water edge will be designed taking
into consideration the potential for higher sea levels (see Section 4.9 Energy and Climate
Change for more information). Upland stormwater systems likewise may be designed to
minimize potential flooding due to projected increases in precipitation and sea level.
The installation of flap gates to prevent saltwater from backing up into the enclosed
drainage would be evaluated as part of final design. WSDOT will also consider federal,
state, and local guidance regarding design considerations for rising sea levels during
final design.

Mitigation for Long-Term Impacts

The risk for potential impacts on stormwater discussed in Section 4.11.3 would be
minimized by incorporating appropriate stormwater treatment measures in the
project design, and in accordance with permits that would apply to all alternatives,
including the permits needed for the facilities to be reconstructed under the No-
Build Alternative. These features and measures would be similar to those described
below for the Preferred Alternative.

No-Build Alternative

The No-Build Alternative would retain the same footprint as the existing conditions,
with most change affecting structures or in-water elements. Therefore, it would
trigger the fewest stormwater retrofit requirements.

Preferred Alternative

After the implementation of design features, BMPs, and other components included
in the Preferred Alternative, or as part of the mitigation defined in other
environmental topic areas, no additional mitigation would be needed.
Stormwater would be treated in accordance with required permits, which call for the use of BMPs prior to being released to surface water. BMPs may consist of ponds, vegetated areas, biofiltration swales, filters, constructed wetlands, or other features and emerging technologies designed to treat for the removal of pollutants from stormwater runoff. Also, landscaping and exterior cleaning practices would include measures to protect water resources.

Drainage conveyance systems would meet applicable requirements for stormwater discharge into Possession Sound; these requirements are in place to minimize the potential for water quality impacts.

**Existing Site Improvements Alternative**

The Existing Site Improvements Alternative would replace existing pavement with new paved surfaces. Stormwater runoff from the upland areas of the project would be treated prior to discharge to Possession Sound in accordance with treatment requirements. A vault system is one of the potential treatment facility types that could be considered.

**Elliot Point 1 Alternative**

For the Elliot Point 1 Alternative, the drainage system for the new PGIS could use bioretention or comparable facilities to treat runoff from areas subject to vehicular traffic. A bioretention facility that provides treatment through binding metals to the soil and uptake of pollutants by plants would be expected to provide better treatment than a vault, which treats through settlement only (Ecology 2005). Drainage runoff from upland areas of the project site would be treated before discharging to Possession Sound, reducing the average annual pollutant load discharged to the Sound from stormwater runoff. Overall, Elliot Point 1 stormwater facilities would be similar to those for the Preferred Alternative.

**Mitigation for Construction Impacts**

**Preferred Alternative**

Measures to reduce turbidity and wave action impact on the shoreline during pier removal could include cutting off the piers at ground elevation, collecting and treating construction stormwater, and complying with the project’s applicable permitting conditions.

Measures to prevent infiltration and contain the dewatering activities would be required in selected areas. It would also be necessary to treat water that had been pumped or otherwise isolated during dewatering before release into Possession Sound.

For any construction work within or above water, a Hydraulic Project Approval (HPA) would be required from WDFW. Work could be limited by the HPA to selected work windows specifying the time of year during which construction activities are allowed to occur. A temporary diversion of the streams could be needed to exclude and protect aquatic communities during construction activities.

In addition to requirements developed through ESA consultations and discussed in Section 4.12.6, Ecosystems, the project would develop and implement plans to minimize
impacts from construction activities and incorporate the plans into construction contracts, including:

- **Turbidity Control Plan**—designed to contain sediments in the nearshore areas for over-water work and for activities such as pile driving, beachhead work, and other activities below the high water level.

- **Temporary Erosion and Sediment Control Plan**—designed to contain and minimize sediment transport from upland construction areas. Disturbed areas would be minimized, protected from erosion, and covered during periods of inactivity that occur prior to final stabilization. Staging of grading operations would be defined and scheduled to minimize the amount of exposed soil at one time. BMPs intended to minimize sediment transport will be identified, marked on project plan sheets, and installed prior to construction activities within the general area of work. Watering may be used to control fugitive dust.

- **Spill Prevention, Control, and Countermeasures Plan** (as called for in Section 4.8.7 Hazardous Materials)—designed to reduce the potential for accidental spills, minimize their quantity, provide direction for containment, and clean up any materials that could cause pollution to the water resources and surrounding environments. Maintenance and operation requirements for equipment and vehicles would be prescribed, on-site spill response materials identified, secondary containment called out, other BMPs for spills discussed, and response, training procedures, and adaptive management processes specified.

- **Dewatering Plan**—designed to prevent groundwater contamination and to ensure appropriate treatment of water removed during dewatering.

- **Dredge Material Management Program** approval (as called for in Section 4.8.7 Hazardous Materials)—designed to manage the disposal of dredged sediments and minimize potential environmental impacts from dredging and disposal activities. The plan requires the approval of state and federal regulatory agencies and would identify the amount of sediment to be disposed, dredged construction techniques, transport method, and the disposal locations.

- **Related water quality permits and approvals**, including the terms and conditions defined by Section 401 permit issued by the U.S. Army Corps of Engineers.

In order to protect the water quality of Possession Sound, and would be further defined by the project’s required water quality permits and by the terms and conditions of the Biological Opinions for the project. BMPs would be used to:

1. Use a floating containment boom surrounding all in-water work areas.
2. Schedule installation of drainage outfall work during periods of low tide to avoid inundation of excavated areas and reduce turbidity.
3. Filling holes left by removed piles with clean sand and gravel.
Other Alternatives

The construction mitigation measures for the No-Build, Existing Site Improvements, and Elliot Point 1 alternatives would be similar to the measures defined for the Preferred Alternative.

Mitigation for Indirect and Secondary Effects

Potential long-term contamination of Possession Sound from indirect effects would be addressed through operational and construction BMPs.

The spread of contaminated sediment or debris suspended during removal of the Tank Farm Pier would be prevented or minimized through the use of construction BMPs such as turbidity curtains, which would allow the suspended sediment or debris to settle out of the water column in a contained area.

Mitigation for Cumulative Impacts

Overall cumulative impacts would be positive and would contribute to improved water quality and water resource benefits for aquatic life and human activities.

4.12 Ecosystems

This section identifies, describes, and evaluates the project’s long-term and short-term impacts on ecosystems (upland, wetland, freshwater, and marine wildlife habitat). The study area boundary for this evaluation is defined as a 1-mile radius from the existing ferry terminal. In addition, biologists reviewed existing information on wildlife habitats present within a 5-mile radius of the existing ferry terminal.

Sensitive wildlife, fish, plants, and their habitat can be adversely affected by project construction and operational modifications. Areas of particular concern include interference with critical life functions (foraging, migration, breeding, etc.); degradation or loss of habitat; habitat fragmentation; effects related to collisions between vehicles/vessels and wildlife; loss of animal or plant populations; impacts on food resources; water quality impacts; and direct effects from construction such as noise or other temporary disruption of habitat areas. Identifying and mitigating risks to ecosystems could prevent or reduce the effects of these impacts.

A detailed description of the affected environment and a more detailed analysis of ecosystem impacts and mitigation are presented in the Ecosystems Discipline Report, which is an appendix to this EIS.

4.12.1 Overview of Analysis and Regulatory Context

Federal, state, and local laws protect many marine, freshwater, and upland plants, animals, and habitat from human-caused influences or impacts. Protecting habitat is necessary for the continued presence of wildlife species in urban environments, such as the city of Mukilteo. Applicable authorities protecting fish, wildlife, and their habitat include:

- **Federal**: Endangered Species Act (ESA); Migratory Bird Treaty Act; Bald and Golden Eagle Protection Act; Magnuson-Stevens Fishery Conservation Management Act (Magnuson-Stevens Act); Marine Mammal Protection Act
(MMPA); Executive Order 11990 on the protection of wetlands; Clean Water Act; Clean Air Act; and National Environmental Policy Act.

- **State:** State Environmental Policy Act; Shoreline Management Act; Hydraulic Code; Fishways, Flow and Screening Code; State Growth Management Act; Washington State Species of Concern Lists; and water quality and stormwater management regulations.

- **Local:** Cities of Mukilteo and Everett critical area regulations and Shoreline Master Programs.

### 4.12.2 Affected Environment

#### Existing On-site Wetland Characteristics

Investigations performed for this project did not identify any wetlands within the project area. Palustrine (freshwater) wetlands are present in the off-site portion of the study area within Japanese Gulch and south of 5th Street, as characterized in Table 4.12-1.

