4.5.1 Overview of Analysis and Regulatory Context

NEPA established a national environmental policy and goals for the protection, maintenance, and enhancement of the environment, which includes communities as well as parks and recreation areas. FTA's regulations for implementing NEPA provide guidance for considering impacts on the social environment. SEPA regulations suggest that general welfare, social, and economic factors be taken into account in an environmental review, but does not apply the term "socioeconomic" or define other requirements for the analysis of impacts on certain populations.

Pursuant to Title VI of the Civil Rights Act and the Civil Rights Restoration Act, recipients of federal financial assistance must ensure non-discrimination on the basis of race, color, or national origin in all of their programs and activities. Similarly, Executive Order 12898 (1994) requires analysis of the environmental impacts of federal actions specific to minority and low-income populations.

Following Executive Order 12898, USDOT issued Order 5610.2, which describes how USDOT administrations must analyze environmental justice and incorporate environmental justice principles into the transportation decision-making process.

The analysis of parks and recreational impacts is required under both SEPA and NEPA; in addition, there are state and federal regulations regarding the potential conversion of park land for other purposes. Much like the other aspects of the social impact analysis, coordination and consultation with local agencies, non-profit service providers, and the public is critical to the analysis process.

Analyzing Social Impacts

The social impacts section of this EIS examines how the project could alter the ways in which people live, work, play, and function together as members of society. This includes changes to the larger environment or physical setting for a community, which could affect the cohesion and functions of individual neighborhoods or community members, including people in minority or low-income groups. It also includes a review of the public park, recreation, and social services available to the community.

The community impact analysis flows out of the EIS's overall findings of other kinds of environmental impacts. It examines the findings for those and other environmental conditions to assess the potential for significant impacts on communities. The social impacts assessment considers:

Potential displacements of homes, businesses, or community resources
(see *Section 4.2 Land Use and Economics*)

Separation of a neighborhood from its community resources
(see *Chapter 3 Transportation*)

Economic changes resulting from displacements, or other changes affecting local or regional economic activities (see *Section 4.2 Land Use and Economics*)

Changes in the transportation system, parking, or traffic circulation patterns that affect the connectivity within a community or between communities, and altered connections between residential areas and the arterial and transit networks (see *Chapter 3 Transportation*)

Permanent or temporary impacts that adversely affect the community, such as visual, noise and vibration, air quality, parks and recreational resources, and impacts on the local utilities, public services, or facilities (see *Sections 4.2 Land Use and Economics, 4.3 Noise and Vibration, 4.4 Visual Quality, 4.7 Air Quality, and 4.13 Public Services and Utilities*)

Health and resource impacts related to hazardous materials (see *Section 4.8 Hazardous Materials*)

Analyzing Environmental Justice Impacts

The analysis identifies the percentages of low-income and minority populations in the study area that could experience impacts from the project. These percentages are compared to the average percentage of low-income and minority populations at city and county levels. The area of impact for this analysis assumes a study area of 0.5 mile from the footprint of the alternatives. The study area is based on an initial assessment of potential project impacts from all alternatives. The analysis also takes into consideration the potential for environmental justice impacts based on all impacts identified in the EIS, not just the impacts in the environmental justice study area.

The analysis primarily uses the 2000 U.S. Census data. Supplemental data will be incorporated into the Final EIS from the 2010 U.S. Census, which currently has released information at city, county, and regional levels, but not at more localized levels. The analysis also used information collected from other sources including the American Community Survey, Section 8 Housing Assistance data from the U.S. Department of Housing and Urban Development (HUD), and free and subsidized lunch program data from the Mukilteo School District.

USDOT guidance defines "low-income households" using the U.S. Department of Health and Human Services poverty guidelines. USDOT and the U.S. Census Bureau define "minority" to include the following racial/ethnic categories:

- **Black.** A person having origins in any of the black racial groups of Africa
- **Hispanic.** A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race
- **Asian American.** A person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands

- **American Indian/Alaskan Native.** A person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition
- **Native Hawaiian or Other Pacific Islander.** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands

Since FTA and WSDOT began the NEPA environmental review process for the Mukilteo Multimodal Project in October 2004, they have provided frequent opportunities for the public, including minority and low-income populations, to share concerns and discuss specific project details with project staff. Public involvement activities to date have included public meetings, agency and tribal meetings, online meetings, and stakeholder briefings. For more details on this outreach, see *Chapter 7 Public Involvement*. WSDOT continued discussions with the public, agencies, and tribes while preparing technical reports.

Determining Disproportionately High and Adverse Impacts

To identify the potential for disproportionately high and adverse impacts on minority or low-income populations, this analysis considers five primary questions:

Question 1: Does the project affect a resource that is especially important to a minority or low-income population? For instance, does the project affect a resource that serves an especially important social, religious, or cultural function for a minority or low-income population?

Question 2: Would the project result in high and adverse impacts that would be predominantly borne by a minority or low-income population?

Question 3: Would the project result in high and adverse impacts that would be suffered by a minority or low-income population that would be appreciably more severe or greater in magnitude than the impact that would be suffered by the general population?

Question 4: Does the project propose mitigation and/or enhancement measures?

Question 5: Are there project benefits that would accrue to minority or low-income populations at similar or different levels than the general population?

The answers to these five questions help show whether the project alternatives would be likely to result in disproportionately high and adverse impacts on minority or low-income populations.

4.5.2 Affected Environment

This section describes the key characteristics of the social environment, including community resources, assessed neighborhood demographics, parks, low-income and minority populations, and other factors that contribute to community cohesion and

quality of life. The study area is the same as the one used for the environmental justice analysis.

Community Resources

Except for parks and community centers (discussed separately below), the only municipal facility located in the study area is a fire station. Several small offices in the downtown area provide a variety of limited health care services.

The Mukilteo School District serves about 14,000 students living in Mukilteo and south Everett. The study area falls entirely within the attendance boundaries of Mukilteo Elementary School, Olympic View Middle School, and Kamiak High School although the schools are outside of the study area. Two churches are located on Third Street, near the existing ferry terminal. Two community centers, the Boys and Girls Club, and the Rosehill Community Center are in the study area, as are several parks and recreational facilities. These resources are shown on Figure 4.5-1.

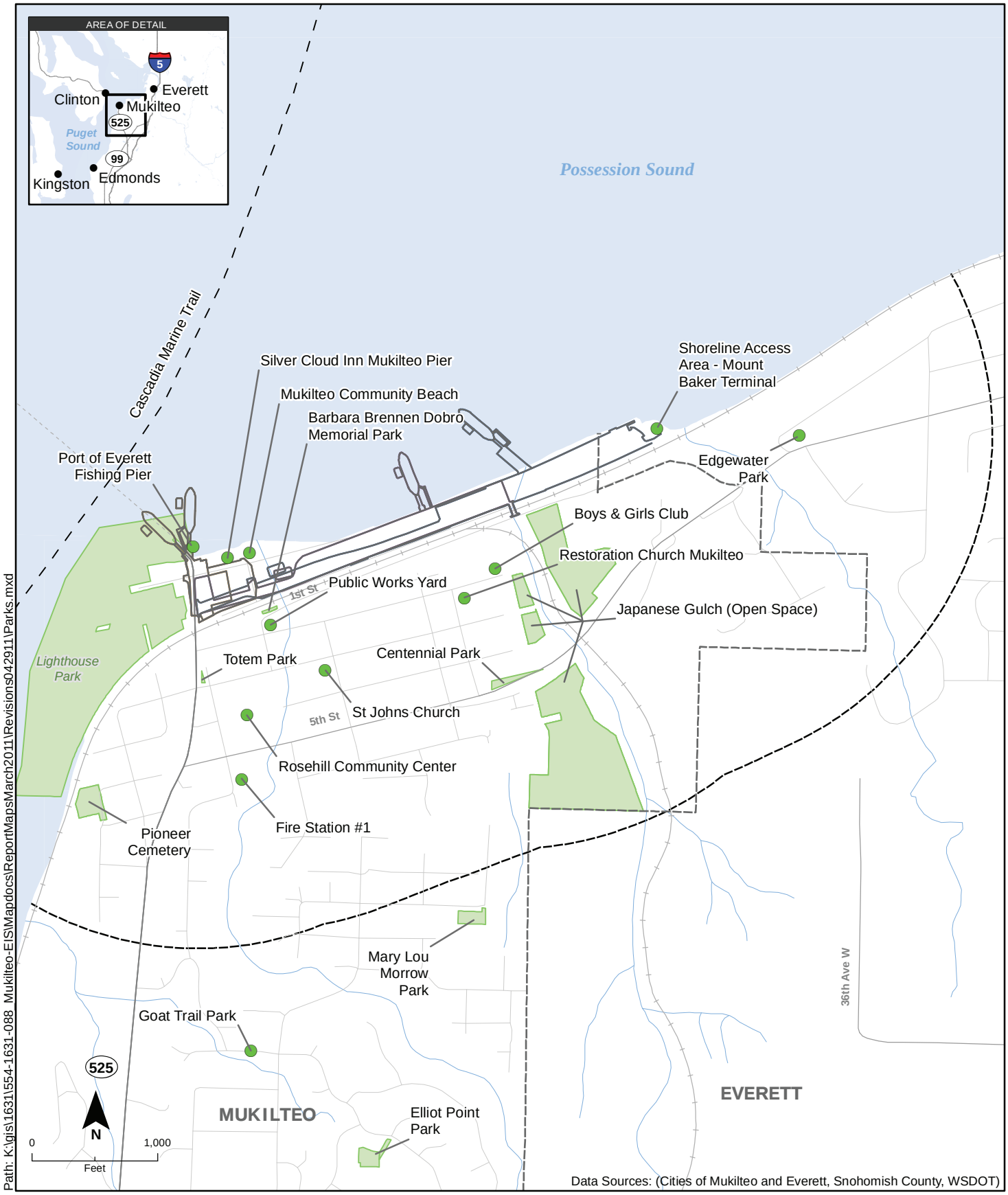
Housing exists on both sides of SR 525 from Second Street to Ninth Street, but south of Ninth Street a steep bluff limits development west of SR 525. Two other neighborhoods are located west of SR 525 in the study area: one at Horizon Heights Drive (approximately 19th Street), and the other between 80th Street SW and 84th Street SW.

Commercial development in the study area is concentrated in the old downtown area and along SR 525. The old downtown area is located east of SR 525, approximately from Sixth Street to the waterfront. As with residential development, nearly all of the commercial development has occurred east of SR 525 (see Figure 4.2-2 in *Section 4.2 Land Use and Economics*). Exceptions are the waterfront sub-area and the intersection of SR 525 and 84th Street SW, each of which has a small number of businesses west of SR 525. The waterfront sub-area currently has only one hotel, three restaurants, a small store, a building with a number of office and art-related uses, the NOAA facility, and several commercial parking lots.

Housing

Most study-area housing is owner-occupied single-family houses. The study area had a total of 2,021 housing units in 2000. The owner-occupancy rate in 2000 was 77.0 percent for the study area, compared with 68.5 percent in Mukilteo and 67.7 percent in Snohomish County.

Single-family detached units account for 64.4 percent of all housing units, which is higher than in the city of Mukilteo (57.9 percent) or in Snohomish County (62.2 percent). None of housing units currently listed for sale by HUD in Snohomish County is located in Mukilteo. The Housing Authority of Snohomish County (HASCO) operates a variety of rental assistance programs serving more than 5,000 families, seniors, and disabled individuals. HASCO has no facilities within the study area.



Legend

- Recreational Opportunities / Parks and Recreational Facilities
- 1/2 Mile Study Area Buffer
- City Boundary

Figure 4.5-1. **Recreational and Community Resources**

Parks and Recreational Resource

The study area contains a number of parks and recreational facilities that provide a variety of outdoor and indoor activities (Figure 4.5-1).

Pioneer Cemetery is a 0.5-acre historic town cemetery, located approximately five blocks southwest of the ferry terminal, with expansive views of Puget Sound.

The Rosehill Community Center provides a variety of indoor and outdoor athletic facilities.

Totem Park is a 0.1-acre park adjacent to SR 525, three blocks south of the existing ferry terminal.

Mukilteo Lighthouse Park is on the shoreline to the west and south of the existing ferry terminal. The 14.4-acre site encompasses the former Mukilteo State Park, the former U.S. Coast Guard Light Station property, and the portion of Front Street along the park. The City's approved master plan for the park features a central lawn with open views of the lighthouse and the Sound; a pedestrian loop path system that connects with a planned pedestrian promenade along the waterfront to the east; shoreline restoration; viewpoints; a pedestrian pier; streetscape improvements; new picnic, play, and restroom facilities; and improved vehicular circulation and parking that avoids intrusions on a more pedestrian-oriented shoreline. A boat launch is currently located at the park. The City has completed two phases of improvements to the park, including a 4-acre landscaped area with play areas, sheltered picnic facilities, an interpretive area, a waterfront promenade, restrooms, and improved beach access. In 2011, the City completed the second phase, which focused on Front Street.

The Port of Everett fishing pier and seasonal day moorage is located just east of the Mukilteo ferry terminal.

The Mukilteo Community Beach is a 0.3-acre parcel along the shoreline at the end of Park Street, adjacent to the west entrance of the Mukilteo Tank Farm. It offers shoreline access, community programs, and a limited amount of parking. It is also a popular site for SCUBA divers to access the offshore area.

Fowler Pear Tree Park is a 0.1-acre site in old downtown Mukilteo. The Fowler Pear Tree was planted during the U.S. Civil War, and is a registered state historic landmark.

Japanese Gulch is a 20-acre public open space in a ravine that carries Japanese Creek and runs from approximately the north end of Paine Field to the shoreline at the east end of the Mukilteo Tank Farm. It features views of Possession Sound.

Centennial Park is a 0.25-acre park located in the northeastern part of the city. This small park includes space for picnics and features the Japanese Gulch Memorial.

A public shoreline access area for Edgewater Beach is to the east of the Mukilteo Tank Farm in the city of Everett. Associated with the Port of Everett's Mount Baker

Terminal, the access area is a City of Everett permitting condition for the terminal, with enhancements including parking, benches, and a shoreline walkway. The area is not yet officially open.

Edgewater Park is located in the city of Everett, slightly east and upland of the project area. The 1.5-acre site includes picnic tables, tennis and basketball courts, and a playground.

The Cascadia Marine Trail is one of 16 non-motorized water trails designated as National Millennium Trails by the White House Millennium Council. The trail crosses to the west of Point Elliot and extends through Puget Sound from Olympia to Point Roberts on the U.S.-Canada border.

Recreational Fishing

The Port of Everett's fishing pier and the public pier near the Silver Cloud Inn provide access for recreational fishing, which is popular in and near the study area. Salmon, crab, and shrimp are typically harvested by boat, while shellfish are harvested from shore. WDFW divides Washington State waters into Fishing Management Areas. One of the most popular fishing areas is the bar at the south end of Whidbey Island, just offshore from Scatchet Head and Possession Point. The easiest and quickest way to reach this bar from the mainland is to launch at the Mukilteo Lighthouse Park; however, this ramp can be difficult to use in high winds. The Port of Everett boat launch in Everett is farther from the south end of Whidbey Island but is larger and more protected from wave action.

Demographics

Racial characteristics for the study area population as of the 2000 Census are shown in Table 4.5-1. The minority percentage for each census block group in the study area is shown in Figure 4.5-2. The analysis also assesses ethnicity in terms of the non-white and white Hispanic populations that may be present. In the study area, less than 4 percent of the population was Hispanic in 2000. Although the City of Everett limits fall within the study area, its populated areas are outside the study area and are not shown here.

Table 4.5-1. Racial Composition of Residents in Snohomish County, City of Mukilteo, and Census Tracts within the Study Area

	Snohomish County	City of Mukilteo	Census Tract 413.01	Census Tract 413.02
Total	606,024	18,042	4,845	6,001
White alone	518,043	14,540	4,216	4,821
Black or African American alone	9,587	333	24	159
American Indian and Alaska Native alone	8,127	15	5	98
Asian alone	35,534	2,092	170	500

Table 4.5-1. Racial Composition of Residents in Snohomish County, City of Mukilteo, and Census Tracts within the Study Area

	Snohomish County	City of Mukilteo	Census Tract 413.01	Census Tract 413.02
Native Hawaiian and Other Pacific Islander alone	1,250	31	15	0
Hispanic	28,590	18,019	142	264
Some other race alone	11,365	242	30	6
Two or more races	22,118	789	215	202
Percent non-white	14.5	19.4	13.0	19.7

Source: U.S. Census 2000 Summary File 3 – Table P006 and P007

Income characteristics for the study area are shown in Table 4.5-2. The percentage of households below the federal poverty threshold in the study area is shown in Figure 4.5-3.

Table 4.5-2. Income Level of Residents in Snohomish County, City of Mukilteo, and Census Tracts within the Study Area

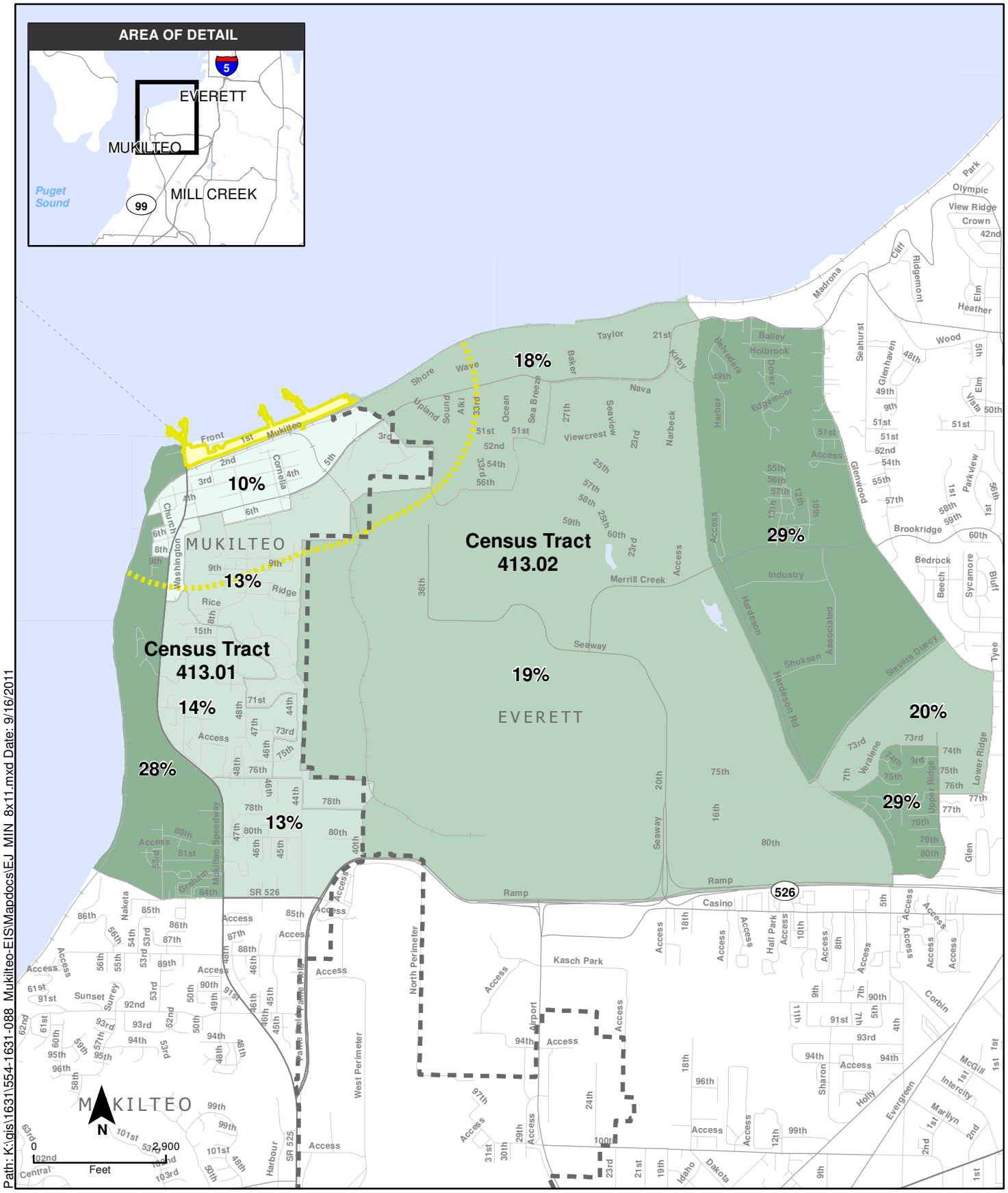
Housing Type	Snohomish County	City of Mukilteo	Census Tract 413.01	Census Tract 413.02
Median household income in 1999	$53,060	$67,323	$63,548	$70,360
Share of population below poverty level (%)	6.9	3.4	3.6	4.5

Source: U.S. Census 2000 Summary File 3 (SF 3) – Tables P053, P087

Tribal Communities

There are no tribal reservations in the project area. Several tribes trace their ancestry to the native inhabitants of the Puget Sound region, and their members continue to live, work, fish, hunt, and participate in traditional cultural activities in locations throughout the region. These tribes include the federally recognized Lummi Nation, Muckleshoot Tribe, Samish Tribe, Sauk-Suiattle Tribe, Snoqualmie Tribe, Stillaguamish Tribe, Suquamish Tribe, Swinomish Tribe, Tulalip Tribes, and Upper Skagit Tribe, as well as the non-federally recognized Duwamish Tribe and Snohomish Tribe.

As described in *Section 4.12 Ecosystems*, the project area supports several species of salmon, crab, shellfish, and other marine species that have always been central to tribal cultures of Western Washington. Tribal harvests focus on salmon, Dungeness crab, and shellfish. The primary mode of harvesting salmon is with anchored or drifting gill nets. Tribal harvesting of Dungeness crab is accomplished mostly with pot gear or during summer low tides. Shellfish have also been harvested by tribal fishers, but in recent years, the occurrence of toxic algae has closed beaches throughout much of the urbanized Tacoma-Seattle-Everett region, because littleneck clams, butter clams, and horse clams accumulate toxins that can be harmful or fatal to humans.



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Legend

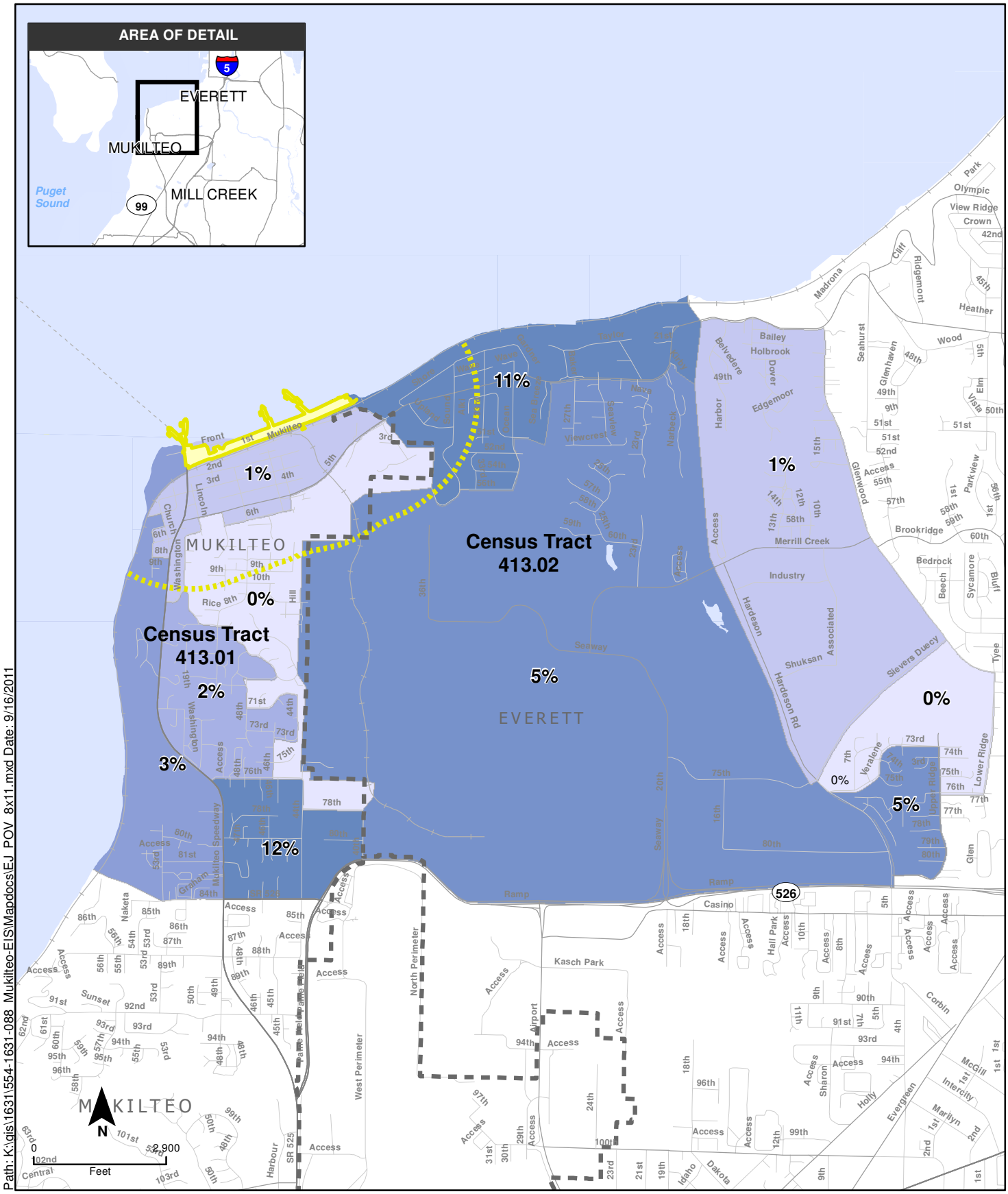
- Project Area
- 0.5 Mile Study Area Buffer
- City Boundary

% Minority by Census Block Group

- 10% - 11%
- 11% - 14%
- 14% - 20%
- 20% - 26%
- 26% - 29%
- 29% - 32%

Figure 4.5-2. Percent Minority

Data Sources: Cities of Mukilteo and Everett, Snohomish County, WSDOT, and U.S. Census Bureau, 2000 census data



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Legend

- Project Area
- 0.5 Mile Study Area Buffer
- City Boundary

% Below Poverty by Census Block Group

- 0% - 1%
- 1% - 2%
- 2% - 3%
- 3% - 4%
- 4% - 6%
- 6% - 12%

Figure 4.5-3. Percent Below Poverty

Data Sources: Cities of Mukilteo and Everett, Snohomish County, WSDOT, and U.S. Census Bureau, 2000 census data

Fishing opportunities for salmon, Dungeness crab, and other shellfish are shared among federally recognized tribes of Western Washington and they have access to seasons and areas not open to the general public. The tribes also have resource management roles that they conduct in coordination with the Washington Department of Fish and Wildlife.

Tribal fishers have used the Tank Farm Pier as shelter during periods of strong south winds. The Tank Farm Pier also provides habitat and refuge for crabs. The area off the upland portion of the Mukilteo Tank Farm is not typically fished with drift gear because of the proximity to the Tank Farm Pier. Fishing is precluded in the immediate area around the existing ferry terminal due to ferry traffic.

Tribal harvesting of Dungeness crab is accomplished mostly with pot gear, during summer low tides. Tribal crab and clam harvesting occurs most of the year. Ghost shrimp are harvested year-round for use as bait from the sandy areas near the Port of Everett Mount Baker Terminal. Typically, Chinook salmon are fished from July to September, pink salmon in July, coho from early September to October, and chum salmon from mid-October through November.

4.5.3 Long-Term Environmental Impacts

Long-term social impacts from transportation projects may result from the acquisition of properties, removal of buildings and other physical features, displacement of businesses or residents, separation of a neighborhood from its community resources, impacts on traffic circulation patterns, impacts on parks, or impacts on neighborhood cohesion. Separation of a neighborhood from its community resources may be caused by operational changes such as rerouting traffic, pedestrian or transit service, as well as by physical barriers such as new roadways or other transportation facilities.

No-Build Alternative

Social Impacts

The No-Build Alternative would not alter the overall ferry terminal layout.

The surrounding community is routinely affected by the deficiencies of the current facilities. Long queues block driveways and side streets, and waterfront access is both limited and impeded by conflicts between vehicles and pedestrians.

The No-Build Alternative conditions hinder access to the waterfront, the small businesses, and the Mukilteo Lighthouse Park. In the future, increasing ferry traffic volumes would make vehicular access to the waterfront businesses more difficult.

Currently, only a small portion of ferry traffic uses residential streets to avoid traffic signals on SR 525 and SR 526, although this could worsen as ferry traffic increases in the future.

Impacts on Parks and Recreational Resources

Because of congestion and overall increase in traffic, ferry queues, parking constraints, and ferry loading and unloading, the No-Build Alternative would continue to hinder access to Mukilteo Lighthouse Park and Community Beach Park. Recreational use of this popular park is expected to increase over time. The Port of Everett fishing pier and seasonal day moorage would be replaced, including the floats and piers, temporarily removing the ability of people to use it for fishing.

Environmental Justice Considerations

No resources or services specific to low income and minority populations exist in the area. There would be no impacts on low-income housing sites, social service providers, or other environmental justice resources. The Port of Everett's existing fishing pier would remain.

The maintenance and structure replacements associated with this alternative would not adversely affect the occurrence or abundance of aquatic species, including species harvested by tribal fishers.

Existing Site Improvements Alternative

Social Impacts

The Existing Site Improvements Alternative would make limited improvements at the existing site, replacing and realigning existing ferry facilities such as the ferry slip and trestle. Congestion and vehicle/pedestrian conflicts at the Front Street/SR 525 intersection would continue to impair the integration of the Mukilteo waterfront with the surrounding community.

This alternative would remove the existing Port of Everett fishing pier and seasonal day moorage, and displace Ivar's restaurant, and art-related businesses at Park Avenue and First Street. The displacement of these resources would further reduce the limited commercial activities that help draw people to the waterfront area for reasons other than the ferry. The fishing pier is used extensively by the local community and is one of a limited number of shoreline recreational fishing opportunities open to the public in the area. Two potential replacement locations have been identified; see Figure 2-3 in *Chapter 2 Alternatives*.

This alternative would slightly increase the walk from the ferry to buses relative to the No-Build Alternative, but the improved bus transit center would offer more amenities (shelter, route information, benches) for passengers, and it is closer to the commuter rail Mukilteo Station. Because of the extension of First Street and the new intersection at First Street and SR 525, bus service would improve between the Mukilteo waterfront and nearby social resources. The proximity of the new transit center and the commuter rail station would improve bus-rail connections for rail users in the community.

This alternative, with overhead loading included, would also help reduce delays in the ferry system operations, benefiting all populations.

Impacts on Parks and Recreational Resources

The Existing Site Improvements Alternative would remove the Port of Everett's public fishing pier and seasonal day moorage, which is a recreational resource used by the community and the public. If not replaced prior to its removal, the loss of the pier would be an impact on a recreational resource for the community because it is one of a limited set of shoreline recreational fishing opportunities available to the public in the area.

As discussed for the No-Build Alternative, congestion on the waterfront would continue to impair access to Mukilteo Lighthouse Park and Mukilteo Community Beach.

Environmental Justice Considerations

There are few effects that would potentially impact minority or low-income populations disproportionately. Some displaced employees from Ivar's restaurant may be from low-income or minority groups. These employees could be retained if Ivar's were relocated to a location in the area suitable for its business and if the restaurant's operations can transition without a long period of disruption. Otherwise, these individuals could lose their jobs permanently.

The existing fishing pier and day moorage would be removed. Low-income or minority people who rely on fishing as a food source would be affected if no replacement facility is provided before removal. A user survey conducted by WSDOT in October 2011 found that minority and low-income people use the pier, although the number of users fluctuates throughout the year.

As discussed in *Section 4.12 Ecosystems*, the Existing Site Improvements Alternative would not adversely affect the occurrence or abundance of aquatic species, including species that are harvested by tribal fishers.

As discussed in *Section 4.6 Cultural Resources*, the project's construction would likely impact archaeological resources, many of which are of importance to Native Americans.

FTA and WSDOT would continue coordination and government-to-government consultations with affected tribes to resolve any issues associated with treaty rights. FTA would also continue Section 106 consultations to address adverse effects to cultural resources of significance to the tribes.

Elliot Point 1 Alternative

Social Impacts

This alternative would convert a portion of the Mukilteo Tank Farm to a multimodal transportation use with public shoreline access features, and it would remove the existing ferry terminal facilities. This alternative would improve access to the waterfront and integrate the Mukilteo downtown area with the waterfront.

As discussed below, a public access area near the Mount Baker Terminal would be displaced.

The distance between the ferry and local bus service at the new transit center is a short walk (0.15 mile). However, the distance from Mukilteo Station to the ferry terminal may be longer than some people can walk (0.41 mile).

This alternative would extend First Street and provide a new signalized intersection at SR 525 and First Street. First Street would feature sidewalks and bicycle lanes; at the driveway for the ferry terminal, a walkway would continue outside the holding area to a shoreline promenade to the west of the ferry dock. As with the Existing Site Improvements Alternative, by improving bus circulation, this alternative would improve bus service between the waterfront and nearby social resources. By improving bus-rail connections, this alternative would benefit rail users in the community.

This alternative would increase areas available to queue vehicles waiting to reach the terminal and would provide adjacent bus facilities. As discussed in *Chapter 3 Transportation,* the queue would not reach SR 525. The additional capacity would reduce traffic congestion, cut-through traffic, blocked driveways, and other impacts in the adjacent neighborhoods compared to the No-Build Alternative. The new roadway would provide access to the public shoreline area near the Mount Baker Terminal. Community access to Mukilteo Station would remain generally the same as it is today.

Impacts on Parks and Recreational Resources

The Elliot Point 1 Alternative would occupy some of the upland area at the eastern end of the Mukilteo Tank Farm currently used for informal access to the shoreline and dedicated for permanent public access in the future. About 0.5 acre of the public access area, including parking, would be displaced and relocated to the west. The site features parking, a pathway, and benches.

The permit approved for the Mount Baker Terminal requires the Port of Everett to provide access to the area, pending completion of planning for the Mukilteo Multimodal Project. The current design for the Elliot Point 1 Alternative would provide access, but parking for the shoreline area would be relocated to the west, which would be less convenient or accessible, particularly for people with disabilities. However, the alternative would extend the shoreline areas available to the public and

open a larger section of the shoreline to public access than is currently available by providing a shoreline promenade to the west and east of the new ferry terminal.

The demolition of the Tank Farm Pier would remove a known dive site, and the operation of the ferry in the area would restrict other fishing or diving activities in the immediate vicinity. However, the removal of the existing ferry terminal would allow for more opportunities for public shoreline access in the central waterfront area.

The transit center would include layover facilities for transit, which would reduce the need for buses to use Mukilteo Lighthouse Park for layover parking. Similarly, the removal of the existing ferry terminal and its related traffic on Front Street would improve access, safety, and parking availability for the park.

Environmental Justice Considerations

No services specific to low-income or minority populations exist in this area. There would be no impacts on low-income housing sites, social service providers, or other environmental justice resources. As discussed in *Section 4.12 Ecosystems*, the Elliot Point 1 Alternative would not adversely affect the occurrence or abundance of aquatic species, including species that are harvested by tribal fishers. Some of the habitat for crabs west of the Tank Farm Pier could be removed, but is not expected to alter the abundance of crabs that are available to fishers in the Puget Sound or in the crab management region that Point Elliot is within.

Removal of the Tank Farm Pier would open up an area that could be used for additional shoreline access as well as waters for tribal, public, or commercial fishing. Fishing activities, including fishing by tribal members, could be affected by the physical presence of the proposed new ferry terminal as well as removal of the Tank Farm Pier, which currently can provide shelter during storms and winds.

Once the existing ferry terminal is decommissioned, there would be more opportunities for fishing closer to Elliot Point, Mukilteo Lighthouse Park, and offshore areas.

Current clamming areas and ghost shrimp harvest areas would remain accessible to tribal fishers. Upon completion of the new ferry terminal, portions of the Mukilteo Tank Farm shoreline, waters around the Tank Farm Pier, and currently fenced or restricted areas would become publicly accessible. Ferry navigation and terminal security would still restrict areas around the ferry terminal. FTA would pursue government-to-government consultations with affected tribes to resolve potential issues associated with treaty rights.

Potentially beneficial permanent impacts on area fish and shellfish include improvements to water quality and sediment over the long term resulting from the removal of creosote-treated timber at the existing ferry terminal and other timber debris or structures (see *Section 4.11 Water Resources*).

As discussed in *Section 4.6 Cultural Resources*, the project's construction could impact prehistoric archaeological resources important to Native Americans and historic archaeological resources important to Japanese-Americans. This alternative has the least overlap with the prehistoric site and has the lowest potential to impact it. FTA would continue to conduct Section 106 consultations to address adverse effects.

Elliot Point 2 Alternative

The social impacts of this alternative would be similar to the Elliot Point 1 Alternative.

This alternative would displace one business, the glass blowing art studios, in order to develop the First Avenue extension.

This alternative would provide the shortest walk between the multimodal connections. The distance from the ferry to local bus service would be 0.08 mile, and the distance from Mukilteo Station to the ferry would be 0.19 mile.

Traffic improvements, and the related improvements for local residents, would be similar to those for the Elliot Point 1 Alternative. When the holding area is full, backups could still extend to SR 525, unlike the Elliot Point 1 Alternative. The benefits of Elliot Point 1 Alternative's expanded vehicle capacity would not occur.

Impacts on Parks and Recreational Resources

Impacts on parks and recreational resources would be similar to the Elliot Point 1 Alternative, except this alternative does not affect the Mount Baker Terminal shoreline access area. The Elliot Point 2 Alternative would provide a shoreline promenade to the west and east of the new ferry terminal that would be open to the public, but it would not directly connect to the Mount Baker Terminal shoreline access area facilities. Other impacts of removing the Tank Farm Pier and the existing ferry terminal site would be similar to the Elliot Point 1 Alternative. The Port of Everett fishing pier and day moorage would remain.

Environmental Justice Considerations

Minority or low-income populations would not be affected differently than tourists, commuters, or residents.

As with the Elliot Point 1 Alternative, removal of the Tank Farm Pier and establishment of a new ferry terminal could alter existing tribal fishing practices, but could open new areas as a result of the removal of the existing ferry terminal. FTA will continue coordination and government-to-government consultations with affected tribes to resolve potential issues associated with treaty rights. The construction of the alternative has the potential to encounter archaeological resources, including a site of significance to Native Americans. The alternative's design includes fill to avoid encountering the resource, and limits excavations. FTA would continue Section 106 consultations to address any adverse effects.

4.5.4 Construction Impacts

This section addresses the temporary impacts that may result from the construction of new facilities, hauling of materials, and the staging of major construction activities.

Both standard practices and context-specific measures will be incorporated into the project to reduce noise, light and glare, and air quality impacts during construction as well as truck traffic impacts on the community, as discussed in more detail in *Sections 4.3 Noise and Vibration, 4.4 Visual Quality, 4.7 Air Quality,* and *Chapter 3 Transportation*. Construction activities are not expected to have disproportionately high and adverse impacts on low income and minority populations.

No-Build Alternative

Construction would take place only as facilities require replacement. Construction would have temporary impacts on adjacent uses from noise and temporary disruption of traffic circulation. As described in *Chapter 3 Transportation,* this would temporarily alter access and increase delays to businesses and other uses along the waterfront, but access is expected to be maintained.

The construction would fully close the facility for a 4- to 9-month period. Full closure would have the greatest transportation impact on ferry users primarily because the ferry route would be redirected to Edmonds. Waterfront traffic circulation would improve without ferry operation but patronage at some businesses could decline because area activity levels would decrease. Construction activities conducted while the terminal is in operation would result in some disruptions to ferry operations and traffic patterns. Nearby residents would be subject to increased dust, dirt, traffic, visual impacts, and other inconveniences during the construction period. As detailed in *Section 4.3 Noise and Vibration,* higher noise levels would occur during construction, but mitigation measures are identified to avoid adverse impacts to sensitive receptors such as the hotel and residences near the existing terminal.

The No-Build Alternative would result in a temporary closure of the Port of Everett fishing pier. A nearby public pier beside the Silver Cloud Inn could be used instead. Users of Mukilteo Lighthouse Park would also experience higher noise levels during construction.

Section 4.12 Ecosystems contains a more detailed discussion of potential impacts on fishing. Whenever in-water work is conducted, fish distribution or abundance may be temporarily affected, which may disrupt typical tribal and non-tribal fishing activities. Fishing may be affected by noise, vibration, construction activities, and turbidity. The presence of barges and other construction vessels and equipment could also interfere with the use of private boats in the vicinity for fishing or other activities.

Existing Site Improvements Alternative

Construction and demolition activities would be staged to minimize disruptions to existing ferry operations and traffic patterns. The construction of a replacement facility on and adjacent to the existing ferry terminal site would complicate access to waterfront area properties, as well as public waterfront areas nearby. As described in *Chapter 2 Alternatives,* construction would close the terminal facility for several months, which is longer than other Build alternatives but shorter than with the No-Build Alternative.

Nearby residents would be subjected to noise, dust, dirt, traffic, visual impacts, and other disruptions during the construction period at levels that are greater than those described for the No-Build Alternative. The construction period would not extend for as long a period as that of the No-Build Alternative.

The closure of the public fishing pier and seasonal day moorage during construction of the Existing Site Improvements Alternative would remove one of a limited number of shoreline recreational fishing locations open to the public in the area. If construction occurs during the offseason, day moorage would not be affected. WSDOT has identified two options for replacing the facility. If either option or a temporary replacement can be developed before the current facility is removed, impacts on recreational use could be reduced. This would also help avoid impacts to low-income or minority individuals who rely on fishing as a food source. Other recreational properties would remain open to the public during construction and demolition. Construction could affect access to and from Mukilteo Lighthouse Park and the public pier beside the Silver Cloud Inn. The access changes would include detours, delays, and alternative pathways for pedestrians and bicyclists.

Similar to the No-Build Alternative, potential impacts on fishing may result from in-water work.