**Table 4.12-1. Study Area Wetland Habitat**

<table>
<thead>
<tr>
<th>Vegetation</th>
<th>Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese Creek Vicinity</td>
<td>Observed Species:</td>
</tr>
<tr>
<td>Emergent Habitat:</td>
<td>- mallard</td>
</tr>
<tr>
<td>- reed canarygrass</td>
<td>- hooded merganser</td>
</tr>
<tr>
<td>- creeping buttercup</td>
<td>- belted kingfisher</td>
</tr>
<tr>
<td>- rushes</td>
<td>- pileated woodpecker</td>
</tr>
<tr>
<td>Scrub-Shrub Habitat:</td>
<td>Expected Species:</td>
</tr>
<tr>
<td>- salmonberry</td>
<td>- raccoon</td>
</tr>
<tr>
<td>- Himalayan blackberry</td>
<td>- northwestern garter snake</td>
</tr>
<tr>
<td>- sapling red alders</td>
<td>- ensatina</td>
</tr>
<tr>
<td>Forested Habitat:</td>
<td>- Pacific chorus frog</td>
</tr>
<tr>
<td>- red alder</td>
<td>- yellow warbler</td>
</tr>
<tr>
<td>- salmonberry</td>
<td>- common yellowthroat</td>
</tr>
<tr>
<td>- creeping buttercup</td>
<td>- goldfinch</td>
</tr>
<tr>
<td>- piggy back plant</td>
<td>- orange-crowned warbler</td>
</tr>
<tr>
<td>- skunk cabbage</td>
<td>- violet-green swallow</td>
</tr>
<tr>
<td>- lesser periwinkle</td>
<td>- tree swallow</td>
</tr>
<tr>
<td>South of 5th Street</td>
<td>- bushtit</td>
</tr>
<tr>
<td>Forested Habitat:</td>
<td>- bufflehead</td>
</tr>
<tr>
<td>- red alder</td>
<td>- downy woodpecker</td>
</tr>
<tr>
<td>- salmonberry</td>
<td></td>
</tr>
<tr>
<td>- Himalayan blackberry</td>
<td></td>
</tr>
<tr>
<td>- piggy back plant</td>
<td></td>
</tr>
<tr>
<td>Open Water Habitat</td>
<td></td>
</tr>
</tbody>
</table>

#### Terrestrial Wildlife Habitat Characteristics

Terrestrial habitat (including marine nearshore habitat) in the proposed construction areas consists of urban and mixed environments. These habitats have been highly modified from their original condition and are used by animals that are adapted to human activity and disturbance. Upland forest habitat is present within 1 mile of the project area, primarily in Japanese Gulch, Brewery Gulch, and Edgewater Creek Gulch (Figure 4.12-1).
Figure 4.12-1. Wildlife Habitat in the Project Vicinity

Legend:
- Project Area
- 1 Mile Study Area Buffer
- Backshore Restoration Projects
- City Boundary

Note: All habitat locations estimated.

Marine Nearshore Habitat
High-Quality Ecosystem
Biodiversity Areas and Corridors
Wetlands

Data Sources: (Cities of Mukilteo and Everett, Snohomish County, WSDOT, WDFW)
**On-site Terrestrial Habitats**

The predominant terrestrial habitat type found in the study area is urban and mixed-use habitat. It is characterized by a high level (more than 60 percent cover) of impervious surfaces, such as pavement and buildings. Vegetation is limited to lawn and landscape strips and isolated patches of unmaintained scrub vegetation, and is dominated by non-native plants. Buildings can provide nesting opportunities for some species of birds and mammals. The species most commonly found in these areas are generally tolerant of a high level of disturbance and reproduce readily in urbanized environments. Vegetation and wildlife species likely to be found in this habitat are summarized in Table 4.12-2.

### Table 4.12-2. Study Area Urban and Mixed-use Habitat

<table>
<thead>
<tr>
<th>Vegetation</th>
<th>Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-native Species:</strong></td>
<td><strong>Observed Species:</strong></td>
</tr>
<tr>
<td>- Himalayan blackberry</td>
<td>- crow</td>
</tr>
<tr>
<td>- butterfly bush</td>
<td>- house sparrow</td>
</tr>
<tr>
<td>- shrub roses</td>
<td>- Canada goose</td>
</tr>
<tr>
<td>- common St. John’s wort</td>
<td>- European starling</td>
</tr>
<tr>
<td>- Scot’s broom</td>
<td>- several gull species</td>
</tr>
<tr>
<td>- English plantain</td>
<td>- rock pigeon</td>
</tr>
<tr>
<td>- numerous grass species</td>
<td>- great blue heron</td>
</tr>
<tr>
<td>- Scotch broom</td>
<td>- belted kingfisher</td>
</tr>
<tr>
<td><strong>Native Species:</strong></td>
<td><strong>Expected Species:</strong></td>
</tr>
<tr>
<td>- red alder</td>
<td>- bald eagle</td>
</tr>
<tr>
<td>- Douglas fir</td>
<td>- song sparrow</td>
</tr>
<tr>
<td>- Pacific madrone</td>
<td>- white-crowned sparrow</td>
</tr>
<tr>
<td>- red elderberry</td>
<td>- Bewick’s wren</td>
</tr>
<tr>
<td>- bentgrass</td>
<td>- Brewer’s blackbird</td>
</tr>
<tr>
<td>- Canada thistle</td>
<td>- cottontail rabbit</td>
</tr>
<tr>
<td>- fireweed</td>
<td>- eastern gray squirrel</td>
</tr>
<tr>
<td></td>
<td>- house mouse</td>
</tr>
<tr>
<td></td>
<td>- Norway and black rat</td>
</tr>
<tr>
<td></td>
<td>- raccoon</td>
</tr>
<tr>
<td></td>
<td>- Virginia opossum</td>
</tr>
</tbody>
</table>

Marine nearshore habitat, which extends from the high tide line along the shore to approximately 30 feet in depth, is also found within the project area. Bird species likely to be found in the marine nearshore habitat of the project area are listed in Table 4.12-3.
Table 4.12-3. Study Area Marine Nearshore Habitat

<table>
<thead>
<tr>
<th>Wildlife</th>
<th>Expected Marine Bird Species:</th>
<th>Other Observed Bird Species:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Marine Bird Species:</td>
<td>Expected Marine Bird Species:</td>
<td></td>
</tr>
<tr>
<td>- great blue heron</td>
<td>- mallard</td>
<td>- bald eagle</td>
</tr>
<tr>
<td>- surf scoter</td>
<td>- marbled murrelet</td>
<td>- European starling</td>
</tr>
<tr>
<td>- Barrow’s goldeneye</td>
<td>- western grebe</td>
<td>- rock pigeon</td>
</tr>
<tr>
<td>- common goldeneye</td>
<td>- black scoter</td>
<td></td>
</tr>
<tr>
<td>- common murre</td>
<td>- American coot</td>
<td></td>
</tr>
<tr>
<td>- Canada goose</td>
<td>- American widgeon</td>
<td></td>
</tr>
<tr>
<td>- horned grebe</td>
<td>- mew gull</td>
<td></td>
</tr>
<tr>
<td>- red-breasted merganser</td>
<td>- ring-billed gull</td>
<td></td>
</tr>
<tr>
<td>- double-crested cormorant</td>
<td>- glaucous-winged gull</td>
<td></td>
</tr>
<tr>
<td>- pelagic cormorant</td>
<td>- killdeer</td>
<td></td>
</tr>
<tr>
<td>- pigeon guillemot</td>
<td>- common loon</td>
<td></td>
</tr>
<tr>
<td>- red-necked grebe</td>
<td>- long-tailed duck</td>
<td></td>
</tr>
<tr>
<td>- numerous gull species</td>
<td>- harlequin duck</td>
<td></td>
</tr>
<tr>
<td>- various waterfowl</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are two freshwater streams, Japanese Creek and Brewery Creek, in the project area. Both Japanese Creek and Brewery Creek have been designated by Ecology as protected for salmon and trout spawning, non-core rearing, and migration; wildlife habitat; and other values. Water quality data for Japanese Creek indicate high levels of fecal coliform bacteria, lead, and turbidity. The City of Mukilteo’s Comprehensive Surface Water Management Plan identifies water quality problems within the Brewery Creek drainage basin. These problems include untreated runoff with oil content resulting from the existing holding area for ferry traffic, and generally degraded stormwater quality as a result of the types of land use in the drainage basin. Fish have been observed in Japanese Creek, including coho salmon, cutthroat trout, and Chinook salmon, but no fish have been recorded in Brewery Creek.