Elliot Point 1 Alternative

Because construction of Elliot Point 1 would take place on the Mukilteo Tank Farm, operation of the existing ferry terminal would continue until construction is complete. Impacts due to the removal of the existing ferry terminal facilities, such as demolition noise, dust, and the presence of haul trucks, would occur for 1 to 2 months after the new ferry terminal is in place and operating. The other impacts of removing the existing site facility would be similar to those discussed for the Existing Site Improvements Alternative, except there would not be a need to reroute ferry traffic to Edmonds.

For most other construction activities, only minor noise, vibration, and visual impacts would be expected because the Mukilteo Tank Farm would not be open to the public and it is not near homes or businesses.

Construction traffic would temporarily impact the downtown street system and cause delays on local streets and SR 525.

The public shoreline access area developed as part of the Mount Baker Terminal is not yet open to the public and so construction impacts are not anticipated. The Elliot Point 1 Alternative would not directly affect any other recreational facilities. First Street is expected to be completed as part of the initial phase of construction, which would move construction traffic away from the city waterfront and Front Street and would help minimize impacts to Mukilteo Lighthouse Park and the fishing pier.

Potential impacts on recreational fishing and crabbing may result from in-water work. In-water work may temporarily affect fish distribution or abundance, which would in turn disrupt typical tribal and non-tribal fishing activities. A large population of crabs is present in the Tank Farm Pier area. Individual crabs could be injured or killed during pile removal or placement, but overall impacts on crabs would not be substantial (see *Section 4.12 Ecosystems*), and impacts on the community, including tribes, are not expected to occur.

The removal of the existing terminal could require a temporary closure of the Port of Everett's fishing pier and seasonal day moorage.

Elliot Point 2 Alternative

Construction impacts on community cohesion and social resources or interactions would be low and primarily related to construction traffic, similar to those for the Elliot Point 1 Alternative. Only minor noise, vibration, and visual impacts would be expected because the Mukilteo Tank Farm would not be open to the public and it is not near homes or businesses.

Construction impacts on parks and recreation would be similar to those for the Elliot Point 1 Alternative and could include temporary closure of the Port of Everett's fishing pier and seasonal day moorage.

4.5.5 Indirect and Secondary Impacts

Major transportation projects can have community impacts that are removed in time or space from the project area, such as job creation, gentrification, and redevelopment.

No-Build Alternative

Impacts that could be considered indirect have been already identified as part of the long-term consequences of the No-Build Alternative. No additional indirect impacts are anticipated.

Existing Site Improvements Alternative

As with the No-Build Alternative, any indirect impacts on the social environment and community groups are discussed as long-term environmental impacts.

Elliot Point 1 Alternative

This alternative would indirectly benefit community cohesion by providing the opportunity for redevelopment of the waterfront area, and helping the City of Mukilteo achieve its planned visions for downtown and Mukilteo Lighthouse Park. This alternative would remove the existing ferry terminal features and operations that are in the center of the downtown waterfront area, and adjacent to the Mukilteo Lighthouse Park. The nearby Buzz Inn property, which is currently leased by WSDOT for holding lanes, would be available for redevelopment by the owner.

Elliot Point 2 Alternative

The indirect impacts of the Elliot Point 2 Alternative would be similar to those for Elliot Point 1.

4.5.6 Cumulative Impacts

No-Build Alternative

This alternative would not affect the Mukilteo Tank Farm. The entire 18.85-acre parcel proposed for transfer to the Port of Everett would be available for development. The City of Mukilteo anticipates the land would be redeveloped as a recreational resource. The redevelopment of the Mukilteo Tank Farm would likely have some positive impacts on the City of Mukilteo and the immediate surrounding neighborhood. This redevelopment would improve local recreation options such as more opportunities for shoreline access, as well as a potential City proposal to relocate a boat launch currently at Mukilteo Lighthouse Park. However, because the No-Build Alternative would not improve the transportation infrastructure in the vicinity of the ferry terminal, lack of access and continued traffic congestion would hinder or limit redevelopment of the Mukilteo Tank Farm.

Pending a land transfer from the U.S. Air Force, the NOAA Mukilteo Research Station is expected to be redeveloped and expanded to include additional public education and research facilities. Plans are still in early stages, but these activities could help enhance the vitality of the waterfront area.

WSDOT has indicated that it does not have plans to fund or build any improvements to SR 525 that would increase its capacity before 2030. However, due to the forecasted increase in traffic volumes on SR 525 from ferry service demand, increased ridership at the Mukilteo Station, development of the remaining Mukilteo Tank Farm, and increases in general traffic, the combined contributions from those traffic generators may accelerate the need for several road improvements that could

ease congestion and improve safety. If they occur, these improvements would improve the public's ability to access the area's parks and recreational resources, as well as social resources, businesses, and residences.

Existing Site Improvements Alternative

The cumulative impacts of the Existing Site Improvements Alternative and the related redevelopment of the Mukilteo Tank Farm would be similar to those reported for the No-Build Alternative above.

Elliot Point 1 Alternative

Relocation of the ferry terminal would result in WSDOT vacating the existing ferry terminal site, potentially allowing a consolidated area of about 3 acres for redevelopment. On the Mukilteo Tank Farm, approximately 5 acres would remain available for development, and could include community facilities, depending on proposals to be developed by the Port of Everett or others, and would be subject to permitting and approvals. The City of Mukilteo has expressed an interest in relocating the boat launch ramp currently at Mukilteo Lighthouse Park to the Mukilteo Tank Farm. Removing the boat launch from Mukilteo Lighthouse Park would help improve the pedestrian and shoreline access functions called for in the park's master plan, and reduce areas needed for parking and boat loading and unloading. This alternative would construct roadways that improve local circulation and access in the waterfront area, which would support the proposed boat launch relocation.

The alternative's improvements to local circulation and access in the waterfront area and to the Mukilteo Tank Farm could support plans for the NOAA Mukilteo Research Station redevelopment, which may be expanded to include additional public education and research facilities that would be open to the community and could help support revitalization of the central waterfront.

Elliot Point 2 Alternative

The extension of First Avenue would not extend to Mount Baker Terminal or the shoreline access area as part of the project, but it would provide an opportunity for the Port of Everett or others to complete a roadway to the shoreline access area, or to further develop the public shoreline area, consistent with the City of Mukilteo and City of Everett Shoreline Master Plans. As with the Elliot Point 1 Alternative, the alternative's improvements to local circulation and access could support plans for the NOAA Mukilteo Research Station to be expanded to include additional public education and research facilities.

4.5.7 Mitigation Measures

The Mukilteo Multimodal Project is expected to have relatively minor long-term social impacts. Consequently, little mitigation would be required for impacts to social resources, nearby residents, or environmental justice populations.

Mitigation for Long-Term Impacts

As described in *Section 4.2 Land Use and Economics*, property owners of parcels to be acquired would be compensated, and residents and business owners who would be displaced as a result of the proposed property acquisitions would receive relocation assistance in accordance with state and federal law.

Mitigation for Impacts on Parks and Recreational Resources

For the Existing Site Improvements Alternative, WSDOT would replace the Port of Everett's fishing pier and seasonal day moorage. WSDOT would coordinate with the Port and the City of Mukilteo to replace the pier at another location. If feasible, the pier would be replaced prior to the removal of the existing pier.

Although a portion of the public shoreline access area parking at the Mount Baker Terminal would be occupied as part of the Elliot Point 1 Alternative, the alternative would provide replacement parking and a promenade that would connect to the site. It also would provide access improvements needed to open the site to the public. As discussed in *Chapter 5 Section 4(f)*, a modified design to maintain parking and direct access to the shoreline access area could mitigate the impact.

Environmental Justice Considerations

Interference with access to tribal fisheries is the only foreseeable environmental justice impact. FTA would pursue government-to-government consultations with affected tribes to resolve potential issues associated with treaty rights.

As described in *Section 4.6 Cultural Resources* and in the *Cultural Resources Discipline Report*, mitigation for adverse impacts will be developed in consultation with interested tribes and parties, and the State Historic Preservation Officer. Potential measures are discussed in *Section 4.6 Cultural Resources*.

Mitigation for Construction Impacts

A project communication and public awareness program would describe the changes occurring on the Mukilteo waterfront and inform the public that businesses there are open and accessible during construction. WSDOT, the Port of Everett, Sound Transit, and the City of Mukilteo would coordinate if multiple projects in the waterfront area are implemented concurrently.

During construction, reduced parking along Front Street would negatively affect businesses on the waterfront by impeding customer and employee access. Potential

mitigation measures to address construction impacts on businesses, including closure of the terminal, are identified in *Section 4.2 Land Use and Economics*.

For the No-Build Alternative, the Port of Everett fishing pier would be closed temporarily during construction of the new replacement facilities at the existing terminal. The temporary closure of the pier could be partially mitigated by encouraging the use of the nearby public pier adjacent to the Silver Cloud Inn and by public information and signage identifying other available locations for fishing.

Public notification of proposed construction activities, including timing of construction, would be provided to all local service providers and schools within the immediate vicinity of the project site.

Recycling of demolition debris on site has been incorporated into construction practices to reduce the amount of material hauled off site to regional facilities and to reduce truck traffic on roadways. A construction traffic control plan would be developed prior to construction to minimize disruptions to traffic patterns during construction, as described in *Chapter 3 Transportation*.

Mitigation measures for traffic, noise, and visual impacts are discussed in *Chapter 3 Transportation* and *Sections 4.3 Noise and Vibration* and *4.4 Visual Quality*, respectively.

4.5.8 Initial Environmental Justice Conclusions

The preceding sections evaluated the potential for direct or indirect social impacts in general. This section specifically assesses the likelihood that one or more of the alternatives may result in disproportionately high and adverse impacts on minority or low-income populations.

Question 1: Does the project affect a resource that is especially important to a minority or low-income population?

The Mukilteo Multimodal Project alternatives would not displace housing, social service providers, unique ethnic establishments, or other resources that are particularly important to low-income and minority populations. The project alternatives would potentially displace or temporarily close a fishing pier or the Tank Farm Pier. The fishing pier is open to the public, and although the areas around the Tank Farm Pier are not open to public access, boaters can access the surrounding waters. In scoping comments provided in 2010, the Tulalip Tribes stated that they continue to use the Mukilteo shoreline to harvest salmon, shrimp, and crabs; however, effects on these natural resources are not anticipated and are not likely to change the availability or abundance of marine species. This in turn would not be likely to result in changes to harvests. Several key elements, such as the removal of the Tank Farm Pier, are expected to provide environmental benefits due to the removal of over-water structures and potential sources of contamination.

Question 2: Would the project result in high and adverse impacts that would be predominantly borne by a minority or low-income population?

No data suggest that the displacements, construction impacts, or other impacts would be predominantly borne by minority or low-income populations.

Question 3: Would the project result in high and adverse impacts that would be suffered by a minority or low-income population that would be appreciably more severe or greater in magnitude than the impact that would be suffered by the non-minority and/or non-low-income population?

No data suggest the displacements, construction impacts, or other impacts would be appreciably more severe for minority or low-income populations, particularly if a replacement for a public fishing pier is available before it is closed or replaced.

Question 4: Does the project propose mitigation and/or enhancement measures?

Yes. Through the Section 106 process and ongoing EIS coordination among WSDOT, FTA, cooperating and participating agencies, and tribal governments, the project is working closely with consulting tribes on ecosystems and natural resources, archaeological resources, and other issues of interest to Native Americans. Design refinements and mitigations are being developed through consultations with the consulting tribes and others to address impacts on resources important to Native Americans. Any potential impacts to tribal treaty rights would be addressed through government-to-government agreements. With mitigation, the project does not anticipate severe impacts remaining in any area of the environment.

Question 5: Are there project benefits that would accrue to minority or low-income populations at similar or greater levels than the general population?

As described above, the Elliot Point 1 and Elliot Point 2 alternatives would benefit enhanced public shoreline access and the aquatic environment through the removal of the Tank Farm Pier over-water structures and piles that are potential sources of contamination. The Elliot Point 1 Alternative also provides improved shoreline access and open space areas, including the daylighting of Japanese Creek.

Also, the jobs created to construct the new terminal facilities would be available for low-income and minority populations, although outreach, training, and other incentives would likely increase the potential for low-income or minority individuals to obtain these jobs. Lastly, all Build alternatives would provide increased transit capacity and reliability, as well as improved safety conditions for motorists, bicyclists, and pedestrians accessing the ferry and the waterfront. The improvements in transit and non-motorized access would benefit low-income individuals at the same or higher levels as the general population, because these modes are lower in cost than vehicular use.

Conclusion: Potential interference with tribal fisheries is the only foreseeable environmental justice impact. WSDOT and FTA anticipate continuing state and federal government-to-government consultation with affected tribes.

4.6 Cultural Resources

This section discusses the project's potential effects on cultural resources. This analysis was conducted in compliance with the National Historic Preservation Act (NHPA) and its implementing regulations with FTA as the lead federal agency.

4.6.1 Overview of Analysis and Regulatory Context

The NHPA requires federal agencies, in this case FTA, to identify and assess the effects of federally assisted undertakings on historic properties and to consult with others to find acceptable ways to avoid or mitigate adverse effects. Properties protected under Section 106 of the NHPA are those that are listed in or are eligible for listing in the National Register of Historic Places (NRHP). Eligible properties generally must be at least 50 years old, possess integrity, and meet at least one of four criteria of significance. Historic properties may include archaeological sites, buildings, structures, districts, or objects.

In consultation with the State Historic Preservation Officer (SHPO), at the Washington State Department of Archaeology and Historic Preservation (DAHP), FTA determined the project Area of Potential Effects (APE) for archaeological resources and historic buildings and structures. The APE encompasses an area beginning west of SR 525 at Elliot Point (current name for the geographic area where the Point Elliott Treaty was signed) and extending 0.75 mile east along the shoreline, well beyond the end of the Mukilteo Tank Farm (Figure 4.6-1). The BNSF railroad tracks generally mark the southern boundary of the APE. Although the project's direct, physical impacts would be limited to a smaller area, the APE was drawn large to accommodate potential indirect impacts, such as visual and auditory changes and vibration, on cultural resources.

According to the NHPA implementing regulations, certain people or groups are automatically entitled to *consulting party* status, including appropriate federally recognized Native American tribes (36 CFR 800.2). WSDOT and FTA are consulting with the federally recognized Tulalip Tribes, Suquamish Tribe, Swinomish Tribe, Muckleshoot Tribe, Samish Tribe, Sauk-Suiattle Tribe, Snoqualmie Tribe, Stillaguamish Tribe, Upper Skagit Tribe, and the Lummi Nation. FTA and WSDOT have also consulted with the following interested parties: the Japanese Cultural and Community Center and the non-federally recognized Duwamish Tribe and Snohomish Tribe.

Figure 4.6-1. **Historic and Cultural Resources Area of Potential Effects**

Mukilteo Multimodal Project

4.6.2 Affected Environment

The project has identified five resources that are listed in or eligible for listing in the NRHP.

- Mukilteo Shoreline Site, an archaeological site with stratified pre-contact shell midden deposits
- Point Elliott Treaty Site where the 1855 treaty between the U.S. government and Puget Sound Native American tribes was signed
- Old Mukilteo Townsite, an archaeological site with buried remnants of the early Mukilteo business district
- Japanese Gulch Site, with buried deposits associated with early twentieth century Japanese mill workers
- Mukilteo Light Station, a NRHP-listed early twentieth century lighthouse complex

Key terms

***shell midden** – A shell midden or shell mound is an archaeological feature consisting mainly of mollusk shells where aquatic resources were prepared directly after harvest and prior to use or storage. Shell middens often reveal what food was eaten or prepared and include many fragments of stone tools and household goods.*

***stratification** (building of layers) – The Mukilteo Shoreline Site includes bedded layers of crushed shell, charcoal, charcoal-stained sediments, and fire-modified rock deposited on top of the clean sand and gravel of the beach berm.*

***lifeway** – A custom, practice, or art: reflecting the traditional lifeways of a tribal society.*

Nine other properties were also assessed and FTA's determined they are not eligible for NRHP listing, including the buildings and structures on the property now owned by the U.S. Air Force, as well as the Ivar's restaurant building, and the existing Mukilteo ferry terminal. Resources found not to be eligible for the NRHP are not subject to the NHPA and are not discussed in this section. The *Cultural Resources Discipline Report* (see *Supporting Technical Reports* in the Table of Contents for location) includes details on those resources.

4.6.3 Historic Background

The Mukilteo vicinity, with a Salish name meaning "a good place to camp" or "goose neck," was well known historically as a gathering place for local Native American people. The importance of the area to Native American groups is reflected in its selection as the site for the signing of the Point Elliott Treaty in 1855. Euroamerican settlement of the site vicinity began soon after signing of the treaty, with J.D. Fowler and Morris Frost filing the first land claims. By 1858, Fowler and Frost had established a post for trading with local Native American residents; a store, saloon, hotel, and a post office soon followed (Figure 4.6-2).

In 1903, the Mukilteo Lumber Company established a mill on the Mukilteo waterfront, which was acquired in 1909 by the Crown Lumber Company. This mill, which employed both Euroamerican and Japanese workers, operated until 1930. The last of its buildings was destroyed by fire in 1938. The millsite was subsequently

acquired by the U.S. Army and an ammunition shipping facility was built in the early 1940s. Ownership of this facility was transferred to the U.S. Air Force in 1951 for construction of a fuel supply depot and tank farm.

Figure 4.6-2. Photo Showing Indians, Canoes, Early Settlers, and J.D. Fowler with his Oxen at Mukilteo

The specific cultural resources within the project area are discussed below. Five of these properties have been determined eligible for the NRHP because they meet one or more of four National Park Service (NPS) criteria of significance:

A. The property is associated with events that have made a significant contribution to the broad patterns of our history.

B. The property is associated with the lives of persons significant in our past.

C. The property embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

D. The property has yielded, or is likely to yield, information important in prehistory or history.

The five eligible resources are described in detail below:

Mukilteo Shoreline Site

The Mukilteo Shoreline Site (designated 45SN393 by DAHP) was identified in 2005 during initial cultural resource studies for the Mukilteo Ferry Terminal Project. The site's original landforms have been obscured by pavement and buildings or buried beneath fill. The north-facing shoreline of Elliot Point has been at least occasionally occupied by Native Americans for approximately 1,000 years. The Mukilteo Shoreline Site contains the remnants of this occupation, including a thick, horizontally extensive shell midden over 1,500 feet (0.3 mile) in length. The midden is characterized by intact, bedded layers of crushed shell, charcoal, charcoal-stained sediments, and fire-modified rock. The alkaline depositional environment of the shell midden has created ideal preservation conditions for bone, in the form of both unmodified animal remains and fragments of mammal bone and beaver teeth modified into tools. Within the shell midden layers are the remains of animals that were hunted, fished, and gathered by the Native occupants of the site, the plants that they ate, and the wood that they used for fuel and implements. Stone tools and tool-making debris reflect the kinds of stone implements they used, how they used them, and the various ways in which the tools were made.

The archaeological investigation established preliminary boundaries and content for the Mukilteo Shoreline Site. Geoarchaeological tests helped investigators deduce the physical framework of the site, establish the depositional context for the shell midden, and construct a preliminary landform history.

Testing suggests that the Mukilteo Shoreline Site was an important year-round occupation that played a prominent role in the settlement systems of Native American communities. Elliot Point would have been a valuable place not only for the year-round availability of certain subsistence resources, but also as a strategic landform near the intersection of south Puget Sound, the protected tidewaters east of Whidbey Island, the entrance to Hood Canal, and the exit to the Strait of Juan de Fuca through Admiralty Inlet. The site is also near the mouth of the Snohomish River, which provides a transportation route east to the foothills, the Cascade crest, and beyond. This site has been determined eligible by the U.S. Air Force under NRHP Criterion D, for the property's potential to provide information important in understanding history or prehistory.

Point Elliott Treaty Site

The Point Elliott Treaty Site (designated 45SN108 by DAHP) is the location where the 1855 treaty between the U.S. government and the Native American tribes of northern Puget Sound was signed. The Treaty caused extreme changes for Native American people by divesting them of their lands and establishing the reservation system. At the same time, the Treaty is a legal document that establishes the sovereignty of independent tribal governments, and it is a symbol of survival. Work associated with the Point Elliott Treaty Site included archival research, coordination with the tribes, and

oral history interviews with tribal informants. Although exact locations where 1855 Point Elliott Treaty events occurred remain uncertain, the size of the Treaty gathering, nature of the landform, and other factors suggest that the site boundary should encompass the entire original geography for the point, which ended east of where the Tank Farm Pier is today or just past Japanese Gulch.

FTA has determined the Point Elliott Treaty Site is eligible for listing as a historic site in the NRHP under Criterion A for its association with the history of Indian/white relations, and under Criterion B for its association with prominent political leaders of the day, Governor Isaac Stevens, and a number of Indian leaders including Seattle, Patkanim, Goliah, and Chowitshoot. DAHP has also suggested the site is eligible as an archaeological site under Criterion D for its potential to provide information important in understanding history and prehistory.