**Off-site Terrestrial Habitats**

Wildlife species found in nearby off-site habitats may be affected by construction or operation of the project. Similar to on-site areas, the off-site areas also contain marine nearshore habitat. In addition, off-site terrestrial habitats also include upland forest, grasslands, edge habitat, and palustrine (freshwater) wetlands and streams. Vegetation and wildlife likely to be found in these habitats are summarized in Table 4.12-4.
### Table 4.12-4. Study Area Off-site Habitats

<table>
<thead>
<tr>
<th>Vegetation</th>
<th>Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upland Forest Habitat</strong></td>
<td></td>
</tr>
<tr>
<td>Japanese Gulch, Brewery Gulch, and Edgewater Creek Gulch:</td>
<td>Observed Species:</td>
</tr>
<tr>
<td>- red alder</td>
<td>- hairy woodpecker</td>
</tr>
<tr>
<td>- black cottonwood</td>
<td>- pileated woodpecker</td>
</tr>
<tr>
<td>- big-leaf maple</td>
<td>- chestnut-backed chickadee</td>
</tr>
<tr>
<td>- Douglas fir</td>
<td>- European starling</td>
</tr>
<tr>
<td>- western red cedar,</td>
<td>- common crow</td>
</tr>
<tr>
<td>- western hemlock</td>
<td>- bald eagle</td>
</tr>
<tr>
<td>- salmonberry</td>
<td>Expected Species:</td>
</tr>
<tr>
<td>- red elderberry</td>
<td>- coyote</td>
</tr>
<tr>
<td>- Himalayan blackberry</td>
<td>- red fox</td>
</tr>
<tr>
<td>- English ivy</td>
<td>- raccoon</td>
</tr>
<tr>
<td>- piggy back plant</td>
<td>- Virginia opossum</td>
</tr>
<tr>
<td>High-Quality Ecosystem (southwest of project area):</td>
<td>- common garter snake</td>
</tr>
<tr>
<td>- big leaf maple</td>
<td>- northwest salamander</td>
</tr>
<tr>
<td>- red alder</td>
<td>- downy woodpecker</td>
</tr>
<tr>
<td>- sword fern</td>
<td>- northern flicker</td>
</tr>
<tr>
<td>- fringe cup</td>
<td>- Bewick’s wren</td>
</tr>
<tr>
<td>- black-capped chickadee</td>
<td>- varied thrush</td>
</tr>
<tr>
<td>- Hutton’s vireo</td>
<td>- Wilson’s warbler</td>
</tr>
<tr>
<td>- black-capped chickadee</td>
<td>- red-tailed hawk</td>
</tr>
<tr>
<td>- winter wren</td>
<td>- sharp-shinned hawk</td>
</tr>
<tr>
<td><strong>Grassland Habitat</strong></td>
<td></td>
</tr>
<tr>
<td>- tall fescue</td>
<td>- common garter snake</td>
</tr>
<tr>
<td>- reed canarygrass</td>
<td>- western fence lizard</td>
</tr>
<tr>
<td>- other grass species</td>
<td>- European starling</td>
</tr>
<tr>
<td>- soft rush</td>
<td>- savannah sparrow</td>
</tr>
<tr>
<td>- creeping buttercup</td>
<td>- song sparrow</td>
</tr>
<tr>
<td>- bald eagle</td>
<td>- great blue heron</td>
</tr>
<tr>
<td>- voles</td>
<td>- cottontail rabbit</td>
</tr>
<tr>
<td>- coast mole</td>
<td>- red-tailed hawk</td>
</tr>
<tr>
<td>- red-tailed hawk</td>
<td></td>
</tr>
<tr>
<td><strong>Edge Habitat</strong></td>
<td></td>
</tr>
<tr>
<td>mix of grassland and upland forest edges</td>
<td>Any species noted above</td>
</tr>
<tr>
<td>Additional Species:</td>
<td></td>
</tr>
<tr>
<td>- spotted towhee</td>
<td></td>
</tr>
<tr>
<td>- brown-headed cowbird</td>
<td></td>
</tr>
<tr>
<td>- American robin</td>
<td></td>
</tr>
<tr>
<td>- rufous and Anna’s hummingbirds</td>
<td></td>
</tr>
<tr>
<td>- white-crowned sparrow</td>
<td></td>
</tr>
</tbody>
</table>

Upland forest habitat in the study area is primarily located near stream corridors in Japanese Gulch, Brewery Gulch, and Edgewater Creek Gulch. These large
streamside forest areas are second or third growth and provide beneficial wildlife habitat with a diversity of plant species, two to three canopy layers, surface waters, large and small snags, downed wood, and leaf litter. These areas also provide refuge and corridors for wildlife moving through an otherwise developed landscape. As shown in Figure 4.12-1, WDFW has classified portions of the study area as biodiversity areas and corridors. These areas contain undeveloped ravines, steep hillside, and open spaces that provide refuge for deer, coyote, raptors, and other mammals and birds.

In addition to upland forest, a portion of Japanese Gulch, located south of 5th Street, contains islands of grassland habitat. The off-site area also contains edge habitat, where the grassland and upland forest edges meet. These areas provide diversity and are typically used by a larger number of species than any one habitat.

**Aquatic Marine Environment**

**Existing Physical and Chemical Conditions**

The existing physical characteristics of the shoreline in the study area have been substantially modified in ways typical of many urbanized shorelines of Puget Sound. The entire project area is armored by riprap revetment and bulkheads, through which 14 storm drains and culvert outfalls discharge into Possession Sound.

Samples that were collected from Possession Sound along the shoreline at the Mukilteo Tank Farm in 2003 showed the sediments to be generally in compliance with Ecology’s sediment quality standards (WAC 173-204-320). Samples collected underneath and adjacent to the Tank Farm Pier in 2012 found levels of organochlorine pesticides and petroleum hydrocarbons slightly above regulatory criteria.

A detailed discussion of stormwater drainage in the project area and sediment and water quality in Possession Sound is presented in Section 4.11 Water Resources.

**Existing Biological Characteristics**

While shoreline modifications and human activities have reduced the diversity and abundance of species, many types of plants and animals have still been observed during project dive surveys. Nearly two dozen aquatic plant species are in the study area. Aquatic plants provide surfaces for herring to spawn, produce oxygen and take up carbon dioxide during the day, and provide juvenile fish with a refuge from predators. Aquatic plants and the small organisms that live on their surfaces also provide food for many aquatic species. Although some kelp is present in the study area, no major kelp beds (ribbon or bull kelp) occur there. The most common of the larger aquatic plants are sugar wrack, iridescent seaweed, and sea lettuce.

A survey conducted in 2005 found small patches of eelgrass west and one patch east of the Tank Farm Pier. The most recent surveys conducted in 2011 found no eelgrass throughout most of the proposed project area. Only one small clump of eelgrass (less than 1 square foot) was found just north of the Existing Site Improvements Alternative footprint.

Several invertebrate species are present in the study area. There is habitat for geoduck and hardshell clams; Dungeness crabs are also common. Geoduck surveys
showed very low numbers throughout the study area. Other invertebrates that have been commonly observed include sunflower stars and plumose anemone, and over 50 other invertebrate species, such as crabs, shrimp, barnacles, anemones, urchins, sea stars, clams, nudibranch, and octopus.

More than 40 fish species have been identified in the study area. Possession Sound is in the migratory path of several salmon species and supports many resident fish species. The most abundant fish species is surfperch. Sand lance, an important forage fish for salmonids, and several other species spawn in study area beaches.

The biological diversity in the study area is comparable to other parts of Puget Sound where development has taken place. Diversity is fairly low and the species assemblages do not represent a unique composition nor do they include any rare or uncommon species.

**Federally and State-Listed Species and Critical Habitat**

The ESA provides for the conservation of species that are endangered or threatened with extinction and the conservation of the habitat on which they depend. Several federally and state-listed species that may be present in the study area are discussed below. The *Mukilteo Multimodal Project Biological Assessment* (WSDOT 2012) provides a detailed discussion of species that could occur in the study area and evaluates potential impacts of the proposed project (see Appendix L).

**Endangered Species Listed Under the ESA**

**Southern Resident Killer Whales:** The Southern Resident population of killer whales predominantly feed on salmon. They have occasionally been observed in the vicinity of the Mukilteo ferry terminal, primarily between October and April. Project biologists have not observed any killer whales during site investigations. NOAA Fisheries has designated critical habitat in Washington for Southern Resident killer whales and this habitat encompasses all of Possession Sound.

**Humpback Whales:** Historically, one or two individual humpback whales have been sighted in Puget Sound in an average year. None were observed during site investigations for this project, but they are occasionally seen in the study area.

**Bocaccio:** In the Puget Sound region, the distinct population segment (DPS) of adult Georgia Basin/Puget Sound bocaccio appear to be limited to areas around Tacoma Narrows and Point Defiance. There is little information about their use of the project area. The project area has appropriate depths, steepness, and substrate complexity for adults; historically, bocaccio have been documented in the project vicinity. Critical habitat has not been proposed for bocaccio.

**Threatened Species Listed Under the ESA**

**Marbled Murrelet:** Marbled murrelets are regularly seen foraging and loafing in marine waters near the existing ferry terminal and the lighthouse, although they are unlikely to nest within the project vicinity.

**Chinook Salmon:** The Chinook salmon found in Puget Sound are part of the Puget Sound evolutionarily significant unit (ESU) of Chinook salmon. They use the study area primarily for migration, foraging, and rearing. The closest river for spawning is
the Snohomish River, approximately 7 miles to the north of the study area; however, one juvenile was recently observed in Japanese Creek. Designated critical habitat for Puget Sound Chinook salmon includes the study area.

**Bull Trout:** Designated critical habitat for the Coastal-Puget Sound DPS of bull trout includes the study area, which they use for migration and foraging.

**Steelhead:** The Puget Sound DPS of steelhead trout includes steelhead from river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington. The species is present in Possession Sound and likely to be found in the project vicinity. Critical habitat has not been proposed for steelhead.

**Pacific Eulachon:** Eulachon are not common in Puget Sound and there is little information about them within the project area. The Puyallup River is the only Puget Sound system in which eulachon are known to spawn; spawning regularity in that river is classified as rare. The species was not observed during dive surveys, and is unlikely to occur in the project area. NOAA Fisheries has proposed critical habitat for the southern DPS of Pacific eulachon but that proposal does not include Puget Sound.

**Canary Rockfish:** Canary rockfish have historically been observed in the study area. The project area has none of the rocky reef habitat favored by adult rockfish. Juvenile rockfish are associated with kelp beds and other macroalgae, which are limited in the project area. Critical habitat has not been proposed for canary rockfish.

**Yelloweye Rockfish:** Yelloweye rockfish have historically been observed in Possession Sound; however, little is known about their presence in the study area. The project area has none of the rocky reef habitat favored by adult rockfish. Juvenile rockfish are associated with kelp beds and other macroalgae, which are limited in the project area. Critical habitat has not been proposed for yelloweye rockfish.

**Steller Sea Lion:** No Steller sea lion haul-outs (habitat sites on land or ice) are located on the project site or in the vicinity of the proposed project. Steller sea lions have been observed playing in the propeller wash of the ferry at the Edmonds Ferry Terminal. Steller sea lions may be present in the project vicinity, but none were observed during site investigations.

**Federal Species of Concern**

Coho salmon is a federal species of concern under the ESA that is found in the study area. While species of concern receive no protections under the ESA, coho salmon are covered by the Magnuson-Stevens Act, which requires consultation with NOAA Fisheries concerning potential effects to their habitat (see *Essential Fish Habitat* below). Coho have been documented to use the lower reach of Japanese Creek upstream of the culverts, south of the Mukilteo Tank Farm. Habitat requirements, construction windows, and life histories are similar to federally listed salmonids.
State Species of Concern

Washington State maintains a Species of Concern list for many species native to Washington that are in various states of decline. State-listed species that occur or may occur in the study area are:

- **Endangered:** Southern Resident killer whales and the humpback whale
- **Threatened:** Marbled murrelet and Steller sea lion
- **Candidate:** Pacific harbor porpoise, Chinook salmon, bull trout, canary rockfish, yelloweye rockfish, bocaccio rockfish, Clark’s grebe, Western grebe, and common murre
- **Sensitive:** Bald eagle, common loon, and gray whale
- **Monitored:** Harbor seal, Dall’s porpoise, red-necked grebe, great blue heron, green heron, and Caspian tern
- **Priority habitat:** Priority habitat for Dungeness crab and Pacific sand lance also occurs in the project vicinity. Sand lance spawning has been documented on a small (200 feet) section of beach near the Silver Cloud Inn property approximately 300 feet east of the existing terminal, but would not be affected by any of the alternatives. Impacts on Dungeness crabs are discussed in Section 4.12.3.

Other Marine Mammal Species

Several non-listed marine mammal species have also been observed in the project area. Transient orca whales have been documented in the project vicinity. California sea lions are common in Puget Sound and frequently observed in the project area. Elephant seals and minke whales are less common, but may be seen in the project area. Like all marine mammals, these species are protected under the MMPA, regardless of their abundance.

Essential Fish Habitat

The Magnuson-Stevens Act establishes requirements for essential fish habitat (EFH) descriptions in federal fishery management plans and requires federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. The Pacific Fishery Management Council (PFMC) has designated EFH for Pacific salmon, Pacific coast groundfish, and coastal pelagic species. EFH for all three groups is found in the study area. A detailed discussion of EFH species that could occur in the study area and potential impacts of the proposed project is included in the Biological Assessment (Appendix L).

Commercial, Recreational, and Tribal Fisheries

The proposed project is entirely within WDFW Fishery Management Area 8-2, which includes a number of tribal, commercial, and recreational fisheries. Several tribes have federally recognized treaty rights within the study area to take fish and shellfish at all usual and accustomed fishing grounds and stations. Tribal harvest focuses on salmon and Dungeness crab. Non-tribal commercial gill netting for salmon is limited by
WDFW in this area. Tribal, commercial, and recreational crab fishing occurs in the study area. The most consistent marine harvest activities in the vicinity of the study area are littleneck clams, butter clams, and horse clams. Ghost shrimp are harvested year-round for use as bait. An extensive geoduck survey conducted in 2005 found geoduck densities in the commercial harvest to be extremely low.

### 4.12.3 Long-Term Environmental Impacts

#### All Alternatives

**Over-water Structures**

Each of the proposed alternatives would change the amount of over-water cover due to replacement or construction of wingwalls, dolphins, transfer spans, and passenger and maintenance facilities, as well as demolition of the existing trestle. The Preferred Alternative and the Elliot Point 1 Alternative would also remove the Tank Farm Pier and approximately 3,900 associated piles (7,300 tons of creosote-treated timbers). Table 4.12-5 provides estimates of the approximate changes in over-water cover for the alternatives.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Removal of Existing Over-Water Cover</th>
<th>Creation of Over-Water Cover</th>
<th>Net Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-Build</td>
<td>10,200</td>
<td>13,200</td>
<td>3,000</td>
</tr>
<tr>
<td>Preferred</td>
<td>150,200</td>
<td>21,100</td>
<td>-129,100</td>
</tr>
<tr>
<td>Existing Site Improvements¹</td>
<td>12,100</td>
<td>24,100</td>
<td>12,000</td>
</tr>
<tr>
<td>Elliot Point 1</td>
<td>150,200</td>
<td>33,900</td>
<td>-116,300</td>
</tr>
</tbody>
</table>

¹ Estimate does not include the replacement of the Port of Everett fishing pier and seasonal day moorage facility. Depending on the location and design, 1,500 to 5,000 square feet of over-water cover could be added.

Direct over-water cover reduces sunlight available to macroalgae, which can reduce or eliminate macroalgae populations in an area. Epibenthos are all organisms that live on or just below the surface of the seabed. Those that occur in the immediate footprint of the new trestles would likely be affected, and epibenthic production within about 20 feet of the terminal for any of the alternatives would be affected by shading. Eelgrass is unlikely to be affected due to its location in the study area. The No-Build Alternative would have the least impact on epibenthos because the project would replace existing structures in the same location. Elliot Point 1 Alternative would have the largest amount of new over-water cover due to the size of over-water structures associated with the new terminal; however, this option would also remove over-water cover from the existing terminal facility and the Tank Farm Pier that would provide a net improvement.

Juvenile salmonids depend on nearshore habitats for food and refuge. Over-water structures, such as ferry terminals, bridges, docks, piers, and temporary work trestles, may directly affect juvenile salmon, especially Chinook and chum, by disrupting migratory behavior along the shallow-water nearshore zone. Delays in migration...
could lead to increased energy expenditure. The widths of the over-water structures associated with the No-Build Alternative, Preferred Alternative, and Existing Site Improvements Alternative are all similar. The Elliot Point 1 Alternative would have the largest over-water footprint and could have a greater impact on juvenile salmonid migration. Also, some studies have suggested that migrating salmonids may not pass under an over-water structure, but instead be pushed farther offshore where they may become more susceptible to predation from birds, mammals, and other fish. However, a study performed at the Mukilteo ferry terminal in 2002 did not find any evidence of increased predation due to over-water cover at the site.