Old Mukilteo Townsite

Archaeological investigations associated with the Mount Baker Terminal in 2006 provided physical evidence of the community's history in the form of buried historical archaeological sites. The Old Mukilteo Townsite (designated 45SN404 by DAHP) studies offer unique insights into the town's early community structure, commercial systems, demographics, and lifeways, while recovery of a few clay tobacco pipe fragments, a bead, and a stone pendant may be evidence of Mukilteo's trading post period. Observed historical materials also included deteriorated lumber, burned brick, and historical artifacts, and remains identified through historical research as the Crown Lumber Company store and butcher shop. This site has previously been determined eligible by the U.S. Air Force under Criterion D, for the property's potential to provide information important in understanding history, and under Criterion A for its association with Mukilteo's early development.

Japanese Gulch Site

The Japanese Gulch Site (designated as 45SN398 by DAHP) was also identified in 2006. It is evidence of early twentieth century Japanese mill workers who resided in the racially segregated Mukilteo Japanese Gulch settlement.

The early city directories did not include the Japanese workers, who were evidently employed by the Mukilteo Lumber Company from the beginning of its operation. Newspaper accounts indicate that the mill had hired at least 30 laborers of Japanese ancestry to work in the yard by February of 1904, and reported that other Japanese crews were planned. Caucasian workers initially threatened to leave the company if the Japanese workers were not dismissed, but their protest had little effect. The numbers of Japanese employed at Mukilteo Lumber Company continued to rise and later historical accounts suggest that the number had increased to 150 by 1905.

This site has previously been determined eligible by the U.S. Air Force under Criterion D, for the property's potential to provide information important in

understanding history, and under Criterion A for its association with the Japanese community that settled there.

Mukilteo Light Station

This lighthouse complex, consisting of 11 buildings and structures, is listed in the NRHP. The lighthouse, two keepers' residences, and a coal storage building were constructed in 1906. A two-bay garage, concrete fence posts, sidewalks, a seawall, ladder storage, water basin, and triangle alarm were added before 1935 and are contributing elements.

The Mukilteo Light Station is listed as being historically significant under Criterion A for its association with the maritime history of Puget Sound. It is also significant under Criterion C as a well-preserved complex of buildings and structures typical of those produced by the federal Light House Board in the Pacific Northwest during the late nineteenth and early twentieth centuries.

4.6.4 Adverse Effects

For historic properties, adverse effects occur when an undertaking may alter, directly or indirectly, any of the characteristics that qualify the property for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Examples of adverse effects include physical destruction or damage; restoration, rehabilitation, repair, or other alteration inconsistent with the Secretary's Standards for the Treatment of Historic Properties; relocation of a property from its historic location; change in the character of a property's use or physical features of the setting; introduction of visual, atmospheric, or audible elements that diminish the property's integrity; neglect that causes deterioration; and transfer, lease, or sale of property out of federal ownership or control without adequate preservation controls.

Table 4.6-1 provides a summary of potential adverse effects. Construction of the Mukilteo Multimodal Project, under any alternative, would not change the characteristics that qualify the Point Elliott Treaty Site or the Mukilteo Light Station for the NRHP. The Treaty site's location, association, and setting would remain unchanged, while the lighthouse's location, association, setting, design, materials, and workmanship would remain unaltered. Therefore, FTA has determined there would be no adverse effects on either of these resources. While the construction of the multimodal terminal within the Treaty site's boundaries would not affect the characteristics that make the site historic, FTA and WSDOT recognize the site holds great historic significance. They are, therefore, inviting tribes to participate in a context-sensitive design process and will continue to conduct government-to-government consultations with interested tribes to define satisfactory means of recognizing the site's cultural significance; these measures would apply under any of the alternatives.

Table 4.6-1. Potential Adverse Effects by Alternative

Alternative	Project Elements	Site Potentially Affected
No-Build	Buildings and Utilities	45SN393 Mukilteo Shoreline Site
Existing Site Improvements	Buildings	45SN393 Mukilteo Shoreline Site
	Utilities	45SN393 Mukilteo Shoreline Site
	Stormwater	45SN404 Old Mukilteo Townsite
	First Street/SR 525 Relocation	45SN404 Old Mukilteo Townsite
Elliot Point 1	Utilities	45SN393 Mukilteo Shoreline Site
	Stormwater	45SN393 Mukilteo Shoreline Site 45SN404 Old Mukilteo Townsite
	First Street/SR 525 relocation	45SN404 Old Mukilteo Townsite
	Japanese Creek daylighting and nearby construction elements	45SN398 Japanese Gulch Site
Elliot Point 2	Utilities	45SN393 Mukilteo Shoreline Site
	Stormwater	45SN393 Mukilteo Shoreline Site 45SN404 Old Mukilteo Townsite
	First Street/SR 525 Relocation	45SN404 Old Mukilteo Townsite

For archaeological sites, such as the Mukilteo Shoreline Site, Old Mukilteo Townsite, and Japanese Gulch Site, potential adverse effects would be due to damage to artifacts and damage to the integrity of association among artifacts and cultural and natural sediments. Disruption of these relationships severely limits the ability of archaeologists to interpret a property in a meaningful manner. Because the archaeological sites identified in the APE lie beneath soils used as fill in more recent times, a disruption is most likely to occur when excavation is deep enough to penetrate the protective fill layer.

Although impacts could occur in some localized areas, archaeological investigations suggest limited potential for encountering buried archaeological material (aside from the sites that are already recorded). In general, much of modern Elliot Point consists of a filled lagoon or wetland—landforms that would not have been conducive to pre-Euroamerican-contact or Native American residential activities. The discovery of lagoon or wetland deposits is a good indicator that concentrated pre-contact cultural material, like a shell midden, would not occur. The limited excavations at the Japanese Gulch Site, located on delta deposits, did not identify any pre-contact cultural material or deposits. The original shoreline was at the base of the slopes of Japanese Gulch until the railroad was constructed.

No-Build Alternative

The No-Build Alternative would have a potential adverse effect on the Mukilteo Shoreline Site, but avoids 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.

Existing Site Improvements Alternative

The Existing Site Improvements Alternative has the potential to damage the Mukilteo Shoreline Site if the replacement ferry passenger/maintenance building at the northern edge of the site exceeds the dimensions of the foundations for the existing building or Ivar's restaurant. Excavation for stormwater facilities near the intersection of Front Street and Park Avenue under the Existing Site Improvements Alternative could also damage the Mukilteo Shoreline Site and the Old Mukilteo Townsite, depending on final design.

New roadways and holding lanes would likely be built on fill and so are not expected to adversely affect subsurface material. Retaining walls at the south end of the employee parking could adversely affect historic archaeological material associated with the Old Mukilteo Townsite, depending on design, as would the transit center, stormwater facilities, or other utilities. Removal of the existing in-water terminal facilities has low potential to encounter significant cultural material.

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 as could retaining wall construction for the First Street relocation. The Japanese Gulch Site could be adversely affected by daylighting Japanese Creek, installing a nearby sanitary sewer pump station/generator, and relocating First Street.

The alternative would place fill and a roadway above the eastern edge of the Mukilteo Shoreline Site. It overlaps the least with the boundaries of the archaeological site. Even though this area may have been previously disturbed, utility work could encounter artifacts, so this analysis assumes an adverse effect.

Elliot Point 2 Alternative

The Elliot Point 2 Alternative would move the terminal and its facilities to the east end of the Mukilteo Shoreline Site. The new maintenance building, sanitary sewer pump station, and passenger terminal would be built on top of new fill to minimize the potential for adverse effects on the Mukilteo Shoreline Site. The First Street relocation could adversely affect the Old Mukilteo Townsite depending on depth of excavation required for retaining walls. Removal of the Tank Farm Pier is not likely to encounter significant historic or pre-contact cultural material.

The alternative would place holding lanes and part of a roadway above a portion of the Mukilteo Shoreline Site. It has the second lowest overlap with the boundaries of

the archaeological site. Even though this area may have been previously disturbed, utility work could encounter cultural resources, and FTA has identified a potential adverse effect.

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. While additional mitigation measures, permitting, or shoreline or open space requirements for the project could expand the assumed footprint for the current alternatives, the expansion could be located outside the archaeologically sensitive areas. The existing terminal site would be available for redevelopment if either the Elliot Point 1 Alternative or Elliot Point 2 Alternative is selected. The redevelopment of some portions of the existing terminal site could encounter identified archaeological sites.

4.6.6 Cumul ative 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, and regardless of the alternative

selected for this project, a portion of the Mukilteo Tank Farm may be available for redevelopment. This redevelopment could occur within identified archaeological sites and, therefore, could result in impacts on historic and cultural resources.

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 has initiated consultations with DAHP, and interested tribes pursuant to the NHPA. The technical assessment of project impacts, the stipulations governing additional assessment of impacts, and the development of mitigation options would therefore be guided by a Memorandum of Agreement or Programmatic Agreement. The Agreement and an associated treatment plan would dictate the specific mitigation of impacts on historic properties. Agreed-upon mitigation for adverse effects will be discussed in the Final EIS. The discussion below outlines measures currently under consideration.

The use of fill and other detailed design and construction approaches could eliminate many of the potential adverse effects. If the project could be constructed completely on fill, it could avoid or reduce adverse effects. As the project design advances and clarifies the locations and types of excavation required, precautionary construction techniques would be selected to help avoid or minimize adverse effects.

Monitoring can be undertaken for any excavation that would be deep enough to intersect one of the recorded sites. If construction of an element would adversely affect a NRHP property and the element cannot be redesigned to avoid the adverse effect, mitigation measures must be developed, in consultation with the DAHP and appropriate consulting parties, prior to project implementation. Archaeological sites are important for the information they contain. If this information can be salvaged, then adverse effects can be minimized. Data recovery through controlled archaeological excavation is often undertaken as mitigation for anticipated damage to NRHP-eligible archaeological sites. Plans for the long-term curation of artifacts or samples recovered during archaeological investigations or during construction would be developed in consultation with agencies, property owners, and appropriate tribes, with consideration given to feedback from other interested parties.

Mitigation measures regarding historic archaeological properties that would be adversely affected by the project are expected to include data recovery excavations. Such excavations would be guided by an Archaeological Treatment Plan that identifies research questions applicable to the sites, field excavation methodologies (including a plan for inadvertent discoveries), laboratory analyses, reporting requirements/reviews/approvals, and curation, among other things. Additional mitigation could include interpretive panels and exhibits, and other outreach initiatives. The following subsections provide more detail.

WSDOT and FTA will continue to take reasonable measures to identify ways to minimize adverse effects on historic resources. For all alternatives, measures would include, but not necessarily be limited to:

- Minimizing the construction areas by narrowing the width of facility structural elements, such as holding lanes and shoulder widths, provided such changes are consistent with minimum standards (including allowed variances and deviations) for the facility type.
- Minimizing adverse effects on aesthetics by planting trees and shrubs to enhance the view from historic properties and visually shielding the properties from project facilities that would compromise the historic setting.
- Minimizing disturbance to intact archaeological deposits by using fill or increasing the grade. If excavation is still needed, using careful mechanical excavation under the observation of a qualified archaeological monitor, guided by a monitoring and discovery plan. Disturbed archaeological site spoils, wherever encountered, would be screened to recover formed objects and to ensure that any human remains that might be present are properly treated, and that work stops pursuant to the discovery plan.
- Working with tribes, DAHP, and other interested parties to develop context-sensitive design elements that reflect the historic and cultural significance of the site.

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, mitigation measures as discussed above are likely.

Existing Site Improvements Alternative

At all in-ground construction locations, impacts resulting from new building construction, trenches, drains, and underground utilities would be minimized through the location and size of these elements, and monitoring would be required. To the extent possible, subsurface work in archaeological sites would take place in previously disturbed areas. Similar avoidance, minimization, and data recovery methods would be employed for the terminal supervisor's building, the relocation of First Street and SR 525, holding lanes, parking, and retaining walls.

Elliot Point 1 Alternative

At all in-ground construction locations, impacts resulting from new building construction, trenches, drains, and underground utilities would be minimized through the location and size of these elements; in addition, monitoring would be

required. To the extent possible, subsurface work in archaeological sites would take place in previously disturbed areas. Similar avoidance, minimization, and data recovery methods would be employed for the relocation of First Street and SR 525, holding lanes, parking, retaining walls, and stormwater ponds, if necessary, and restoration measures taken on the Japanese Gulch Site. Other measures could also be defined through the Section 106 consultations and resulting agreement.

Elliot Point 2 Alternative

Mitigation measures for this alternative would be generally similar to those for the Elliot Point 1 Alternative, except that Japanese Gulch would not be affected.

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 that the impacts of a proposed project on air quality be evaluated.

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 (NO_x), particulate matter less than 10 microns in size (PM_{10}), particulate matter less than 2.5 microns in size ($PM_{2.5}$), and ozone (O_3).

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, and damage to animals, crops, vegetation, and buildings.

Under the CAA, the EPA has set NAAQS for six “criteria pollutants”: CO, PM_{10}, $PM_{2.5}$, O_3, sulfur dioxide (SO_2), lead, and nitrogen dioxide (NO_2). 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, 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

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Averaging Time	
Carbon Monoxide (CO)	9 ppm (10 mg/m^3)	8-hour [(1)]	No Secondary Standard	
	35 ppm (40 mg/m^3)	1-hour [(1)]	Same as Primary Standard	
Lead (Pb)	0.15 µg/m^3	Rolling 3-Month Average	Same as Primary Standard	
	1.5 µg/m^3	Quarterly Average	Same as Primary Standard	
Nitrogen Dioxide (NO_2)	53 ppb [(2)]	Annual (Arithmetic Average)	Same as Primary Standard	
	100 µg/m^3	1-hour [(3)]		
Particulate Matter (PM_{10})	150 µg/m^3	1-hour [(4)]	Same as Primary Standard	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual [(5)] (Arithmetic Average)	Same as Primary Standard	
	35 µg/m^3	24-hour [(6)]	Same as Primary Standard	
Ozone (O_3)	0.075 ppm	8-hour [(7)]	Same as Primary Standard	
	0.12 ppm	1-hour [(8)]	Same as Primary Standard	
Sulfur Dioxide (SO_2)	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour [(1)]
	0.14 ppm	24-hour [(1)]		
	75 ppb [(9)]	1-hour	None	

Notes:

(1) Not to be exceeded more than once per year.

(2) The official level of the annual NO_2 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 $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

(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/m^3.

(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.

(8) (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 $\leq$ 1.

(9) 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.

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 emissions 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 mobile source air toxics 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 the EPA, Washington State Department of Ecology (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, particularly the portion of dust that is less than 10 microns in size (PM_{10}) or less than 2.5 microns ($PM_{2.5}$). Particles of this size 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 PM 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_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 the EPA's more stringent standards for both ozone and fine particulates, the region could soon be designated in 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. They are characterized by stagnant atmospheric conditions that tend to trap and concentrate pollutants. In most cases, pollutant-trapping 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 lies at less than 1,000 feet elevation, within areas 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/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 in the region of air quality advisories in the moderate and unhealthy to sensitive populations' categories.

Attainment Status/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 2009b). 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 for new vehicles, and gradual replacement of older, more polluting vehicles with newer, cleaner vehicles, are expected to continue to reduce vehicle emissions. Voluntary programs are expected to contribute to reduced vehicle emissions.

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, and 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. The RTP and the TIP meet the conformity requirements identified by federal and state regulations for CO.

Ozone concentration was not modeled because it has been modeled on a regional scale by the PSRC and is not likely to have an effect. The primary source of air pollution in the Mukilteo project area is vehicle emissions. The presence of traffic queues at the existing tollbooths 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 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 a reasonable radius of the project.

Air quality was modeled for the existing year (2010), the year of opening (2019), and the horizon year (2040) for all the alternatives.

Five intersections were analyzed for CO impacts:

- SR 525/Fifth Street (all alternatives)
- SR 525/First Street (all Build alternatives)
- West Driveway/First Street (Elliot Point 1)
- East Driveway/First Street (Elliot Point 1)
- Tollbooth and First Street (Elliot Point 2)

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 in 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)

	Intersections									
	SR 525/Fifth Street		SR 525/First Street		West Driveway/First Street		East Driveway/First Street		Tollbooths and First Street	
Alternatives	1 hr	8 hr	1 hr	8 hr	1 hr	8 hr	1 hr	8 hr	1 hr	8 hr
2010 (Existing)	5.1	4.5								
2019 No-Build	4.2	3.8								
2019 Existing Site Improvements	4.2	3.8	4.3	3.9						
2019 Elliot Point 1	4.2	3.8	4.3	3.9	3.9	3.6	3.9	3.6		
2019 Elliot Point 2	4.2	3.8	3.9	3.6					3.7	3.5
2040 No-Build	4.8	4.3								
2040 Existing Site Improvements	4.8	4.3	4.3	3.9						
2040 Elliot Point 1	4.8	4.3	4.3	3.9	4.2	3.8	4.2	3.8		
2040 Elliot Point 2	4.8	4.3	4.3	3.9					4.2	3.8

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

Mobile Source Air Toxic (MSAT) Emissions in 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 nearly the same, there would be no appreciable difference in overall MSAT emissions among the various 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.

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 NO_x 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 for specific pollutants were not calculated because they can be highly variable based on construction practices and the equipment a contractor may use; moreover, equipment usages are short-term activities. However, using construction costs as a guide, the Elliot Point 2 Alternative would have slightly lower emissions than the other two Build 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 operating. Larger dust particles settle near the source, while fine particles are dispersed over greater distances from the construction site.

PM_{10} from construction activities is noticeable if uncontrolled. Mud and particulates from trucks are also noticeable if construction trucks are routed through residential neighborhoods.

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, primarily from trucks hauling construction materials to and from the SR 525 corridor and from particulate release as a result of excavation of fill materials at borrow sites distant from the construction zone. These indirect impacts would result from vehicle exhaust along the alternative routes and from increased vehicle congestion and idling times.

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 2010a). 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 vehicles, industries, and consumer products have contributed to cleaner air throughout much of the United States, including 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, but 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

Long-Term Mitigation

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.

Construction Mitigation

WSDOT requires contractors to develop construction plans to identify measures to mitigate air quality impacts. These construction plans would make every attempt to minimize roadway congestion, and conserve energy and reduce air emissions by limiting idling equipment, encouraging construction workers to carpool, and locating staging areas near work sites.

The EPA's National Clean Diesel Campaign and online resources, like the State of California's *Guide to Air Quality Assessment* (www.airquality.org), list emission reduction strategies such as:

- 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, in accordance with 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.

- 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.

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 in the 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 soils, 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 the Draft EIS. The Ecology Model Toxics Control Act (MTCA) cleanup regulations (Chapter 173-340 WAC) and the Sediment Management Standards (Chapter 173-204 WAC), are

two regulations in Washington State that 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

Federal Laws and Regulations
Clean Air Act (CAA)
Clean Water Act (CWA)
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 Code of Federal Regulations [CFR] Part 312)
Endangered Species Act (ESA)
National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Parts 61 to 71)
National Environmental Policy Act (NEPA)
Occupational Safety and Health Act of 1970
Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984 (42 USC §§ 6901 – 6992k)
Toxic Substances Control Act (TSCA)
State Laws and Regulations
Clean Air Act and Local Air Agency Regulations
Dangerous Waste Regulations (WAC 173-303)
Model Toxics Control Act (MTCA, Revised Code of Washington [RCW] 70.105D) and MTCA regulations (WAC 173-340)
Sediment Management Standards (WAC 173-204)
Solid (Non-Dangerous) Waste Disposal (RCW 70.95, WAC 173-304)
State Environmental Policy Act (SEPA)
Underground Storage Tank Statute (RCW 90.76) and Regulations (WAC 173-360)
Underground Utilities (RCW 19.122)
Washington Industrial Safety and Health Act (WISHA, RCW 49.17) and implementing regulations
Lead-Based Paint and Asbestos Work (WAC 296-62 Part I-1; WAC 296-65; WAC 296-155)
Hazardous Waste Operations and Treatment, Storage, and Disposal Facilities (WAC 296-62 Part P)
Safety Standards for Construction Work (WAC 296-155)
Wastewater Discharges to Ground (WAC 173-216)
Wastewater Discharges to Surface Waters (WAC 173-220)
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)

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.