**Habitat Displacement by New Piles and Dolphin Anchor System**

The No-Build and Existing Site Improvements alternatives would each install approximately 20 new piles. The Preferred Alternative would install approximately 110 new piles. The Elliot Point 1 Alternative would install slightly more piles than the Preferred Alternative. New piles and dolphin anchor chain movement would permanently displace bottom (benthic) habitats and eliminate benthic plants and animals, including macroalgae, clams, worms, anemones, and urchins, in the footprint of the new piles and dolphin anchors. Eventually, the new piles associated with the alternatives would become new habitat for a variety of species. All of the alternatives would replace or remove the existing terminal, eliminating about 250 creosote-treated piles that support the timber trestle and transfer span. Benthic communities would likely develop at these locations and vertical pile communities would likely develop on new piles, helping to offset the communities lost during pile removal. The *Mukilteo Multimodal Project Biological Assessment* (WSDOT 2012) contains more information about the impacts to benthic habitat.

**Effects from Propeller Scour**

Ferry propellers create currents that can disturb bottom sediments, resulting in the creation of scour holes that displace benthic organisms and reduce available habitat. Propeller wash modeling conducted for each of the four alternatives showed that scour holes would potentially form as follows:

- **No-Build Alternative:** Scour hole of approximately 2.9 feet at a depth of 20 to 25 feet below MLLW
- **Preferred Alternative:** Scour hole of about 1.4 feet at a depth of 20 to 25 feet below MLLW
- **Existing Site Improvements Alternative:** Scour hole of about 4.5 feet at a depth of 15 to 20 feet below MLLW
- **Elliot Point 1 Alternative:** Scour hole of about 4.5 feet at a depth of 15 to 20 feet below MLLW

Bottom scour would stabilize after a few months; however, it could be minimized by placing coarser sediment on the bottom that would resist movement.
**Beneficial Effects**

Each of the proposed alternatives would remove about 290 creosote-treated piles and decking of the existing terminal. The creosote material may be seeping into the water and sediment, and removing the piles is the only way to eliminate this impact.

**All Build Alternatives**

**Impacts on Marine Nearshore Habitat**

Some marine nearshore habitat would also be lost under the Build alternatives due to the new ferry slip configurations. Wildlife use of this habitat by species such as Barrow’s goldeneye, horned grebe, surf scoter, American coot, double-crested cormorant, pigeon guillemot, mew gull, ring-billed gull, common loon, and glaucous-winged gull could shift to the areas where the existing ferry slip is removed and to adjacent marine nearshore habitats to the east and west.

**Beneficial Effects**

All three Build alternatives would provide enhanced stormwater treatment to remove pollutants from runoff from the project’s parking lots and bus terminals. This treatment would improve habitat by minimizing pollutant loads to receiving waterbodies. More information on stormwater management and treatment is presented in *Section 4.11 Water Resources*.

**Preferred Alternative**

**Terrestrial Habitat**

The Preferred Alternative would develop a portion of the Mukilteo Tank Farm and new landscaping would replace sparse herbaceous and scrub vegetation. Thus, the area would remain as urban and mixed use habitat, but the level of human activity on the site would increase. Wildlife use of this habitat for nesting, foraging, and perching would be reduced and/or displaced. However, reduction of habitat would be minor and temporary because species found in this habitat type are accustomed to human disturbance; moreover, the developed property would also provide some wildlife habitat.

**Impacts on Crab and Crab Habitat**

Dungeness crab abundance is relatively high east of the Tank Farm Pier and gravid female crabs use the sediment berm during the winter. This is in the area where the Preferred Alternative would be located. Removal of the Tank Farm Pier, which would remove feeding habitat as well as change the sea bed in elevations and sediment composition in the area, could reduce crab use in the area. Dredging would occur across a portion of the footprint of the Tank Farm Pier and could also reduce crab use in the area. While pier removal would not affect overall Dungeness crab populations, it would likely reduce the numbers of crabs in the project area.
Erosion of the Sediment Mound underneath the Tank Farm Pier

Over time, a mound of sediment several feet higher than the surrounding seabed has developed in the slow-moving waters beneath the Tank Farm Pier. Removal of the pier would cause a measurable change in wave energy that could, in some circumstances, move sediment from this mound up to 1800 feet down current. The erosion rate would be slow and would only occur during larger (5- to 10-year) storms.

Approximately 1,050 cubic yards of material would eventually be eroded from the sediment mound. Even if all the material were to be mobilized at once and deposited within 2,000 feet of the pier, it would form a layer only 0.08 inch thick. Movement of sediment from the mound would therefore not pose a significant risk of smothering aquatic plants or macroinvertebrates in the project vicinity.

Sediment sampling underneath the Tank Farm Pier revealed low levels of organochlorine pesticides and petroleum hydrocarbons at various layers, but some samples did exceed regulated limits. Transport of sediments could spread contaminated material detrimental to aquatic organisms; however, the amount of material that would be transported would not pose a risk. Section 4.8 Hazardous Materials contains additional discussion of these sediments.

Beneficial Effects

In addition to removing approximately 290 creosote-treated piles and decking of the existing ferry terminal, the Preferred Alternative would demolish the Tank Farm Pier and remove approximately 3,900 creosote-treated timber piles associated with the pier. This would eliminate approximately 7,300 tons of creosote-treated timbers from the environment and create a net gain of approximately 2,870 square feet of benthic habitat. Also, sediments beneath the Tank Farm Pier would undergo additional testing prior to construction. Dredged sediments that do not meet regulated criteria would be disposed of at appropriate upland locations, reducing the amount of contaminated sediments in the aquatic environment. Removing the Tank Farm Pier would also eliminate the shade from approximately 138,100 square feet of over-water structures. This would allow more sunlight that would potentially increase macroalgae and eelgrass growth, increase macroinvertebrate production, and improve habitat for salmonids and other fish. Pile removal would occur over an area of approximately 150,200 square feet, which includes 138,100 square feet for the Tank Farm Pier, 2,000 square feet for the existing trestle, and 10,100 square feet for the fishing pier. The Biological Assessment (Appendix L) provides additional information about biological resources and the Preferred Alternative’s beneficial effects.

Elliot Point 1 Alternative

The Elliot Point 1 Alternative would have similar impacts to those of the Preferred Alternative regarding terrestrial habitat, crabs and crustaceans, erosion of sediment beneath the Tank Farm Pier, and aquatic habitat benefits. Also, under the Elliot Point 1 Alternative, a portion of Japanese Creek within the project footprint would be restored to an open stream with a 50-foot vegetated buffer on each side. The
vegetated buffer would provide nesting and foraging habitat for wildlife and an open stream channel would also improve habitat for fish species that use the creek.

4.12.4 Construction Impacts

All Alternatives

Construction impacts are common to all alternatives and include disturbance from construction activities, grading and staging, impaired water quality, and effects on aquatic species from underwater noise related to pile driving.

Disturbance, Grading, and Staging

Under all alternatives, construction would occur in both the urban and mixed-use habitat and the marine nearshore habitat. The wildlife that currently use these habitats could be reduced and/or displaced during construction as a result of increased traffic, human activity, and noise. However, because the upland area is already developed with residential and commercial uses, effects on wildlife using the urban and mixed environments would be minimal.

In the marine nearshore environment, marine bird species would be affected by construction activity and underwater noise associated with pile driving. The existing underwater noise level is dominated by noise generated from human activities, primarily marine vessel traffic (additional discussion of underwater noise is presented below).

Temporary impacts on non-aquatic vegetation may result from grading, staging, and other project-related activities. No impacts on protected non-aquatic plant species are expected because none are known to occur within the study area.

Water Quality

Construction activities such as pile driving and removal, construction of stone columns, dredging, and placement of anchoring systems could create turbidity and result in temporary impacts on fish and aquatic resources from decreased water quality. The extent and duration of in-water work of each alternative and the specific construction methods and materials would affect the magnitude of the temporary impacts.

Impacts on aquatic resources due to elevated turbidity include:

- Mortality, gill tissue damage, and physiological stress to fish, including juvenile salmonids
- Burial, abrasion of body parts, and clogging of filtration systems of crustaceans and other marine invertebrates
- Reduced light levels affecting behavior and feeding of aquatic animal species
- Reduced photosynthesis by burial of aquatic plants or reduced light levels
- Behavioral changes

Piles would be removed under each alternative, suspending sediment, and temporarily increasing turbidity in the surrounding area. The sediments suspended could also be contaminated by creosote. Factors affecting the amount of turbidity generated during
pile removal include the type and number of piles removed, the removal technique used, and the characteristics of the bottom sediments. Pile installation also can generate turbidity. However, turbidity is less of an issue with pile installation because the impact is highly localized.

Based on modeling conducted for the project, increases in turbidity resulting from pile removal, pile installation, dredging, and the installation of stone columns would be localized and temporary, and would not exceed water quality standards. These activities are also a one-time disturbance, and benthic organisms are expected to rapidly recolonize altered areas after construction.