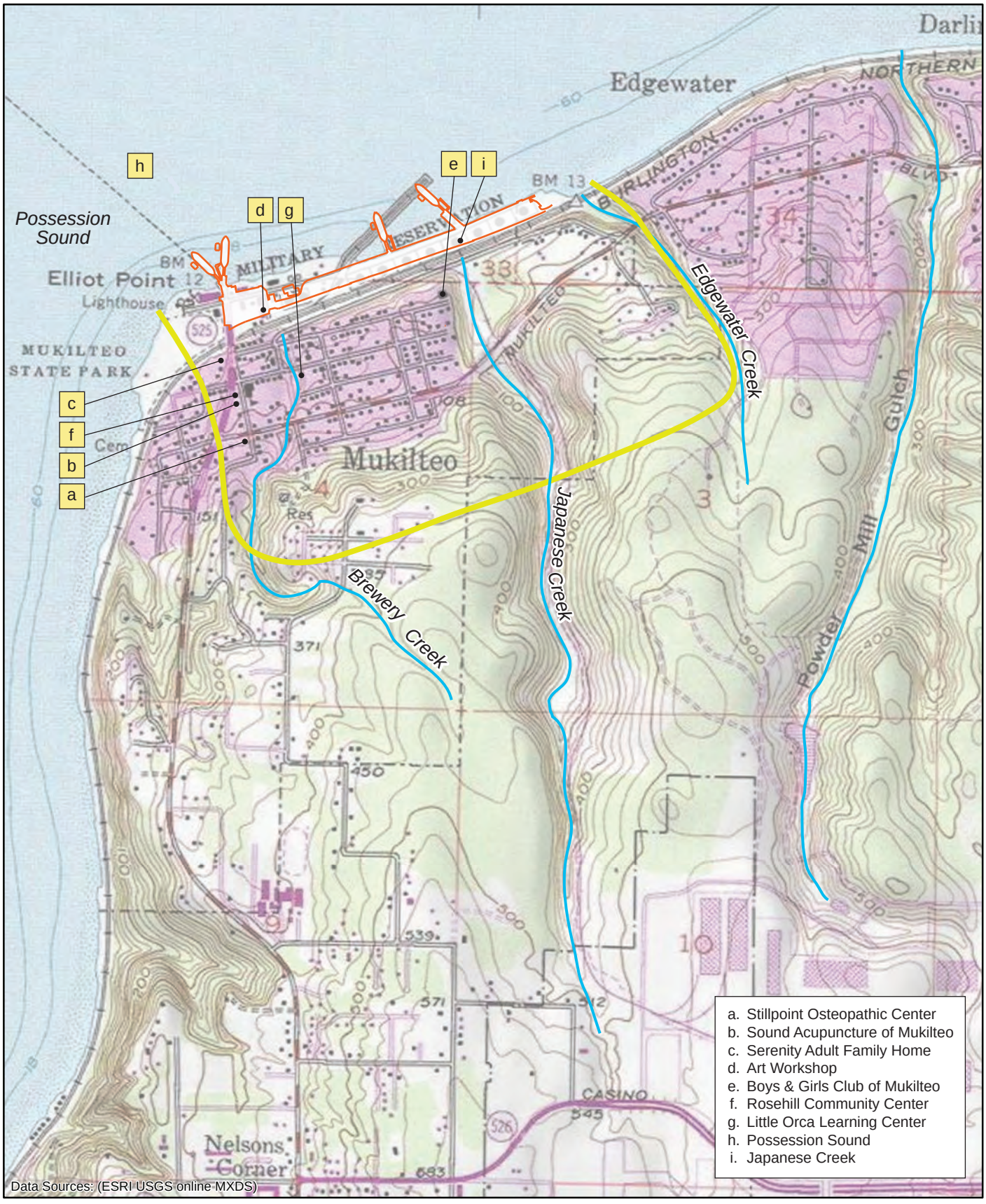


Figure 4.8-1. **Environmental Characteristics, Project Area, Sensitive Receptors, and Study Area**

Mukilteo Multimodal Project

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).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, currently owned by the U.S. Air Force, 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 13 acres of adjacent offshore property. 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 twentieth century. During World War II, the mill property was sold to the U.S. Army, which established the Mukilteo Explosive Loading Terminal for loading ammunition onto ships bound for the Pacific theater. Onsite 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 Air Force later demolished the eastern trestle pier. Fill material was added to much of the site. The facility began operating, through McChord Air Force Base, in 1953 and continued until 1973, supplying jet propellant and aviation gasoline fuels to military installations in the Pacific Northwest.

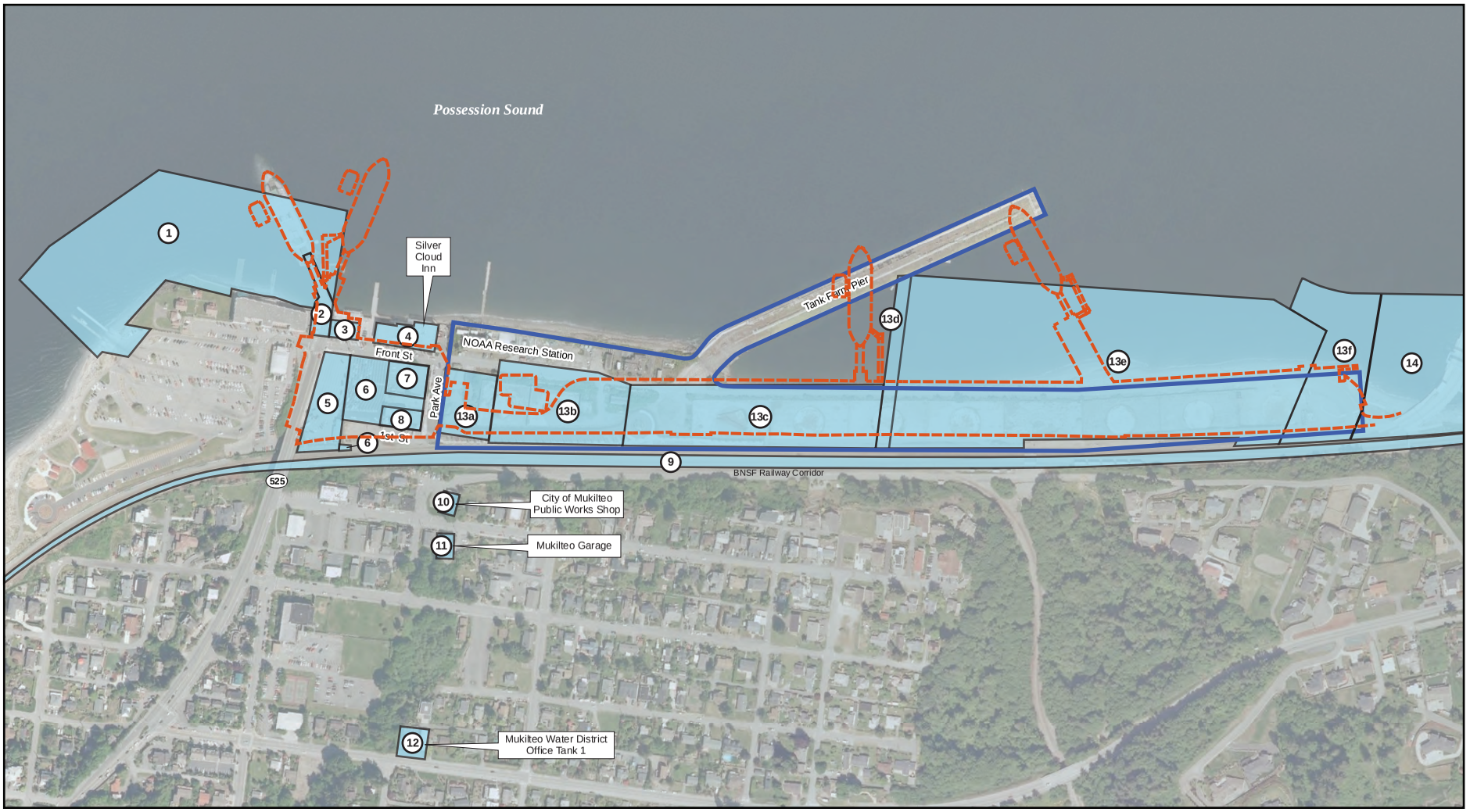


Figure 4.8-2. **Hazardous Materials Site Locations**

Table 4.8-2 Hazardous Materials Sites

Site No.	Site Name	Description	Documented Releases or Past Uses of Hazardous Materials
1	City of Mukilteo	Waterfront property west of current terminal	Potential presence of lead-based paint, asbestos, polychlorinated biphenyls (PCBs), mercury, creosote-treated timber and piles, and sediment contaminated with creosote.
2	Port of Everett	Mukilteo terminal is currently located here	Potential presence of lead-based paint, asbestos, PCBs, mercury, creosote-treated timber and piles, and sediment contaminated with creosote.
3	Ivar's Real Estate	Property occupied by Ivar's restaurant	Potential presence of lead-based paint, asbestos, PCBs, mercury, creosote-treated timber and piles, and sediment contaminated with creosote.
4	Silver Cloud Inn	Hotel immediately adjacent to the project area	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.
5	Washington State Parks and Recreation	Paved area already owned by WSDOT; primarily used for ferry holding	Potential presence of lead-based paint, asbestos, PCBs, and mercury.
6	A & J Enterprises	Paved area currently being used for ferry holding	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.
7	Ivar's Real Estate	Parking lot	Underground PCBs detected in 2009 at southern edge.
8	James Mongrain	Glass blowing manufacturing shop	Potential lead-based paint, asbestos, PCBs, and mercury.
9	BNSF Railway Corridor	Tracks adjacent to the project area	No available information indicates whether loading of hazardous materials, including petroleum products from the Mukilteo Tank Farm, occurred along BNSF tracks.
10	City of Mukilteo Public Works Shop	Building located about 260 feet south of the project area	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.
11	Mukilteo Garage	Repair shop and former gasoline service station located about 300 feet south of the project area	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.
12	Mukilteo Water District	Office building located about 1,250 feet south of the project area	The site had a gasoline underground storage tank that has been removed. No release has been reported for the site.
13	Mukilteo Tank Farm	Property occupies much of project area	Previously remediated site. See Table 4.8-3 below.
14	WSDOT	Part of property lies within the project area; WSDOT leases remainder to the Port of Everett for the Mount Baker Terminal Facility	Asbestos and PCBs.

Site No.: Site number on Figure 4.8-2

*No Further Action is the determination used by Ecology to signify that a site cleanup achieved all site-specific cleanup standards for substances in all media.

Table 4.8-3. Mukilteo Tank Farm Hazardous Materials Summary

Year	Property Owner/ Operator	Event/Activity	Documented Releases or Past Uses of Hazardous Materials
1903	Crown Lumber Company	Lumber mill constructed.	Fuel oil, lubricating oil, coal storage
1930	Crown Lumber Company	Lumber mill closed.	
1938	Unknown	Mill destroyed by fire.	
Early 1940s	U.S. Army	Mukilteo Explosives Loading Terminal established, including two piers.	Vehicle maintenance (gasoline, diesel, lubricating oils); coal-fired power plant
1951	U.S. Air Force	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.	Aviation gasoline, jet propellant
Mid-1960s	U.S. Air Force	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).	
1973	Defense Logistics Agency (DLA)	Operation transferred; facility eventually titled as a Defense Fuel Support Point (DFSP) Mukilteo. By the late 1970's, the pier no longer used for loading fuel.	
1979	DLA	Fuel-contaminated soil discovered within bulk fuel storage tank containment structures.	
1982	DLA	First fuel oil recovery well installed north of and between Tanks 2 and 3.	
1982	DLA	Soil and groundwater in northeast portion of property found to be contaminated.	Chloroform; lead; methylene chloride; tetrahydrofuran; total petroleum hydrocarbon (TPHs), including benzene, toluene, ethylbenzene, jet propellant
1983-1984	DLA	Floating petroleum product observed on groundwater north of Tank 10 and in another recovery well.	
1986-1987	DLA	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.	
1986-1987	DLA	U.S. Navy divers recovered World War II-era ammunition shells from sediments beneath the Tank Farm Pier.	
1989	DLA	Fuel storage and transfer operations ceased on the property.	
1990	DLA	Washington State Attorney General and DLA enter into a Remedial Action Order requiring DLA to complete a Remedial Investigation/Feasibility Study (RI/FS) for clean-up of the Mukilteo Tank Farm.	

Table 4.8-3. Mukilteo Tank Farm Hazardous Materials Summary

Year	Property Owner/ Operator	Event/Activity	Documented Releases or Past Uses of Hazardous Materials
1991	DLA	At least 6 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.	TPHs, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), PCBs, and heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc) detected in soils during tank removal
1991-1994	DLA	Preliminary site investigation and remedial investigation performed at the site.	Jet propellant and aviation gasoline product floating on groundwater; contamination of soil, groundwater, surface water, and sediments by previously documented chemicals
1993-1994		U.S. Navy underwater ordnance survey conducted in areas surrounding the Tank Farm Pier and the trestle pier; no ordnance were found.	
1994	Defense Fuel Supply Center (DFSC)	Ecology issues Enforcement Order to DFSC to address the documented releases of hazardous substances. The order replaced the previous remedial action order from 1990.	
1995-1997	DFSC	Ecology approved site-specific cleanup standards using Washington State Model Toxics Control Act (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.	
1997-2002	DFSC (in 1998, renamed Defense Energy Support Center [DESC])	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.	
2006	DESC	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.	
2006-2007	DESC	WSDOT's archaeological trenching and borings found contaminants 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).	Gasoline and oil-range hydrocarbons, TPH-G, BTEX, and cPAHs
2010	U.S. Air Force	Development of an Environmental Baseline Survey assessing conditions on the site and updating information on current status of underground and above ground storage tanks and other buildings.	

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, 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 identified. 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 Defense Energy Supply Center (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 (Ecology 2006). No environmental covenant or deed restriction has since been entered against the property, and the property was given a "Removal from Hazardous Sites List Completed" site cleanup status in Ecology's 2008 Sediment Cleanup Status Report.

Although the U.S. Air Force has satisfied the terms of Ecology's order, and Ecology determined no further action was needed, WSDOT archaeological field work for the Mukilteo project encountered areas with soil contamination on the Mukilteo Tank Farm in 2006 and 2007. In most cases, soil contaminant concentrations did not exceed Ecology's approved site-specific soil cleanup standard, but some locations had higher concentrations. Several other locations indicated hydrocarbons at higher levels than applicable current standards. Archaeological borings elsewhere on the site revealed

localized residual contamination at lower levels. The areas with residual contamination were in the west and central portions of the site, as shown in Figure 4.8-3. The *Hazardous Materials Discipline Report* provides more information.

Sediment beneath the Tank Farm Pier could have contamination from contact with the pier's estimated 3,000 creosote-treated piles. Sediments under or near 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.

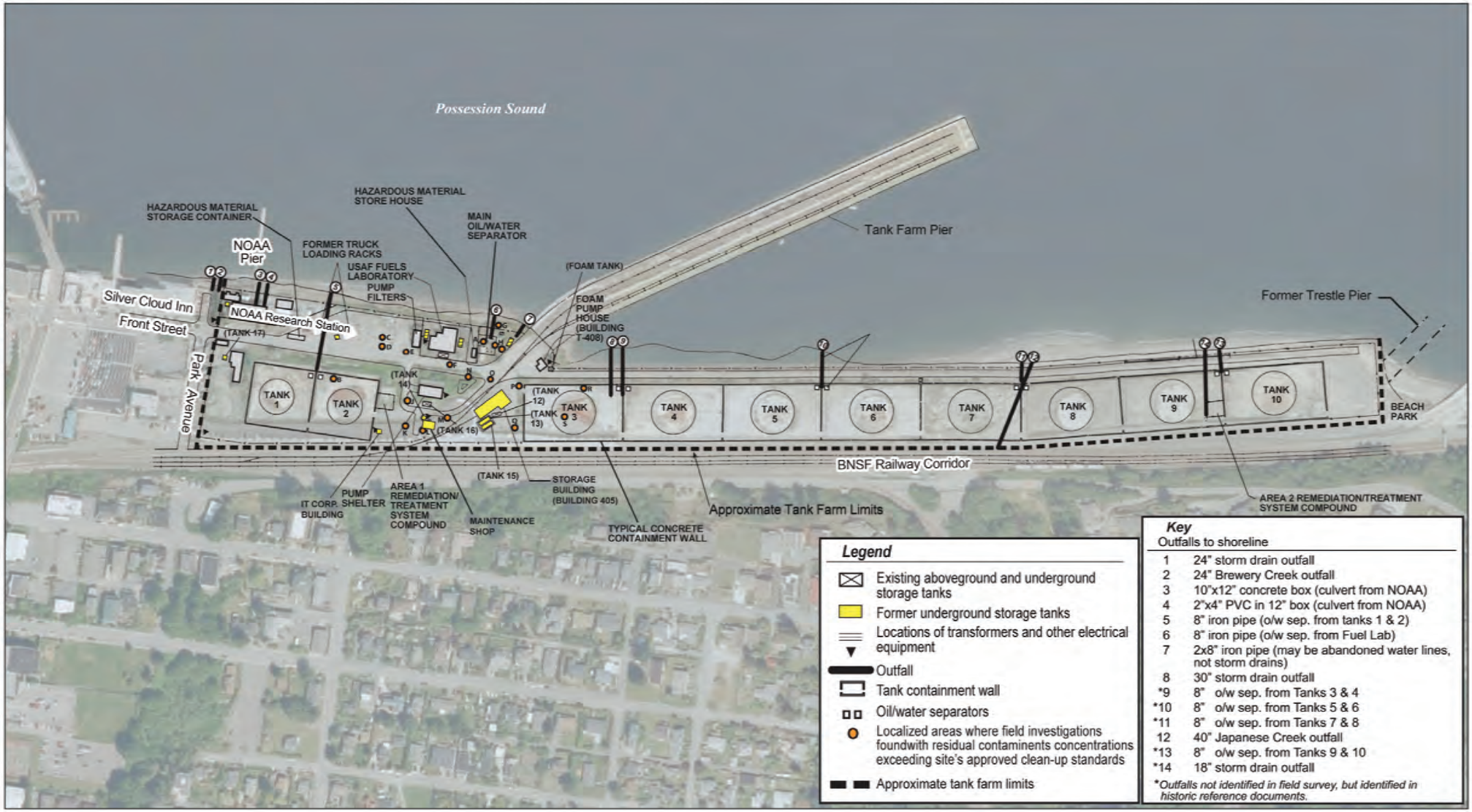
4.8.3 Long-Term Environmental Impacts

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 materials leaks and spills by the traveling public, leaks due to the operation and maintenance of the terminal, dispersal of contaminated sediment, or 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 during other terminal operation and maintenance activities. However, as described in more detail in *Section 4.11 Water Resources*, the Build alternatives would develop stormwater facilities to meet current standards, which would reduce the effects of potential spills and their transport to receiving waters.

For the Elliot Point 1 and Elliot Point 2 alternatives, any sediments beneath the Mukilteo Tank Farm Pier that were contaminated with creosote and petroleum hydrocarbons would be vulnerable to dispersal by wave action and ferry propeller scour after removal of the pier. These alternatives also 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 changes to 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 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.



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Feet

Sources: Herrera Environmental Consultants, Inc. for Jacobs Civil Inc. and Washington State Ferries. December 2003. Hazardous Materials Site Assessment, Former Defense Fuel Support Point Mukilteo Property, Mukilteo, Washington. Figure 3.

Figure 4.8-3. **Tank Farm Property Features**

Mukilteo Multimodal Project

The most environmental benefits would be expected from the Elliot Point 1 and 2 alternatives, which would address potential hazardous materials associated with the Mukilteo Tank Farm and the pier.

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. It also includes 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

Construction Activities Potentially Affected by Hazardous Materials	Alternative			
	No-Build	Existing Site Improvements	Elliot Point 1	Elliot Point 2
Acquire property with potential hazardous materials releases		X	X	X
Renovate, remove, or excavate structures and equipment that could contain asbestos, lead-based paint, PCBs, and mercury	X	X	X	X
Remove storage tanks and associated contaminated soil		X	X	X
Decommission underground oil/water separators, bulk fuel distribution facilities, remediation wells, and all associated piping			X	X
Remove creosote-treated timber and piles from structures being renovated or removed	X	X	X	X
Disturb, dredge, or excavate sediment and soil that has been in contact with creosote-treated timber or piles	X	X	X	X
Grade or excavate potentially contaminated soil		X	X	X
Dewater excavations or pits in the vicinity of potentially contaminated groundwater		X	X	X
Construct stormwater facilities in areas with potential contamination		X	X	X

No-Build Alternative

No property would be acquired for the No-Build Alternative, but 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.

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's fishing pier.

This alternative would require acquisition of all or part of six additional sites located in the central waterfront area of Mukilteo, which would increase the extent of properties requiring demolition, including structures or equipment that could contain asbestos, lead-based paint, PCBs, or mercury. The alternative includes the construction of a transit center above 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 increased spread of contaminated soil or groundwater.

Elliot Point 1 Alternative

For this alternative, WSDOT would acquire a property interest in three known sites with previous contamination. Construction would remove structures, equipment, and other existing features on the Mukilteo Tank Farm site (including the pier), some of which could 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.

Underground oil/water separators, bulk fuel distribution facilities, remediation wells, and associated piping could still exist within the Elliot Point 1 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 400-foot-wide navigation channel, would disturb sediment and soil that have been in contact with creosote-treated timber or piles. If contamination is present in the sediments, exposure to currents and wave action could spread contamination over a larger area.

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. However, the project could encounter hazardous materials when excavating (for utilities, stormwater systems, structural foundations), or for grading and daylighting Japanese Creek. Other related

construction activities would include dewatering. Dewatering could cause groundwater movements, which could result in hazardous materials migration.

The potential presence of hazardous materials remaining on the site would require additional plans, procedures and permitting approvals to construct the Elliot Point 1 alternative. This would include developing 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, and the removal or containment of contamination would improve environmental conditions.