*Section 4.11 Water Resources* contains more discussion about construction-related water quality impacts.

**Underwater Noise**

Pile driving produces intense sound pressure waves in the water column that can adversely affect fish, marine mammals, and other aquatic species. The level of sound produced during pile driving depends on several variables including the type of hammer used, the type and size of piles being used, and the characteristics of the substrate. The distance that the sound travels under water and in air also depends on several variables, including topography.

High levels of underwater sound can injure and kill fish. Fish with swim bladders, such as salmonids, are more susceptible to barotraumas (injuries, such as hemorrhage and rupture of internal organs, caused by pressure waves) from impulsive sounds, like impact pile driving. Death from barotrauma can be instantaneous or delayed up to several days after exposure.

Elevated noise levels can also cause sublethal injuries, such as a reduced ability to detect predators and prey, or hearing damage. Also, sound may affect behavior, resulting in fish avoiding foraging or spawning grounds. The impact of these avoidance responses may be lasting if feeding or reproduction is impeded.

For marine mammals, whales in particular, sound is one of the most critical sensory pathways of information. Noise impairs communication, detection of prey, and navigation. It also causes harmful physiological conditions, energetic expenditures, reduced hearing sensitivity, behavioral changes, and changes in cardiac rates and respiratory patterns. Changes in behavior can range from minor changes in orientation or breathing to interrupted feeding or avoidance of an area. Very loud noises at close range may cause hearing damage, other physical damage, or even death.

Diving birds may also be harmed by noise levels in the range of those that harm fish and mammals, and they may experience similar effects such as a reduced ability to detect predators or prey, or to forage. Mitigation measures and monitoring will reduce impacts to diving birds and other marine mammals.

**No-Build Alternative**

The No-Build Alternative would install approximately 20 new piles, which is the fewest among the proposed alternatives. This would potentially result in the least impact from turbidity and underwater noise.
Preferred Alternative

The Preferred Alternative would install approximately 110 new piles for the terminal facilities and relocated fishing pier. It would remove the existing terminal facility and the Tank Farm Pier, and dredge a navigation channel about 500 feet wide by 100 feet long through a sediment mound beneath the pier. The channel would provide navigation depth of -28 feet at an average lowest tide, which would require dredging to a depth of -30 feet. Approximately 19,500 cubic yards of material would be dredged for the channel.

Pier removal and dredging would likely mobilize sediments under the pier that have been found to contain low levels of organochlorine pesticide and petroleum hydrocarbon contamination. Pile removal would also generate turbidity, as would dredging.

The foundation of the new pier structure for the Preferred Alternative would utilize stone columns. Stone columns are constructed with a vibratory probe that feeds crushed gravel or quarry spall into potentially liquefiable soils to create a solid foundation. Construction of the columns could resuspend sediments and temporarily generate turbidity within the vicinity of the installation area. The installation of stone columns will affect about 1,414 square feet within an area of about 25,000 square feet. The affected area would still provide habitat after construction, though the surface substrate may be more gravelly than prior to stone column installation.

Existing Site Improvements Alternative

Similar to the No-Build Alternative, the Existing Site Improvements Alternative would also install approximately 20 new piles, the fewest among the proposed Build alternatives.

Elliot Point 1 Alternative

Construction impacts from the Elliot Point 1 Alternative would be similar to those described above for the Preferred Alternative. The Elliot Point 1 Alternative would drive somewhat more piles than the Preferred, No-Build, and Existing Site Improvements alternatives. As noted with the other alternatives, pile driving creates the potential for turbidity and underwater noise impacts to aquatic species.

4.12.5 Cumulative Impacts

The population of Puget Sound has increased from approximately 1.29 million people in 1950 to 4.22 million in 2005; by 2025 the population is expected to reach 5.36 million. The population of Snohomish County has increased an average of 3 percent per year since 1960, from 172,199 to 711,100 inhabitants. The city of Mukilteo has even higher growth rates and has expanded from a population of 775 at its incorporation in 1947 to 20,254 today. This trend is likely to continue for the foreseeable future; 2030 population projections for Snohomish County range from 790,930 to 1,109,202.

Population growth and resource use have contributed to environmental impacts in the region. Historically, the project area landscape was dominated by western lowland mixed conifer and hardwood forest. During European settlement of the
region, farming and logging changed the landscape, reducing forest cover and replacing many native species with introduced species. In recent times continuing habitat conversion for urban and industrial development has led to further habitat fragmentation and filling of wetlands.

Aquatic habitat has also been reduced and degraded due to development since the area was settled by Europeans. Approximately one-third of the Puget Sound shoreline has been modified by seawalls, docks, and other structures. Riprap, bulkheads, docks, and other structures line the entire shoreline in the study area. Water pollution is another threat to aquatic ecosystems; urban runoff contributes to non-point source pollution by degrading water quality and threatening aquatic species. Between 2002 and 2006 the number of marine species of concern in the Salish Sea ecosystem (extending from Canada to Puget Sound) increased from 60 to 64. Green sturgeon, Pacific eulachon, Southern Resident killer whales, and several species of salmonids and rockfish have been recently listed as threatened or endangered under the ESA.

Other projects within the study area could contribute to environmental impacts. In general, the Mukilteo Multimodal Project could result in improved water quality by providing stormwater treatment, removing creosote-treated piles, and remediating contaminated sediments. The project could also provide habitat restoration by removing over-water structures and daylighting Japanese Creek if the Elliot Point 1 Alternative were constructed. However, development of shoreline properties could reduce some urban mixed and marine nearshore habitat as well as increase over-water cover; known development activities are described below.

**Mukilteo Tank Farm Transfer, U.S. Air Force**

The change of ownership for the Mukilteo Tank Farm is not likely to contribute to higher cumulative impacts on ecosystems compared to conditions today. The transfer itself is generally “as is” with no further improvements, although the transaction includes covenants to maintain some environmental protections and address issues related to past practices on the site.

**Mukilteo Tank Farm Master Plan, Port of Everett**

If all or parts of the Mukilteo Tank Farm were developed with other uses, development would need to meet current permitting standards, which would include shoreline setbacks, open space requirements, and upgrades of stormwater systems. Redevelopment to current standards would provide environmental benefits. However, redevelopment would also result in increased traffic, human activity, and noise. A full replacement of all facilities on the site would remove the urban and mixed-use habitat used by wildlife, but open space features and landscaping would provide long-term replacement habitat.

**Sounder Mukilteo Station, Sound Transit**

Further development of the Sounder Mukilteo Station is not likely to contribute to increased cumulative impacts on ecosystems because the property is already developed and provides little habitat. The remaining improvements are largely within the existing footprint.
NOAA Mukilteo Research Station Expansion

Expansion of the NOAA Mukilteo Research Station could result in minor impacts on urban mixed and marine nearshore environments, depending on the facility design.

Mount Baker Terminal, Port of Everett

Construction of the Mount Baker Terminal created additional over-water cover along the shoreline. To offset potential impacts from shading, the Port planted eelgrass shoots west of the terminal. A permanent access roadway is still needed for the terminal, which could encourage development of parts of the Mukilteo Tank Farm, but also could trigger City of Mukilteo permit conditions to include more open spaces with ecosystem benefits.

Restoration of Japanese Creek

The City of Mukilteo plans to restore a section of Japanese Creek to its previous channel. In addition, the City plans to add weirs to a section of the creek to allow fish access to an adjacent wetland, which would increase rearing and foraging habitat. The City also plans to daylight the creek along the Possession Sound shoreline, which would restore riparian and aquatic habitat. The Elliot Point 1 Alternative includes this action as part of the alternative, so it would not have a cumulative impact. However, the Preferred Alternative and other alternatives would not affect the areas above the culvert. Daylighting Japanese Creek and other creek restoration activities would increase riparian and aquatic habitat.

Mukilteo Lighthouse Park

Shoreline restoration efforts for this project have improved nearshore habitat within the park. A proposed pedestrian pier would create a small amount of over-water cover. A potential relocation of the park’s boat launch to the Mukilteo Tank Farm would return the existing boat launch shoreline area to a more natural state, but could affect shoreline habitat at the new location depending on the conditions at the new site.

4.12.6 Mitigation Measures

Mitigation for Long-Term Impacts

Preferred Alternative

The Preferred Alternative incorporates ecosystem protection and enhancement measures in its definition because it would remove creosote piles and over-water coverage at the existing terminal site and at the Mukilteo Tank Farm, which would help offset the impacts of new or replacement structures.

Landscaping elements in the proposed project would compensate for some of the lost urban and mixed-use habitats. Loss of marine nearshore habitat would be offset by removal of the existing terminal and Tank Farm Pier.