Elliot Point 2 Alternative

The potential for encountering hazardous materials during project construction would be similar for this alternative as for the Elliot Point 1 Alternative. There may be some localized differences in the potential to encounter contaminated soil or groundwater during construction. This alternative has a more compact footprint than the Elliot Point 1 Alternative, which reduces the extent of construction. It has a shorter extension of First Avenue and it does not include the daylighting of Japanese Creek. However, the alternative would involve more construction along the western boundary of the Mukilteo Tank Farm where contaminated soils and groundwater were encountered in 2006 to 2007. As with Elliot Point 1, 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.

As noted above with the other alternatives, the potential presence of hazardous materials within the construction area would require additional plans, procedures and permitting approvals. It is unlikely that the alternative's construction activities would result in further impacts on people or the environment, and the removal or containment of contamination would improve environmental conditions.

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/mitigation of any hazardous materials issues in accordance with existing regulations and future regulations, which are likely to be more stringent. This project will not result in an accumulation of hazardous materials. The Elliot Point 1 and 2 alternatives 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

Mitigation for Long-Term Impacts

To address spills or leaks that may occur during project operation, WSDOT has a spill plan that the Ferries Division uses to respond to such events. For the Elliot Point 1 and Elliot Point 2 alternatives, long-term impacts were identified due to the potential for migration or potentially contaminated sediments beneath the Mukilteo Tank Farm Pier, and for the possible migration of contamination due to infiltrating stormwater in areas with potentially contaminated soils or groundwater. While the No-Build Alternative or the Existing Site Improvements Alternative would be less likely to have sediment migration, some contaminated sediments could still be encountered or exposed during construction.

Mitigation measures for potentially contaminated sediment migration impacts could include dredging and disposal of contaminated sediments, applying the same procedures and best management practices (BMPs) described below under construction mitigation, or by providing capping, armoring, or other protection to minimize the potential for migration due to wave action, currents, or propeller scour.

If infiltrating stormwater facilities are included in the Elliot Point 1 and Elliot Point 2 alternatives, mitigation would include placing infiltration stormwater facilities only in areas where there is no known contamination if feasible. WSDOT could also clean up the soil beneath and downgradient of the facilities to prevent the spread of contamination into Possession Sound if necessary for stormwater facility operation.

WSDOT could also line soils on the grading edges for the Japanese Creek stream restoration element to ensure no water infiltrates and spreads any existing contamination.

Mitigation for Construction Impacts

The exposure of hazardous materials on the Mukilteo Tank Farm would be limited by keeping concrete pads in place and by building on the fill placed on top of the site. For all Build alternatives involving the acquisition of property, the potential for encountering unexpected contamination during construction could be reduced by using a Phase I Environmental Site Assessment and possibly a follow-up Phase II Assessment to determine appropriate plans and procedures for acquisition, construction, and hazardous materials treatment. In addition to minimizing the potential for environmental impacts due to exposure of hazardous materials, this would also assist in minimizing costs due to delays. If WSDOT leases or obtains an easement to use a property rather than acquiring that property, language regarding contamination could be included in the lease or easement agreement.

Mitigation for Impacts due to Spills

Impacts due to spills could be mitigated by preparing a Spill Prevention, Control and Countermeasures Plan (SPCC Plan) meeting the requirements of WSDOT Standard Specification 1-07.15(1) and a Temporary Erosion and Sediment Control Plan (TESC Plan) meeting the requirements of WSDOT Standard Specification 8-01.3(1)(A). 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 Structures

Before renovating, removing, or excavating any structure or piece of equipment, the structure would be surveyed in accordance with all applicable laws and regulations for the presence of asbestos, lead-based paint, and paint containing other heavy metals such as chromium, PCBs, and mercury.

- Asbestos must be surveyed by an Asbestos Hazard Emergency Response Act (AHERA)-certified building inspector. The survey would verify the presence of asbestos and provide asbestos locations and estimated quantities.
- Lead-based paint must be tested by individuals licensed by the Lead-Based Paint Program located within the Washington State Department of Community, Trade and Economic Development (CTED).
- PCBs and mercury, classified as universal waste (e.g., transformers and light fixture ballasts containing PCBs and mercury-containing equipment such as fluorescent lamps and thermostat switches) must be surveyed in accordance with WAC 173-303-573.

Contaminants can be safely removed using licensed abatement and removal contractors following applicable regulations.

Mitigation for Impacts due to Removal of Storage Tanks

Any remaining storage tanks would be emptied, cleaned, removed, managed, transported, and disposed of according to tank decommissioning and site assessment regulations. Any contaminated soil associated with the removed tanks would be tested per regulatory or permit specifications. Mitigation alternatives involving the tank farm and its former large fuel storage tanks would be addressed through a site-specific plan that would be developed in consultation with Ecology.

Mitigation for Impacts due to Removal of Petroleum Distribution Facilities

All removal, management, and disposal of residual petroleum products and petroleum-contaminated soil encountered would be done in accordance with applicable regulations. All wells would need to be abandoned by a licensed well driller in accordance with state regulations.

Mitigation for Impacts due to Removal of Creosote-Treated Timber and Piles

A Creosote-Treated Timber Removal and Disposal Plan would be prepared, addressing how piles and adhered sediments would 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 Best Management Practices for creosote timber removal. WSDOT could also consider a restriction that would prevent the reuse of the timbers.

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

WSDOT would manage and dispose of contaminated sediment in accordance with applicable permits and regulations, including permits or plans required by Ecology and DNR. If contaminated soils are present, Ecology and DNR will require an approved Sediment Evacuation, Sampling, and Disposal Plan and a Dredged Material Management Plan to ensure contaminated sediments are handled and disposed of properly.

Mitigation for Impacts due to Grading or Excavating Contaminated Soil

A site-specific Soil Excavation, Sampling, and Disposal Plan would be prepared.

The plan would:

- Require appropriately trained hazardous waste operations and response personnel near project work.
- Include a site-specific health and safety component regarding contaminated material exposure and personal protective equipment
- Include 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 careful scraping up of, and if necessary excavating, the granular asphalt bedding material beneath the bottom pad of each welded steel tank bottom that is removed for project construction

- Require sampling of all excavated soil that shows evidence of being contaminated
- Require sampling of all excavated soil that is to be disposed of off site
- Require disposal according to regulatory or permit specifications
- Describe how documentation and notification requirements shall be satisfied

Mitigation for Impacts due to Removal of Contaminated Groundwater

A Groundwater Management Plan would be prepared addressing groundwater that would be dewatered from areas with potentially contaminated soils during project construction. The plan would outline how apparently clean, potentially contaminated, and contaminated groundwater shall be field screened and segregated, collected, stored, sampled and analyzed, managed, reported, and treated or transported and disposed of—all in accordance with state and local laws and regulations. It is not expected that any dewatered groundwater would be classified as dangerous waste.

Mitigation for Impacts due to Construction of Stormwater Facilities in Contaminated Areas

If the use of infiltrating stormwater facilities on sites where contaminated materials may remain cannot be avoided, and such facilities cannot be placed in areas where no contamination has been observed or measured, the following techniques could be used:

- Facilities would be placed over and upgradient of areas with contamination below site-specific cleanup standards
- Soil beneath and downgradient of the facilities would be cleaned to prevent the spread of contamination into Possession Sound
- Non-infiltrating stormwater facilities on site 13 would be lined to ensure no water infiltrates and spreads any existing contamination beneath and downgradient of the facilities

Mitigation for Indirect or Cumulative Impacts

No adverse, indirect, or cumulative impacts were identified; therefore, no 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). The 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 EIS includes an assessment of the project's potential to increase greenhouse gas emissions and contribute to climate change, following WSDOT 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 (CO_2), methane (CH_4), and nitrous oxide (N_2O). Any process that burns fossil fuel releases CO_2 into the air. CO_2 makes up the bulk 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 CO_2 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 Washington 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. Greenhouse Gas Emissions by Sector in Washington State (2008) and the U.S. (2005)

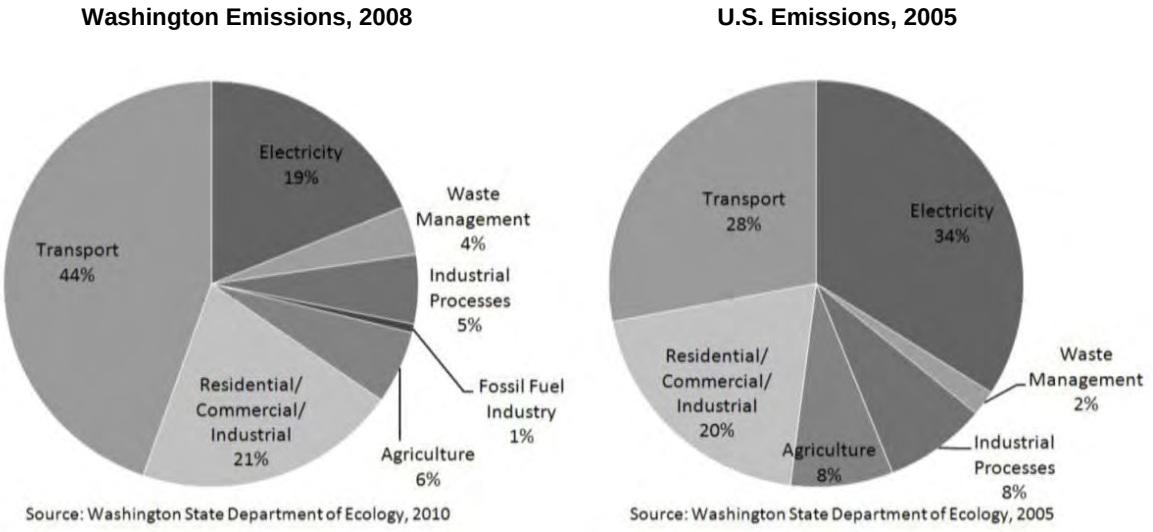
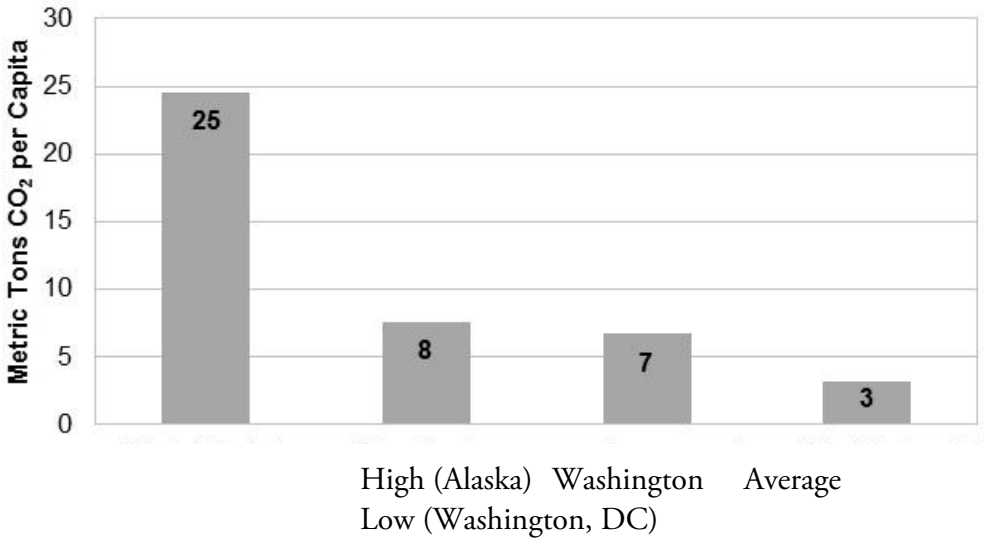


Figure 4.9-2. Per Capita Transportation Greenhouse Gas Emissions by State (2005)



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, the Climate Advisory Team was formed by 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 vehicle miles traveled (VMT) reduction goals as part of the state's greenhouse gas emission reduction strategy.

WSDOT is working with regional jurisdictions to develop transportation plans that reduce greenhouse gas emissions. In addition, WSDOT is among the six agencies leading the development of the state's integrated climate change response strategy.

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 make up the study area for the energy and greenhouse gas emissions evaluation.

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 quite modest compared to the total emissions emitted by the ferry users at the Mukilteo ferry terminal.

Consistent with the requirements of RCW 39.94.020, 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.

Table 4.9-1. Operational Impacts Comparison

	No-Build	Existing Site Improvements	Elliot Point 1	Elliot Point 2
Local traffic volumes	The project does not affect ferry holding area vehicle capacity or vessel capacity; therefore, no change in traffic volumes is expected between project alternatives.			
Ferry queue (outside ferry terminal)	Similar to existing conditions, for the No-Build and Existing Site Improvements alternatives, a ferry queue would continue to form on the shoulder of SR 525 – no change in emissions or energy use.		The ferry queue would be less likely to extend onto SR 525, helping reduce conflicts and reducing energy use and greenhouse gas emissions.	Energy and greenhouse gas emissions would be similar to those today.

Table 4.9-1. Operational Impacts Comparison

	No-Build	Existing Site Improvements	Elliot Point 1	Elliot Point 2
Toll booths	Similar to existing conditions, the No-Build Alternative would include three toll booths – no change in emissions or energy use.	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.		
Front Street conflicts	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.		Both Elliot Point alternatives would remove the conflict with traffic on Front Street. 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.	
Terminal bus loading areas	Similar to existing conditions, the No-Build Alternative would provide two bus bays. During layovers, buses would move to a nearby parking lot, just south of the bus loading area. Current conditions would continue – no change in emissions or energy use.	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.		
Passenger loading	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.	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.		
Terminal buildings	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.			

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. This off-site energy use is called "embodied energy." Construction emissions come primarily from the combustion of fuel used to construct the facility.

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.

The greenhouse gas emissions analysis assumed all construction energy will be provided by diesel and used the diesel CO_2 emission factors provided by The Climate Registry's General Reporting Protocol. Nitrous oxide and methane emissions were estimated to be 5 percent of the CO_2 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 CO_2 emissions per gallon, and methane at about 5 percent (EPA 430-R-07-002).

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. 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.

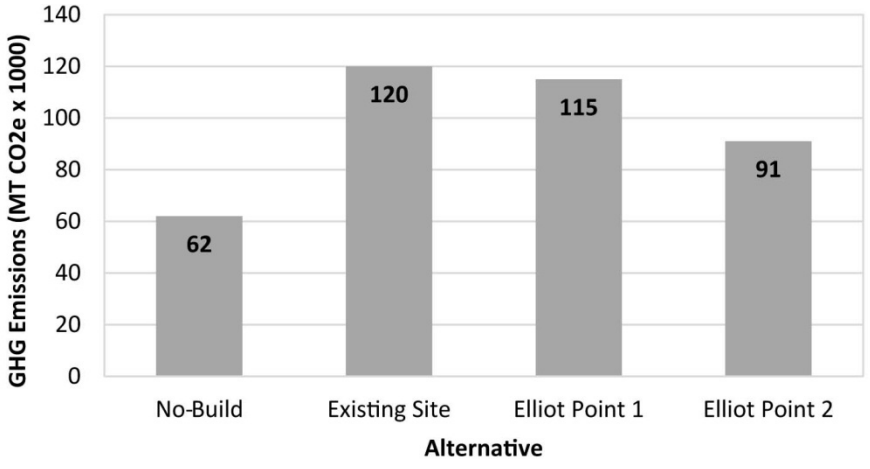
Table 4.9-2. Construction Impacts Comparison

	No-Build	Existing Site Improvements	Elliot Point 1	Elliot Point 2
Project cost ($M)	68	130	126	100
Energy (MBtu)	807,000	1,564,000	1,516,000	1,203,000
Greenhouse Gas Emissions (MT CO_2e)	62,000	120,000	115,000	91,000

Note:

Total project costs are presented in millions of dollars, energy in million Btus, and greenhouse gases in metric tons of carbon dioxide equivalents.

Figure 4.9-3. Construction Greenhouse Gas Emissions



4.9.5 Indirect and Secondary Impacts

Energy

Indirect impacts related to energy consumption would occur if construction or operation of the project caused measurable impacts on other sectors of the economy,

such as utilities, or impacted 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 to 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 emissions patterns from any of the project alternatives.

4.9.6 Cumulative Impacts

The regional-scale analysis methods used for energy use and greenhouse gas emissions is largely cumulative impact assessment, since 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 projects in the area include:

- Mukilteo Tank Farm Transfer from the U.S. Air Force to the Port ownership
- Port of Everett's Tank Farm Master Plan
- NOAA Fisheries Service Mukilteo Research Station expansion
- Port of Everett 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 small 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.

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, bike, 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.

The biggest reduction in transportation energy use and greenhouse gas emissions would come from vehicle and fuel improvements. Current corporate average fleet efficiency (CAFE) standards require the average efficiency of new cars and light trucks sold in 2016 to be 34.1 miles per gallon. 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 setting the first ever medium- and heavy-duty vehicle efficiency standards (NHTSA 2010b), 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

Measures taken to address 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 should 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 is working with other state agencies to develop the state's integrated climate response strategy. The strategy was in development through 2011 and will be delivered to the state legislature in December 2011. Strategic recommendations for state-funded capital projects will consider future climate conditions to improve resilience. As part of this work, Washington State agencies are looking at the complex interplay between climate variables and communities.

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 the PSRC, WSDOT developed maps showing a 2- and 4-foot rise in the project area, and evaluated the potential for projected design measures to withstand the projected 2- to 4-foot sea-level rise and increased storm intensity. Compared to the No-Build and Existing Site Improvements alternatives, the Elliot Point 1 and 2 alternatives 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 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 to 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 to the environment, which includes geologic conditions, hazards, and resources. The Washington State Growth Management Act 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 has been shaped by the movement of glaciers approximately 13,500 years ago, which 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 has 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 sediments 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/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 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.

Figure 4.10-1. **Landslide Susceptibility and Steep Slopes**

The potential for landslide 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, indicating the bluffs are susceptible to landslides, and additional hazard areas may be present along the bluff that are not mapped.

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 in the past 5 years. However, not all of the areas of unsuitable fill material have been completely delineated so exact locations are not fully known. More information on the extent of these areas will be developed in later design stages of the project.

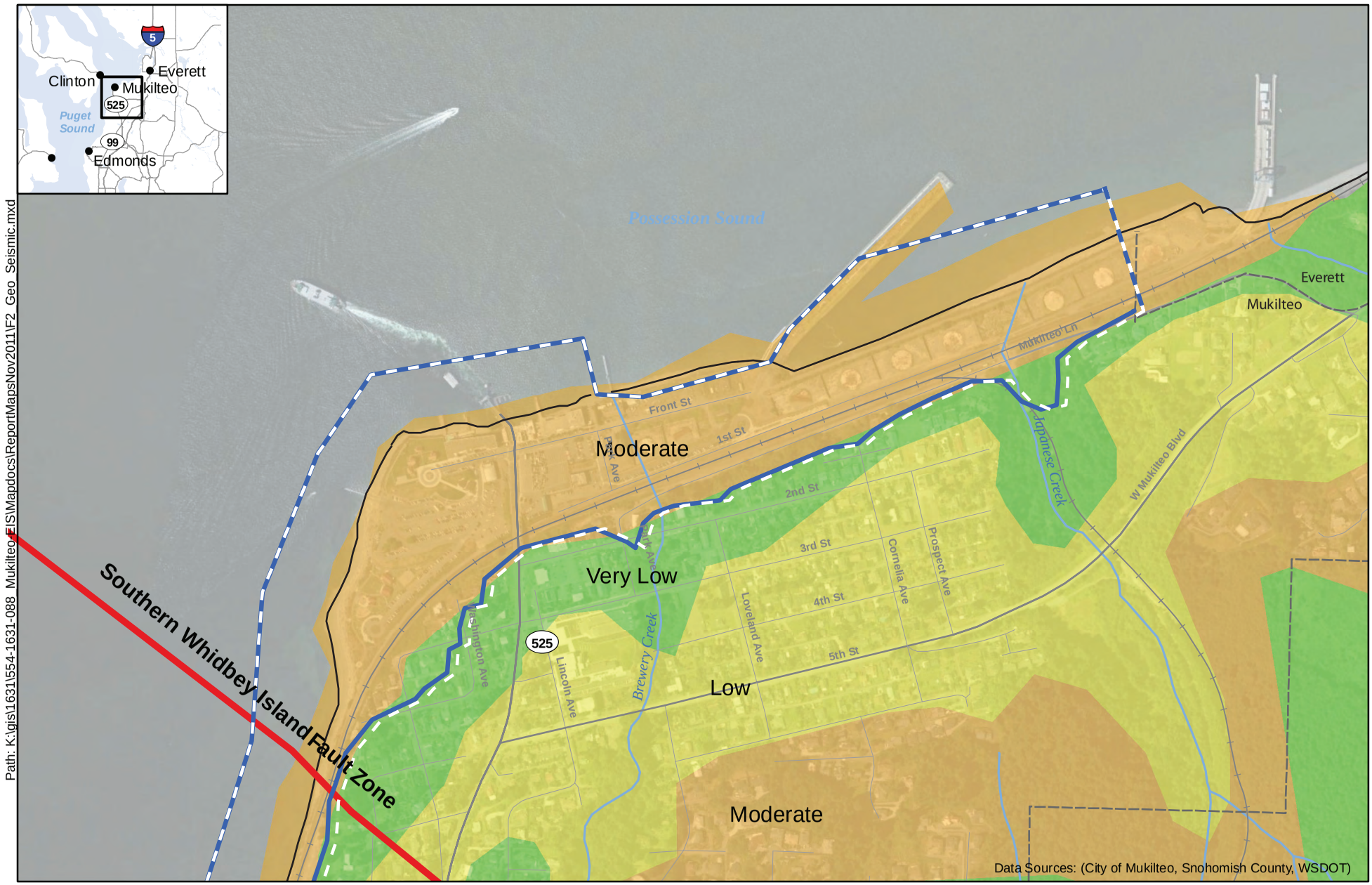
Earthquakes

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).