Mitigation measures that would help avoid or minimize potential impacts on fish, marine mammals, and other aquatic species include:
• Collecting and conveying stormwater generated by the over-water coverage of the dock to onshore water quality treatment facilities to avoid the potential for water quality impacts in Possession Sound
• Using concrete or steel piles where possible, which would likely be replaced less frequently
• Incorporating grating and/or lights under the pier in the terminal design, where feasible, to minimize the effects of shading on fish species migrating along the shoreline

The project would also comply with the terms and conditions developed through consultation with NOAA Fisheries and the U.S. Fish and Wildlife Service in compliance with the ESA, the Magnuson-Stevens Act, and MMPA, which would be documented in the services’ Biological Opinions and other permits, and included in the project’s Record of Decision by FTA. The project would also meet the permit requirements of local, state, and federal agencies with jurisdiction over aquatic lands and shoreline areas; these permits include commonly applied mitigation measures or BMPs as well as project-specific mitigation requirements.

Removal of the existing terminal facility and the Tank Farm Pier would help to mitigate the increase in over-water structures, resulting in a net reduction of over-water cover of 3.0 acres. Demolition of the pier would also remove approximately 3,900 creosote-treated piles from the marine environment, likely improving water quality in the long term. Removal of the Tank Farm Pier has the potential to mobilize any contaminated sediments underneath the pier. As part of the project’s design and permitting processes, the newly exposed sediment surface will be further characterized to determine if contaminated sediments are present at depths that would be exposed after dredging. WSDOT will consult with the permitting agencies to determine if a cap or other measures are needed to reduce the potential for erosion and transport of contaminated sediment. The detailed measures and the data requirements necessary to define the measures will be guided by the permitting process and its requirements.

Mitigation for hazardous materials, as defined in Section 4.8, Hazardous Materials, includes measures to clean up or contain contamination encountered during project construction.

No-Build Alternative
The No-Build Alternative would replace existing over-water structures and could increase over-water coverage. The increase in over-water coverage may require compensatory mitigation for any lost ecosystem function and values. Compensatory mitigation could include funding for the removal of other over-water structures no longer in use or other habitat restoration measures. The exact type of mitigation would be determined in consultation with WDFW, DNR, and other regulatory agencies during project permitting.

Existing Site Improvements Alternative
The Existing Site Improvements Alternative would require mitigation similar to that described for the No-Build Alternative.
Elliot Point 1 Alternative

Similar to the Preferred Alternative, the Elliot Point 1 Alternative would mitigate the increase of over-water structures by removing the Tank Farm Pier. The Elliot Point 1 Alternative would result in a net reduction of 2.6 acres of over-water cover.

Mitigation for Construction Impacts

Preferred Alternative

Mitigation for construction impacts would include BMPs, conservation measures, and avoidance and minimization measures that are outlined below and would be further defined through the consultation and permitting process required for the project. Construction BMPs would be implemented to avoid or minimize impacts on ecosystem resources from construction activities. The Mukilteo Multimodal Project Biological Assessment (WSDOT 2012) provides more details about many of the projects proposed BMPs and standards. Construction activities would comply with the terms and conditions developed through consultation with NOAA Fisheries and the U.S. Fish and Wildlife Service in compliance with the ESA, the Magnuson-Stevens Act, and MMPA, and through all other permits required for the project.

Noise impacts would be minimized by construction planning and scheduling of in-water work to avoid critical periods in the life cycles of protected species and their habitats; monitoring for marine mammal and bird presence before and during construction; using installation techniques such as vibratory hammers instead of impact pile driving to reduce noise generation whenever possible; conducting pile driving during low tides using wood pile caps with concrete piles when feasible; monitoring ongoing compliance with permit terms and conditions during construction; and using lower level warning sounds and ramping up noise to warn wildlife of pending noise increases.

Impacts on migratory birds would be addressed by timing vegetation and structure removal appropriately, removing noxious weeds, and revegetating those areas and other disturbed areas with native species.

In addition to the terms and conditions defined through ESA consultations, additional measures to minimize general construction impacts include:

- Developing and implementing an approved Construction Stormwater Pollution Prevention Plan, which would serve as the overall stormwater mitigation plan and would include each of the following plans: Temporary Erosion and Sediment Control Plan; Spill Prevention, Control, and Countermeasures Plan; Concrete Containment and Disposal Plan; and Fugitive Dust Plan.

- Selecting construction equipment and techniques to minimize surface impacts, noise, and disturbance to or transport of bottom sediments. WSDOT will consult with the permitting agencies to determine if a cap or other measures are needed to reduce the potential for erosion and transport of contaminated sediment at the Tank Farm Pier site.

- Selecting and implementing BMPs to properly prevent pollutants from entering the water due to construction activities or pile removal.
• Adhering to the conditions specified in dredging and sediment disposal permits, NPDES permits and related construction and water quality permits.
• Using adaptive management strategies if problems are identified.

Other mitigation measures that could avoid or minimize impacts on ecosystems are discussed in Section 4.3 Noise and Vibration, Section 4.7 Air Quality, Section 4.8 Hazardous Materials, and Section 4.11 Water Resources.

Other Alternatives

The No-Build Alternative, the Existing Site Improvements Alternative and the Elliot Point 1 Alternative would have similar construction mitigation measures as the Preferred Alternative, except for measures related to the treatment of hazardous materials or the Tank Farm Pier, which only the Elliot Point 1 Alternative would also feature.

Mitigation for Cumulative Impacts

The development of the Mukilteo Tank Farm may result in the loss of urban and mixed environments and marine nearshore habitat. Appropriately designed landscaping or open space elements in the proposed project vicinity would compensate for some of the lost urban and mixed-use habitats. Compliance with existing federal, state, and local regulations would also reduce environmental impacts.

4.13 Public Services and Utilities

This section evaluates the project’s potential to affect public services and utilities within a study area that includes the SR 525 corridor to the ferry terminal and the areas within 0.5 mile of the alternatives.

4.13.1 Overview of Analysis and Regulatory Context

Regulatory Context

Public services and utilities are areas of analysis required under NEPA and SEPA. Factors to be considered include direct changes to physical facilities or the operations of public service providers, and potential changes in the demand for or quality of the public services and utilities. The study area, roughly the northern half of the city of Mukilteo and a small portion of the city of Everett, includes the service areas of several public service providers in the project area.

4.13.2 Affected Environment

Public services and facilities in the study area include police, fire, and emergency medical response, public schools, and solid waste collection. Public service facilities located in the study area are shown in Figure 4.13-1. This includes the City of Mukilteo’s public works buildings and shops, as well as the facilities identified below.
Figure 4.13-1. Public Services
Police, Fire, and Emergency Medical Services

The Washington State Patrol and the City of Mukilteo Police Department provide police and patrol services in the study area. State Patrol officers provide traffic control along SR 525 and security at the existing ferry terminal.

The City of Mukilteo Fire Department provides fire suppression, rescue, and emergency medical services in the study area. As part of a county-wide mutual aid agreement coordinated through Snohomish County Emergency Management Services, adjacent jurisdictions provide backup emergency response to the study area.

Schools

The Mukilteo School District serves about 14,000 students living in Mukilteo and south Everett. Two schools are in the study area, Mukilteo Elementary School and Olympic View Middle School, both about 1.5 miles south of the proposed ferry terminal sites.

Solid Waste and Utilities

Solid waste and refuse service is provided by Waste Management NW. Water, sewer, electric power, natural gas, telephone, and cable telecommunications providers include the Mukilteo Water and Wastewater District, the Snohomish County Public Utility District No. 1 (SnoPUD), Puget Sound Energy (PSE), Verizon, and Comcast.

4.13.3 Long-Term Environmental Impacts

No-Build Alternative

The No-Build Alternative would not generate additional demand for most public services. It would, however, result in increased traffic congestion along SR 525 and in Mukilteo’s downtown and waterfront areas. As a result, additional demand would be placed on the Washington State Patrol to manage traffic. These traffic delays and congestion could result in longer response times for emergency service providers and would also make access to and from schools, community facilities, and activities in the study area more difficult.

No long-term impacts on utilities would occur.

Preferred Alternative

The Preferred Alternative is not expected to generate additional demand for public services. Reductions in queue length and the elimination of existing congestion and safety points would improve access and response times for public service providers. The significant reduction in queuing on SR 525 could reduce the need for Washington State Patrol traffic control on SR 525 compared to the No-Build Alternative.

No long-term impacts on utilities are expected. The new facility is not anticipated to substantially increase the overall demand for services from utility providers, but it will connect to those utilities.
Existing Site Improvements Alternative

The Existing Site Improvements Alternative would not generate additional demand for public services. The alternative would include some improvements in access and traffic circulation along SR 525 and in the downtown and waterfront areas. Compared to the No-Build Alternative, the project could improve transportation access and circulation in the study area, and safety concerns related to sight distance would be reduced. Queuing and congestion problems would still remain. Overall, compared to the No-Build Alternative, emergency service provision and access to public facilities would be similar or better and demand for the Washington State Patrol to provide traffic management could be reduced, compared to No-Build conditions.