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.



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Legend

- Streams
- City Boundary
- Shoreline

Liquefaction Susceptibility

- Moderate
- Low
- Very low

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

Figure 4.10-2. **Seismic Hazards**

Liquefaction and Settlement

Liquefaction from an earthquake can result in damage or collapse of 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 (0.5 meter 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 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. Existing structures do not meet current seismic code or reflect new developments in earthquake and tsunami science, or advances in material science and construction techniques. 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 existing structures have aged and may not meet updated seismic codes. 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 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 landslides on land 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 lateral capacity of the sediments leading to damage or collapse of 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 anticipated to the existing upland structures would reduce the potential damage to site buildings resulting from strong ground motion, liquefaction, or settlement. The construction of a new dock terminal and upland buildings would be completed under current seismic design criteria and site-specific geotechnical information received. These buildings would be less susceptible to damage from ground motion than unaltered older structures.

The potential for liquefaction impacts for the Existing Site Improvements Alternative would be similar to 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 in the vicinity of the Existing Site Improvements Alternative project area. Potential impacts to off-shore 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 throughout a larger area, which would help reduce risks.

Elliot Point 1 Alternative

Offshore structures would be constructed similar to the No-Build and Existing Site Improvements alternatives; however, this alternative would relocate the ferry terminal from its current location to the eastern portion of the Mukilteo Tank Farm. It would require a longer pier and trestle leading to the transfer span and towers, and a new passenger building, new toll booths, a terminal supervisor's building, and a maintenance building. The Tank Farm Pier would be removed up to its existing bulkhead. Dredging of sediment would occur under the pier. Japanese Creek would be restored to an open stream. The offshore and onshore elements of the existing ferry terminal would be removed.

Ground Motion, Liquefaction, and Settlement

The Elliot Point 1 Alternative would be subject to similar moderate to high seismic risks as the No-Build or Existing Site Improvement alternatives. However, stable soils have been identified occurring at shallower depths than at the existing site. The alternative would be largely developed on a currently vacant site, which allows greater flexibility for the project to apply soil strengthening and stabilization measures and foundation supports for structures. Environmental or archaeological considerations may restrict the use of grouting and other techniques, but its major structures are outside of archaeological sites. Design and construction measures would address locations that contain unsuitable fill material, or weak, compressible, and organic soil, helping to minimize the risks from seismic effects.

Tsunamis

Based on bathymetry, the Elliot Point 1 Alternative would likely withstand tsunami-related damage to a greater degree than the No-Build Alternative or Existing Site Improvements Alternative due to the slight reduction of wave energy resulting from higher elevations farther offshore. As with the Existing Site Improvements Alternative, advances in engineering design developed from observations and analysis of damages resulting from recent tsunamis may be applied to the design of the Elliot Point 1 Alternative, which could reduce impacts.

Landslides

On land, landslide susceptibility for the Elliot Point 1 Alternative is greater than the No-Build and Existing Site Improvements alternatives. As presented in

Figure 4.10-1, a high landslide susceptibility has been established by the City of Mukilteo approximately 350 feet from the closest design footprint. Steep slopes are also identified within 300 feet of the southern extent of the design footprint. Impacts resulting from slope failure are expected to be low because slope failures are likely to be small and shallow landslides. Landslides could reach the area of the alternative; however, the majority of damage would be isolated to parking areas and roadways.

A large submarine landslide could also impact the Elliot Point 1 Alternative although the area of the previous landslide is more removed. If this alternative is selected and the project progresses into further design stages, further investigation of geotechnical conditions would be conducted and appropriate design measures to stabilize soils would be provided. The alternative already includes soil strengthening measures, including stone columns and deeper foundation supports for the offshore structures that would be load bearing, such as the trestle.

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.

Elliot Point 2 Alternative

This alternative would be similar to the Elliot Point 1 Alternative, but it does not extend as far east and does not include the daylighting of Japanese Creek. It also has a shorter trestle than the Elliot Point 1 Alternative.

Ground Motion, Liquefaction Settlement, Tsunami, and Landslides

The anticipated seismic effects for the Elliot Point 2 Alternative would be similar to those for the Elliot Point 1 Alternative.

4.10.4 Construction Impacts

Construction impacts are potential short-term impacts during project construction to geologic and hydrologic resources, and impacts from erosion hazards during project construction.

No-Build Alternative

Erosion

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 best management practices for stormwater management during construction.

Geological Resources

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

Existing Site Improvements Alternative

Erosion

The Existing Site Improvements Alternative would not significantly increase 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.

Geological Resources

The use of geological resources for the Existing Site Improvements Alternative does not appear to pose appreciable impacts on geological resources.

Top soil, 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.

Elliot Point 1 Alternative

Erosion

Construction could increase erosion, especially in areas where soft and loose soil conditions exist. Erosion could also occur in areas where slopes direct surface water to vulnerable areas, where fill embankments are constructed near soft or loose soil, and where construction occurs.

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

Geological Resources

Compared to the No-Build Alternative, a greater volume of geological resources would be used for the Elliot Point 1 Alternative, particularly for fill, but this would not pose an appreciable impact on geological resources.

Elliot Point 2 Alternative

Erosion and Geological Resources

The erosion hazards and use of geological resources for the Elliot Point 2 Alternative would be very similar to the Elliot Point 1 Alternative.

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 impact public safety, cause structural damage, and result in economic disruption. The change in location of offshore structures may alter sediment migration and disturb current erosion and deposition areas of nearshore sediments.

No-Build Alternative

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

Existing Site Improvements Alternative

Though 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 alter sediment transport patterns considerably more than current conditions.

Elliot Point 1 Alternative

The Elliot Point 1 Alternative indirect and secondary impacts would be similar to the Existing Site Improvements Alternative.

The alteration in location of offshore terminal structures for the Elliot Point 1 Alternative and daylighting of Japanese Creek could disrupt sediment transport patterns, but these activities are expected to be minor in terms of geologic conditions and would generally remove sediments or fill that were placed in the area by past activities. The current surface profile of nearshore sediments would also be impacted by dredging of sediments beneath the Tank Farm Pier to allow for deeper ferry berth. The possible implications of changing sediment transport patterns are mostly from sediment depletion in the vicinity of offshore structures, but the design assumes foundations and other stabilization treatments that would reduce the potential geologic effects of sediment depletion or transport.

Elliot Point 2 Alternative

The Elliot Point 2 Alternative indirect impacts would be similar to those discussed for the Elliot Point 1 Alternative.

4.10.6 Cumulative Impacts

This region has been shaped by the movement of glaciers approximately 13,500 years ago, which carved deep north-south trending channels filled with glacial till and other sandy soils, sediments, and river deposits. 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.

Roads, bridges, and buildings are now constructed under updated codes, which require additional protection against earthquakes or soil erosion in sensitive zones; however, in some cases, future activities may include development and regrading in the area that could lead to soil erosion, even with erosion control practices in place.

Changes that would occur as a result of the project include reworking disturbed soil, localized minor grade changes, 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 potential measures to prevent, minimize, or offset long-term and short-term impacts from geologic hazards to structures and geologic resources. Some of these measures would be included in the project design with the issuance of a Record of Decision (ROD), and further refined during preliminary and final engineering design phases of the project.

Long-Term Impacts

The following long-term mitigation measures are common to all alternatives:

- During preliminary and final design, geotechnical engineering would further characterize existing geologic hazards such as, but not limited to: landslides (onshore and offshore), steep cut slopes, soil liquefaction and settlement for incorporation into the final engineering stage of the project. 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 and based on the recommendations of the project geotechnical engineer. Assessments will comply with WSDOT geotechnical design standards.
- In the project's preliminary and final design stages, WSDOT would define the specific soil stabilization techniques needed to minimize liquefaction of soils. Ground stabilization techniques (such as compaction grouting, jet grouting, or the placement of stone columns in the vulnerable areas) may be feasible at Elliot Point 1 and Elliot Point 2 sites, but are not feasible for the No-Build or Existing Site Improvements alternatives due to the proximity of other buildings. Environmental and archaeological considerations may also restrict the use of grouting and other techniques.
- The project would adhere to City of Mukilteo and City of Everett regulations regarding critical areas regulations to safeguard public health, safety, and welfare, and 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, tsunami, 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, and lateral spreading caused by earthquakes.
- Design engineers would incorporate new understanding of impacts from recent seismic events and/or tsunamis into the design and operation of the facility.

Construction Impacts

WSDOT would adhere to applicable local regulations regarding grading and excavation. These regulations address preserving, enhancing, or replacing understory and groundcover; minimizing degradation of water quality and sedimentation of creeks; minimizing impacts of increased runoff erosion and sedimentation; and protection of groundwater resources. Grading, excavation, and/or the removal of top soil and vegetative cover would require local permits.

4.11 Water Resources

This section discusses the potential impacts the proposed alternatives may have on marine water, land 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*.

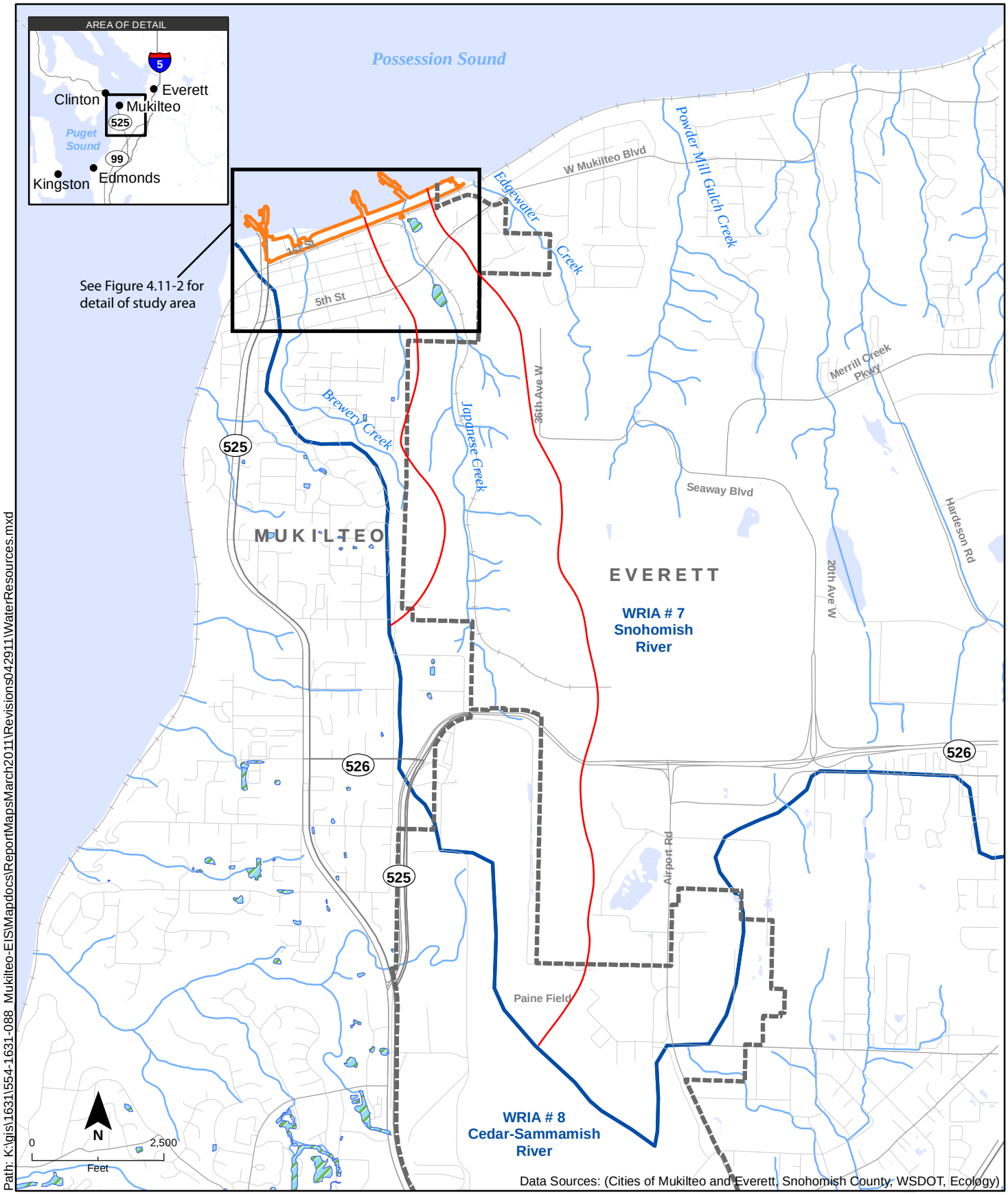
4.11.1 Regulatory Context

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. An array of federal and state regulations and permits, many of which are under the authority of the CWA, control activities ranging from discharges into U.S. waters to construction or fill within waters. For instance, surface water quality standards are implemented through the CWA Section 401 certifications and are compliant with the Water Pollution Control Act and Washington State's Water Quality Standards. Groundwater Standards protect existing and future beneficial uses of groundwater through reduction or elimination of containment discharge. WSDOT also must be in compliance with its National Pollutant Discharge Elimination System (NPDES) permit and the WSDOT Highway Runoff Manual, which is equivalent to the 2005 Ecology Stormwater Management Manual for Western Washington.

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 along the shoreline, and upland effects on water resources would be limited. Upland parts of the study area are generally the edge of the alternatives, which then extend out to Possession Sound. 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.

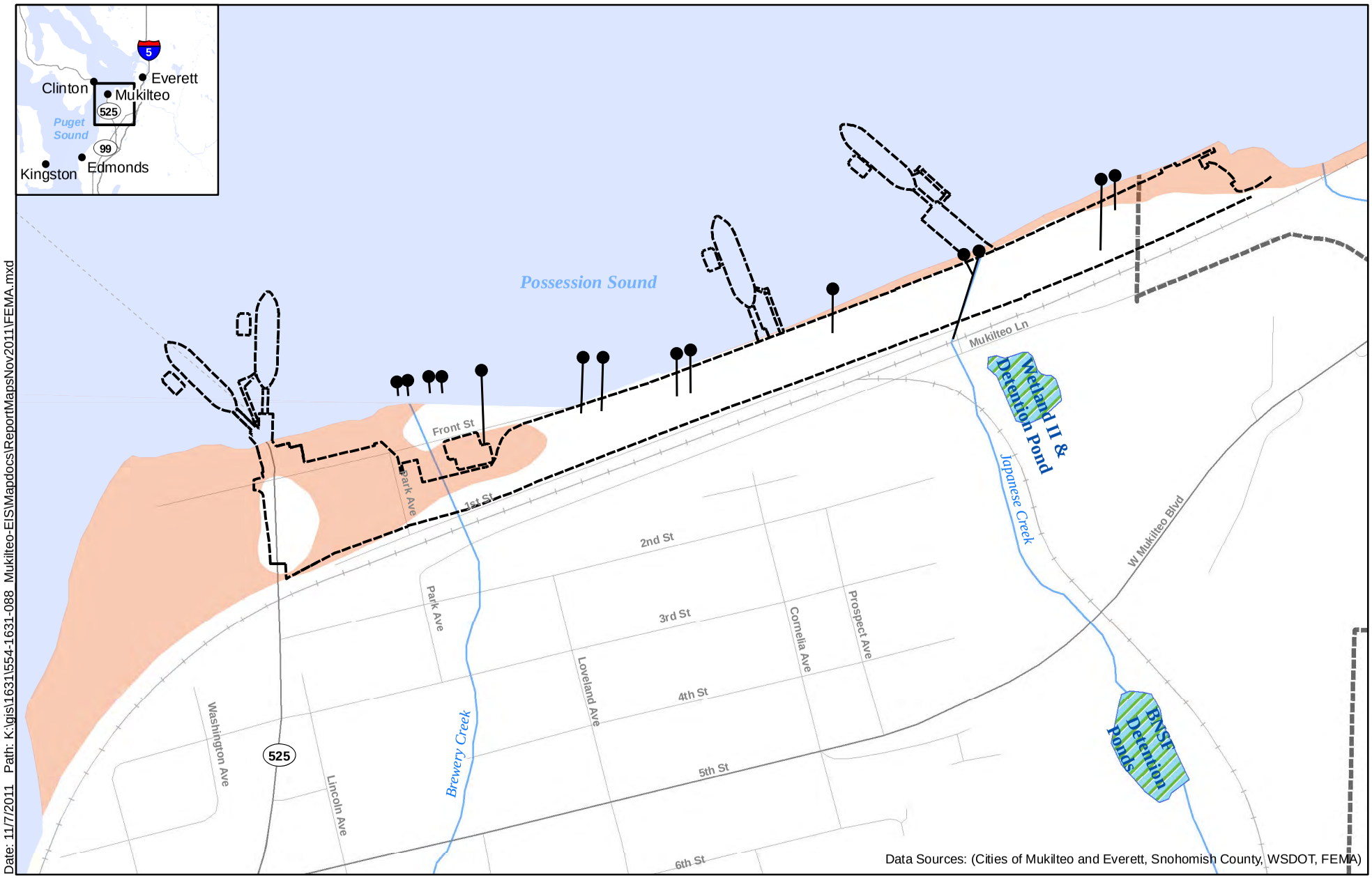
The project area lies north of the BNSF tracks along the Mukilteo waterfront. Most of the area has been graded and filled for existing development and is relatively flat. Across the project area there is less than a 10-foot change in elevation. Beyond the railroad tracks is a relatively steep hillside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



Legend

- Project Area
- City Boundary
- Wetlands
- Streams
- Waterbodies
- WRIA Boundary
- Stream Basin Boundary

Figure 4.11-1. **Water Resources in the Project Vicinity**



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Legend

- 100 Year Floodplain
- Waterbodies
- Wetlands
- Streams
- Project Area
- City Boundary
- Outfalls Study Area

N

0 500

Feet

Exhibit 4.11-2 **Water Resources in the Study Area**

Mukilteo Multimodal Project

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, providing sediment transport from the adjacent streams.

Japanese Creek originates near Paine Field Boulevard in the city of 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 Mukilteo Tank Farm 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 reaching Possession Sound. No fish have been documented in Brewery Creek.

Water Quality

Possession Sound is included on the *2008 Washington State Water Quality Assessment [303(d)]* list (Ecology 2009) 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 since 1994 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 identified 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 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 mean lower low water (MLLW) at low tide to +11.3 feet MLLW at high tide. The study site overlies the Intercity Plateau Aquifer. However, this portion of the aquifer 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- and offsite 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 2003b) 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 clean-up 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 by vehicle traffic, routine business uses, and the ferry terminal operations within the study area. Pollutants also come from former Mukilteo Tank Farm operations, atmospheric deposition, and wildlife fecal matter. Multiple stormwater outfalls within the study area discharge into Possession Sound, shown on Figure 4.11-2.

Flooding

A portion of the study area is mapped by the Federal Emergency Management Agency (FEMA) within a 100-year floodplain (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, flooding near the Brewery Creek outfall is expected independent of tidal conditions during storm events with a recurrence interval of more than 25 years. This would occur because of the limited capacity of the stream culvert pipe. If a high tide coincides with this type of flooding situation, flooding could spread out 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 and the larger areas with vegetation are to the east of the site.

4.11.3 Long-Term Environmental Impacts

All alternatives may impact water resources in several ways: 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 from stormwater would generally be similar under all alternatives.

Stormwater

Increases in land cover could generate higher volumes of runoff, and paved areas used by vehicles can carry pollutants. Runoff would discharge directly to Possession Sound, which is a major receiving waterbody that would be unaffected by any change in flow volumes or rates. However, the existing conveyance system capacity could be affected by increased flows. Adequate sewer facilities and restrooms are proposed, which would reduce the potential for onsite contamination from possible leaks of aging pipes. Also, landscaping and exterior cleaning practices would include measures to protect water resources.

The No-Build Alternative would retain the same footprint as the existing condition, with most change affecting structures or in-water elements. The No-Build Alternative would contribute the largest amount of stormwater-related pollutants to Possession Sound due to minimal stormwater retrofit requirements.

The Existing Site Improvements Alternative would have a similar amount of impervious surface as the No-Build Alternative, but would include current stormwater treatment facilities.

The Elliot Point 1 Alternative would result in many of the same impacts as the No-Build Alternative. However, increased impervious surface would require larger stormwater treatment facilities.

The Elliot Point 2 Alternative would have less impervious surface than the Elliot Point 1 Alternative, which would result in less stormwater runoff generated.

Flooding

Because no additional stormwater runoff flows are proposed to be routed to this area in the proposed alternatives, no increase in the existing occasional flooding is anticipated.

New drainage systems that are installed at or above the elevations of the existing drainage outfall elevations are not expected to be adversely affected by high tides. However, as discussed in *Section 4.11.7,* potential adaptations to sea level rise may be necessary.