No long-term impacts on utilities are expected to result.

Elliot Point 1 Alternative

The potential long-term impacts of this alternative are similar to those described above for the Preferred Alternative.

4.13.4 Construction Impacts

No-Build Alternative

Traffic congestion resulting from construction activities could affect response times for emergency service providers. This could occur not only in Mukilteo, but also in Edmonds during periods when the terminal is completely closed and ferry traffic is redirected to Edmonds.

The No-Build Alternative includes construction of a new replacement slip and normal repair and maintenance activities. While not likely, minor disruptions in ferry service could occur during these activities.

Preferred Alternative

Construction vehicles on local roadways could cause congestion, but this would not markedly affect emergency service response times or access to public service facilities.

Because the Mukilteo Tank Farm is not currently in use and it is located at the end of most of the utility service areas, construction or relocation of utilities is not expected to cause service disruptions to residents or businesses in the project vicinity. Minor service disruptions could occur during construction of intersection improvements proposed at SR 525 and First Street, or for connecting utilities to the new facilities.

Existing Site Improvements Alternative

Construction impacts for the Existing Site Improvements Alternative would be similar to those discussed for the No-Build Alternative.

Construction of the Existing Site Improvements Alternative would have temporary impacts on project site utilities because service disruptions would be needed to connect new facilities to water, sewer, and gas mains.
Elliot Point 1 Alternative

The potential construction impacts of this alternative are similar to those described above for the Preferred Alternative.

4.13.5 Indirect and Secondary Impacts

Few indirect impacts on public services or utilities have been identified. For the No-Build Alternative, ferry operations would continue to operate similarly to present conditions. The Existing Site Improvements Alternative would be similar. For the Preferred Alternative and Elliot Point 1 Alternative, removing the existing ferry terminal features and operations at Front Street could provide the opportunity for redevelopment of the waterfront area. Utility replacements or upgrades may be necessary to serve future development and would be the responsibility of the developer. The Elliot Point alternatives provide the opportunity to reclaim portions of a currently vacant site, and improve the transportation access to the site, which could enable other developments on portions of the site not used for transportation purposes. These developments could also require improvements in utilities or expand areas requiring public services.

4.13.6 Cumulative Impacts

No cumulative impacts on public services or utilities have been identified for any of the alternatives.

4.13.7 Mitigation Measures

Mitigation for Long-Term Impacts

None of the alternatives involve long-term impacts requiring mitigation.

Mitigation for Construction Impacts

For all alternatives, impacts on public services would be minimized by preparing an Emergency Response Plan in coordination with emergency responders that addresses construction and operation safety issues and includes response procedures for emergencies.

WSDOT would coordinate with local water, stormwater, and sewer districts regarding potential relocations of utility infrastructure. In the case of off-site interruptions in service, customers would be given advance notice. Where utility relocations are necessary in public rights-of-way, utility objects would be placed outside of applicable control zones—areas WSDOT maintains around roadways to minimize risk of roadwork damaging utility objects. If it is not possible to locate utilities outside of control zones, mitigation measures would be applied in compliance with the WSDOT Utilities Manual (May 2013) and in coordination with the City of Mukilteo. Other WSDOT construction BMPs would be maintained throughout construction.
4.14 Other Considerations

This section identifies whether any adverse effects could not be mitigated, and it documents any irreversible and irretrievable commitments of resources that would be involved in the Mukilteo Multimodal Project. It also presents information on the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term environmental productivity.

4.14.1 Irreversible Decisions and Irretrievable Resources

WSDOT and FTA have expended funds for the planning, design, and environmental review of this project, but similar activities would be required for any course of action regarding the terminal, including the No-Build Alternative. The existing terminal has facilities that will need to be replaced due to their age and condition.

For any of the alternatives, some resources would be irretrievable after completion of project construction. These resources would include the physical materials used to build the project such as aggregate to make concrete and asphalt, steel to make rebar and structures, oil to make asphalt, and earth materials for fill. The energy that would be consumed for construction work, and would therefore be irretrievable, would include fossil fuels to operate construction equipment and to transport materials and workers to the site. Although all of these resources are finite in nature, their supply would be adequate for this project and other needs in the near future.

Some excavated soils not reused on site would be disposed of at landfills, and the space used for these soils would not be available for other wastes. However, there is adequate landfill space available to accommodate all wastes that local communities would dispose of in the foreseeable future.

Energy used during operation of the facility would include electricity needed to keep lights and electrical systems running; fossil fuels to operate the ferries; and, indirectly, fossil fuels for vehicles to drive to the ferry terminal. These activities would occur under the No-Build Alternative and with any of the Build alternatives, although the Build alternatives would be more energy efficient because the new terminal building would be built to LEED silver standards. Project operation is not expected to have a substantial effect on energy consumption, energy sources, or fuel available in the region or the state.

All of the alternatives would involve activities that could disturb archaeological sites, resulting in potential damage to archaeological artifacts. Measures to avoid adverse effects would be included in each alternative.

What are the tradeoffs between the short-term uses of environmental resources and long-term gains (or productivity) from the project?

To consider whether the project’s long-term benefits make it worth the short-term disruption and the use of the resources involved in building the project, the EIS considers factors such as duration of project construction and the effects on all elements of the environment from construction. It then weighs these impacts against the project’s anticipated benefits.
All alternatives would expend resources to replace the terminal’s aging facilities with newer, more seismically stable facilities.

Because of the constraints of the existing site, neither the No-Build Alternative nor the Existing Site Improvements Alternative is able to fully address safety and security needs because the terminal area cannot be fully secured. The location of the existing site in the floodplain presents additional safety and operational problems, especially with climate change likely to worsen storm surges and winter storms. In addition, the No-Build Alternative would expend funds and incur construction impacts to replace a facility in a configuration that continues to pose longer-term problems for operations and safety. This includes poor sight distance for vehicles loading and unloading, constrained transit capacity, and continued pedestrian-vehicle conflicts. The Existing Site Improvements Alternative would include overhead passenger loading, which would improve terminal operation somewhat.

All Build alternatives would expend resources to create new transit facilities, add a signalized intersection at First Street and SR 525, and make other street improvements. These improvements would lead to long-term benefits for multimodal connectivity, transit mobility, vehicle travel, and pedestrian connectivity. These mobility improvements would promote economic growth in downtown Mukilteo.

The Preferred Alternative and Elliot Point 1 Alternative both involve higher levels of construction activities, material use, and site preparation activities compared to the No-Build Alternative or the Existing Site Improvements Alternative. This includes preparation of the Mukilteo Tank Farm for construction, the removal of the existing terminal facility and the Tank Farm Pier, dredging, and the development of the terminal and transit center on an entirely new site. However, while the short-term uses of resources would be greater, the long-term gains or benefits would include improved operations for the ferry terminal, reduced congestion, and improved safety and security. Safety and security benefits cannot be calculated quantitatively, but potential consequences of not providing for an improved facility to meet current seismic standards and national security directives range from severe regional transportation mobility disruption to injury and loss of life. These risks would be present as long as the facility remains unimproved. These alternatives are also expected to provide greater social and economic benefits because they relocate the terminal away from existing waterfront businesses and a major community waterfront park, and they would redevelop a large portion of a vacant brownfield site for beneficial public uses.

The removal of the Tank Farm Pier would also provide an environmental benefit by reducing the extent of over-water structures in the area, and removing thousands of creosote-treated wood piles. All Build alternatives would improve stormwater treatment facilities; the Preferred Alternative and Elliot Point 1 Alternative would treat water from a larger area, producing a greater benefit. Building the terminal on a new site at a higher elevation than the existing terminal could help to minimize impacts of service disruption due to long-term flooding associated with rising sea levels.

All of the alternatives would affect archaeological sites. However, an area developed as part of a federal project triggers certain protections for historic resources that would not apply to private development of the same area. Therefore, the Preferred
Alternative (or any other alternative) for this project would only proceed in consultation with interested tribes and DAHP, and include commitments developed through the Section 106 process to resolve the project’s adverse effects on the archaeological sites. The project’s Section 4(f) commitments will incorporate the MOA and add an overlapping regulatory protection to the resources on the site. The project’s federal approval would also stipulate how the project would protect resources and mitigate for unavoidable impacts. The Preferred Alternative’s Section 106 commitments also include designing project elements and features to commemorate the area’s significant cultural and historic sites and increase public understanding of their importance.