Proposed outfalls would be designed to prevent occasional tidal backwater impacts from flooding the site and adjacent areas. If necessary, tide gates would be added to the design of the outfalls to provide extra storage when the gates are closed. Conveyance pipes may need to be upsized to provide for storage in combined high storm and tide 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 Elliot Point 2 Alternative is not located within the FEMA 100-year floodplain.

Marine Vegetation

Another potential impact on water quality is shading of the nearshore aquatic vegetation. This could reduce photosynthetic activity and dissolved oxygen levels in the immediate area of the ferry pier.

Over-water structures would generally be similar to 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 Elliot Point 1 Alternative has the largest pier and greatest amount of new over-water coverage, but also removes the Tank Farm Pier, resulting in a net removal of about 116,000 square feet of over-water cover. The Elliot Point 2 Alternative has a shorter pier than the Elliot Point 1 Alternative and also removes the

Tank Farm Pier, for a net removal of about 135,000 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 measureable impacts on aquatic life. 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 pier, and removal of piles supporting the Tank Farm Pier and the existing timber trestle.

Propeller-induced currents during ferry docking are not expected to disturb the sound's bottom slopes or sediments near the ferry terminal. The *Propwash and Vessel Wakes Study* completed for the proposed alternatives determined that the maximum bottom velocities for the ferries do not exceed the regulated threshold for resuspension of bottom sediments (Coast & Harbor 2011).

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 spill of other harmful materials could escape containment and collection, resulting in adverse impacts on the offshore and nearshore water resources.

The pier for the Elliot Point 2 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 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 over-water spills.

4.11.4 Construction Impacts

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

Demolition of existing features may convey contaminants into water resources, impairing water quality. Wind-blown dust from exposed surfaces and other fugitive dust from construction materials containing contaminants may be carried to adjacent water resources.

If water is encountered during excavation and construction activities, dewatering of selected areas may be required to allow those activities to proceed. Dewatering of a site 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 below ground surface. While few elements extend that deep, some excavation related to foundation and structural elements or removal of utilities could extend to these levels, however, overall excavation is expected to be limited and designed to avoid archaeological resources as much as possible. Where excavation does occur, dewatering activities may encounter contaminated groundwater and soils, and could cause groundwater to migrate.

Sediment

Construction activities could also result in soil erosion, which could lead to sediment entering stormwater runoff. If not handled in accordance with applicable construction 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 construction, 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. 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 during construction periods involving pile removal or sediment-disturbing activities would also help avoid impacts.

Construction of the fixed dolphin structures, wing walls, trestle, and pedestrian overhead loading walkway would involve driving piles or drilling shafts into the sediment. Piles would be composed of steel or concrete. The driving of solid cast concrete piles into sediments would result in temporary turbidity increases as bottom sediments are displaced. 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 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.

Construction of new drainage outfalls along the Possession Sound shoreline would likely require localized excavation of the armored shoreline. These excavation activities could also produce suspended sediments that could escape collection, thereby creating small

turbidity plumes in the nearshore area. Increased turbidity would briefly reduce penetration of light in the water column and thereby reduce productivity of aquatic plants and algae that form part of the food chain.

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 spills.

If an accidental spill of fuel, lubricant, or septic material occurs 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, which could contaminate nearby water resources with construction materials.

Existing Site Improvements Alternative

In comparison with the No-Build Alternative, the Existing Site Improvements Alternative would have additional 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 Elliot Point 1 and Elliot Point 2 alternatives where the grade is flatter.

Elliot Point 1 and 2 Alternatives

Construction impacts for the Elliot Point 1 and 2 alternatives would be similar. 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 2006). Wave action and currents could then transport the resuspended contaminants to

nearby areas of Possession Sound, potentially resulting in adverse impacts on aquatic organisms. See *Sections 4.11.2* and *4.12 Ecosystems*.

Increased stormwater infiltration into the groundwater table and adjacent open stream sections may occur, resulting from pavement removal and replacement and land changes. Impacts on water quality may result if runoff is conveyed through the potentially contaminated soils described in *Section 4.11.2*.

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

4.11.5 Indirect and Secondary Effects

Contaminated sediments or pieces of creosote-treated wood or other potential hazardous materials could be suspended during removal of the Tank Farm Pier as part of the Elliot Point 1 and 2 alternatives, and then spread over time by wave action or currents. All alternatives also involve the removal of creosote piles at the existing terminal site; this action has the potential to release fragments of the piles into the water. Contaminated sediments or debris could be transported farther out into Possession Sound by wave action, currents, and sediment drift, and could degrade the marine habitat quality in Possession Sound.

4.11.6 Cumulative Effects

Population growth and resource use has 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. But it was not until 1945 that a state office, the Pollution Control Commission, was established to control pollution. State permits for wastewater discharges were not required until 1955. Pulp mills and other industrial dischargers began treating their discharges by the early 1960s. 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 newsworthy 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 resulted in 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 to water. As redevelopment occurs, requirements are triggered and updated methods of treating and managing discharges

are implemented. The reasonably foreseeable future without the project includes several nearby projects that will help improve water quality, reduce pollution, and retrofit older stormwater systems. In addition, the region has invested in public education and pollution prevention programs that will help to keep contaminants from reaching the waters.

This project and several nearby projects would trigger requirements for water quality treatment retrofit measures. The cumulative impact would be beneficial by improving water quality, reducing pollution, and updating aging stormwater systems.

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 (WSDOT would then obtain a portion of the tank farm site from the Port of Everett to implement the selected alternatives, as warranted)
- Port of Everett Tank Farm Master Plan
- Sound Transit Mukilteo Station Expansion
- NOAA Mukilteo Research Station Expansion
- Port of Everett Mount Baker Terminal
- City of Mukilteo's Shoreline Master Plan – Restoration of Japanese Creek

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

As with the Mukilteo Multimodal Project, other projects would implement required water quality treatment to meet minimum standards, 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, decreasing 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 (LID) techniques may be identified.

Climate Change Adaptation

As 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 to withstand higher sea levels (*see Section 4.9 Energy and Climate Change* for more information). It may be necessary to design the stormwater system at a higher elevation to prevent potential flooding due to an increased sea level. The installation of flap gates to prevent saltwater from backing up into the enclosed drainage may need to be evaluated. WSDOT will consider federal, state, and local guidance regarding design considerations for rising sea levels when the project is in final design.

Mitigation for Long-Term Impacts

Potential impacts on stormwater discussed in *Section 4.11.3* would be avoided by incorporating appropriate stormwater treatment measures in the project design.

Stormwater would be treated through use of best management practices (BMPs) prior to being released to surface water. BMPs may consist of ponds, vegetated areas, biofiltration swales, filters, created wetlands, or other features designed to treat for the removal of pollutants from stormwater runoff. Also, landscaping and exterior cleaning practices would include measures to protect water resources.

It may be difficult due to the limited area to treat runoff from the over-water facilities; therefore, the project design may incorporate offsite or equivalent area (compensatory) mitigation for stormwater runoff from the transfer span areas. Any offsite stormwater treatment mitigation would be provided in an area of comparable size with similar vehicular traffic and pollutant-loading characteristics.

Drainage conveyance systems would meet current requirements for stormwater discharge into Possession Sound.

No-Build Alternative

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

Existing Site Improvements Alternative

The Existing Site Improvements Alternative would replace existing pavement with new paved surfaces. This would trigger current requirements for stormwater runoff treatment before discharge. The drainage system for the terminal and the new

pollutant-generating impervious surface would include a vault facility. Drainage from upland areas of the project site would be treated before discharge to Possession Sound.

Elliot Point 1 and 2 Alternatives

For the Elliot Point 1 Alternative, the drainage system for the new pollutant-generating impervious surfaces could utilize bioretention facilities or comparable facilities to treat runoff from areas subject to vehicular traffic. A bioretention facility, which treats through cation exchange and plant uptake through the engineered soil mix, would be expected to provide better treatment than a vault, which treats through settlement only (Ecology 2005). Drainage 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.

The Elliot Point 2 Alternative would have less impervious surface than the Elliot Point 1 Alternative, and less stormwater runoff. Stormwater facilities would be similar to those for the Elliot Point 1 Alternative.

Mitigation for Construction Impacts

Measures to reduce turbidity and wave action impact on the shoreline during pier removal work 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 the Washington State Department of Fish and Wildlife. 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.

A number of plans would be developed and implemented to minimize impacts from construction activities and incorporated into construction contracts. The project would be monitored and inspected for compliance with these plans:

- Turbidity Control Plan—Implemented 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 ordinary high water level.
- Temporary Erosion and Sediment Control Plan—Developed 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 and marked on project plan sheets. Watering may be used to control fugitive dust.

- Spill Prevention, Control, and Countermeasures Plan—Developed 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, onsite spill response materials identified, secondary containment called out, other BMPs for spills discussed, and response, training procedures, and adaptive management processes specified.
- Dewatering Plan—Implemented to prevent groundwater contamination and to ensure appropriate treatment of water removed during dewatering.
- Dredged Materials Disposal Plan—Developed to manage the disposal of dredged sediments and minimize potential environmental impacts from dredging and disposal activities. The plan requires regulatory agency approval and would identify the amount of sediment to be disposed of, transport method, and the disposal locations.

In order to protect the water quality of Possession Sound, BMPs would be selected that would:

1. Contain soils and slurry generated during pile removal and installation to minimize turbidity.
2. Contain any floating debris generated during construction activities, and dispose of collected debris onshore in an appropriate manner.
3. Contain dredged sediments on a barge. The barge storage area would consist of filter material and a curb or lip around the perimeter of the barge.
4. Ensure that oil-absorbent materials are readily available to contain and clean up any oil sheen observed. Dispose of used absorbent material in a landfill that meets applicable federal and state requirements.
5. Contain any sediments placed in the subtidal areas for habitat enhancement to avoid and minimize turbidity in the surrounding areas of Possession Sound.
6. Use a floating containment boom surrounding all in-water work areas.
7. Schedule installation of drainage outfall work during periods of low tide to avoid inundation of excavated areas and reduce turbidity.

Indirect and Secondary Effects Mitigation

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

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.

Cumulative Impacts Mitigation

Overall cumulative impacts will be positive and will contribute to improved water quality and water resource benefits for aquatic life and human activities. Therefore, no mitigation is necessary.

4.12 Ecosystems

This section identifies, describes, and evaluates the project's long-term and short-term impacts to 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 to 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 Draft 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; 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; and water quality and stormwater management regulations.
- Local: Cities of Mukilteo and Everett Critical Areas Regulations and Shoreline Master Programs.

4.12.2 Affected Environment

Existing Onsite Wetland Characteristics

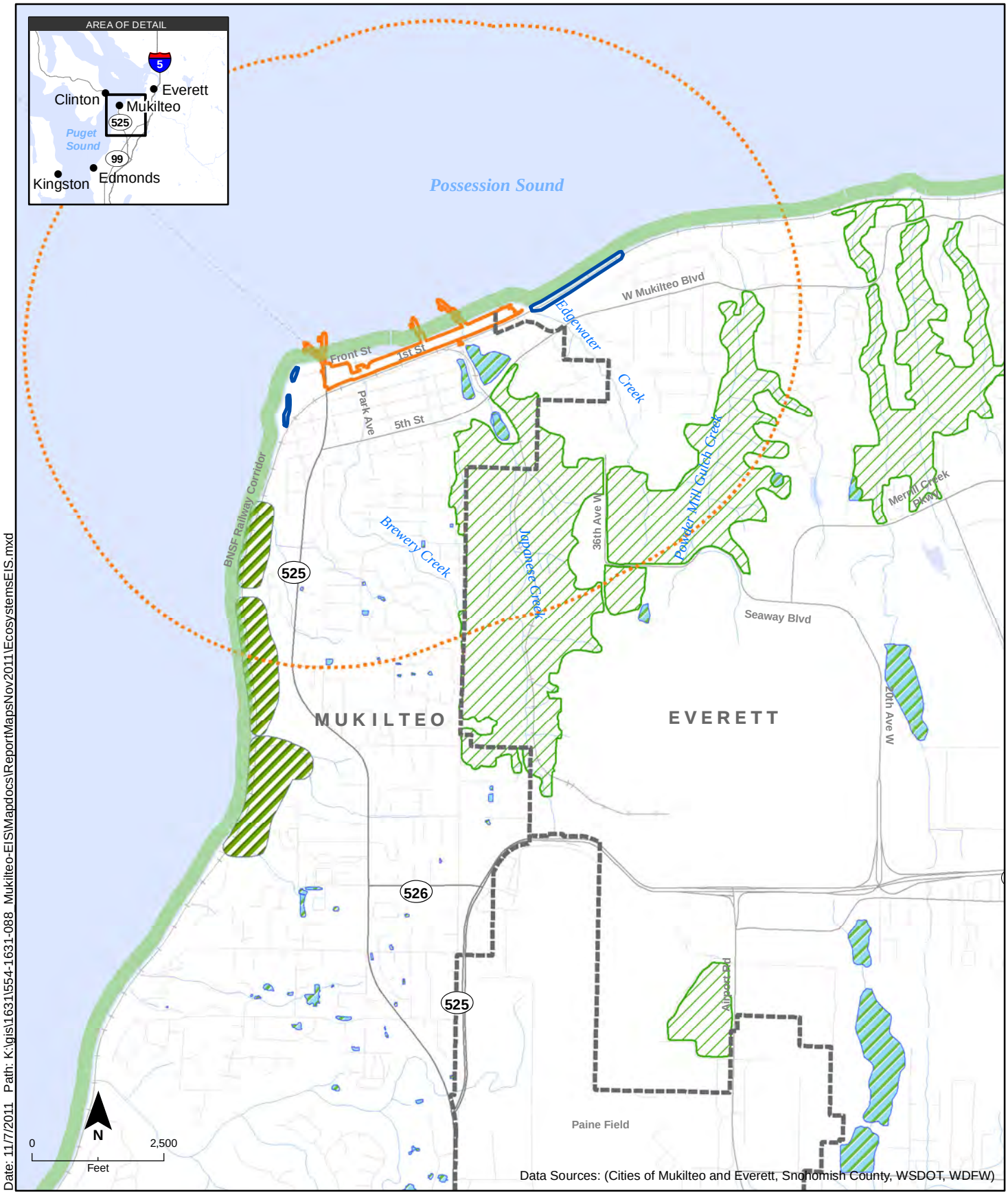
Investigations performed for this project did not identify any wetlands within the project area. Palustrine (freshwater) wetlands are present in the offsite portion of the study area within Japanese Gulch and south of Fifth Street, as characterized in Table 4.12-1.

Table 4.12-1. Study Area Wetland Habitat

Vegetation		Wildlife
Japanese Creek Vicinity	South of Fifth Street	(Throughout offsite palustrine wetland habitat)
Emergent Habitat: - reed canarygrass - creeping buttercup - rushes Scrub-Shrub Habitat: - salmonberry - Himalayan blackberry - sapling red alders Forested Habitat: - red alder - salmonberry - creeping buttercup - piggy back plant - skunk cabbage - lesser periwinkle	Forested Habitat: - red alder - salmonberry - Himalayan blackberry - reed canarygrass - piggy back plant Open Water Habitat	Observed Species: - mallard - hooded merganser - belted kingfisher - pileated woodpecker Expected Species: - raccoon - northwestern garter snake - ensatina - Pacific chorus frog - yellow warbler - common yellowthroat - goldfinch - orange-crowned warbler - violet-green swallow - tree swallow - bushtit - bufflehead - downy woodpecker

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).



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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

Figure 4.12-1. **Wildlife Habitat in the Project Vicinity**

Onsite 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

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

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 project area marine nearshore habitat are listed in Table 4.12-3.

Table 4.12-3. Study Area Marine Nearshore Habitat

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

There are two freshwater streams, Japanese Creek and Brewery Creek, in the project area. Both Japanese Creek and Brewery Creek have been designated by the Washington State Department of Ecology (Ecology) as protected for salmon and trout spawning, non-core rearing, and migration; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic 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.

Offsite Terrestrial Habitats

Wildlife species found in nearby offsite habitats may be affected by construction or operation of the project. Similar to onsite areas, the offsite areas also contain marine nearshore habitat. In addition, offsite 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 Offsite Habitats

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

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 hillsides, 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 Fifth Street, contains islands of grassland habitat. The offsite 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 the 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). Also, piles associated with the Tank Farm Pier have potentially leached some creosote-related hydrocarbons into the surrounding marine sediments of Possession Sound. Creosote is harmful to fish, shellfish, and other marine organisms, particularly those species that use the creosote piles for spawning habitat or that eat the eggs of the species that have laid spawn on the timber.

A detailed discussion of storm 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.

Previous surveys conducted in 2002 and 2005 found small patches of eelgrass west and one patch east of the Tank Farm Pier. The most recent surveys did not find eelgrass in the vicinity of the Elliot Point 1 or 2 alternatives. Eelgrass surveys were conducted in July and September of 2011 at each of the proposed Build alternative locations and around the perimeter of the Tank Farm Pier. Only one small clump of eelgrass (less than 1 square foot) was found just north of the Existing Site Improvements Alternative footprint. No eelgrass was found anywhere else in the project area.

Several invertebrate species are present in the study area. There is habitat for geoduck and hardshell clams, and 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 Biological Assessment (BA) for the project will provide a detailed discussion of species that could occur in the study area and evaluate potential impacts of the proposed project.

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 Service has designated critical habitat in Washington for Southern Resident killer whales that 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.

Boccacio: In the Puget Sound region, adult 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, though 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 distinct population segment (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 Service 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 Service 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

The State of Washington 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 will 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 Service 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 will be included in the BA.

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

Ferry and Vehicle Traffic

Because of the replacement of 124-vehicle vessels with 144-vehicle vessels, vehicle traffic would increase slightly under all alternatives. However, because the area is already heavily developed with high levels of disturbance, and species present are habituated to human use of the site, any impacts would likely be minor.

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. Elliot Point 1 and 2 alternatives would also remove the Tank Farm Pier and approximately 3,000 associated piles. Estimates for the approximate changes in over-water cover for the proposed alternatives are in Table 4.12-5.

Table 4.12-5. Over-Water Cover Estimates for Each Alternative (square feet)

Alternative	Removal of Existing Over-Water Cover	Creation of Over-Water Cover	Net Change
No-Build	10,200	13,200	3,000
Existing Site Improvements*	12,100	24,100	12,000
Elliot Point 1	149,900	33,900	-116,000
Elliot Point 2	149,900	15,200	-135,000

* Estimate does not include the replacement of the Port of Everett fishing pier and seasonal day moorage facility. Depending on the location and design, 1500 to 5000 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 Tank Farm Pier providing 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 width of the over-water structures associated with the No-Build, Existing Site Improvements, and Elliot Point 2 alternatives 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, 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 Elliot Point 1 Alternative would install approximately 100 new piles, and the Elliot Point 2 Alternative would install approximately 30 new piles. 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 various alternatives would become new habitat for a variety of species. For the Elliot Point 1 and 2 alternatives, removing the existing ferry terminal and the approximately 3,000 piles associated with the Tank Farm Pier would more than offset benthic habitat losses from new piles. Benthic communities and vertical pile communities likely would develop at those locations, replacing or exceeding those communities that would be removed.

Beneficial Impacts

Each of the proposed alternatives would remove 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. The Elliot Point 1 and 2 alternatives would also remove approximately 3,000 piles from the Tank Farm Pier.

All Build Alternatives

Impacts to Marine Nearshore Habitat

Some marine nearshore habitat would also be lost under all of 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 Impacts

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

Elliot Point 1 and 2 Alternatives

Terrestrial Habitat

The Elliot Point 1 and 2 alternatives would develop a portion of the Mukilteo Tank Farm and 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 and 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, and the developed property would also provide some wildlife habitat.

Impacts to 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 Elliot Point 1 and 2 alternatives would be located. Removal of the Tank Farm Pier, which would remove feeding habitat as well as change the seabed 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.

Beneficial Impacts

In addition to removing the creosote-treated piles and decking of the existing ferry terminal, the Elliot Point 1 and 2 alternatives would demolish the Tank Farm Pier and remove approximately 3,000 creosote-treated timber piles associated with the pier. This would eliminate a large source of creosote in the environment. Also, any sediments found to be contaminated under the pier would be remediated. Removing the pier would also eliminate the shade from approximately 138,080 square feet of over-water structures, allowing more sunlight that would potentially increase macroalgae and eelgrass growth, increase macroinvertebrate production, and improve habitat for salmonids and other fish.

Elliot Point 1 Alternative

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, temporary impacts from 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 would 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 is known to occur within the study area.

Water Quality

Construction activities such as pile removal, pile driving, and installation and placement of anchoring systems could 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.

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. Potential 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

Increases in turbidity resulting from pile removal and installation would likely be localized and temporary, and would not exceed water quality standards. Turbidity would be monitored to confirm compliance with water quality standards and guide pollution-management techniques.

Installation of the anchors would result in a one-time disturbance. However, benthic organisms are expected to rapidly recolonize the area 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 underwater 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. 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, navigation, and 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. With proper mitigation and monitoring in place, however, they are not likely to be harmed.

The Elliot Point 1 Alternative would drive three times more piles than the Elliot Point 2 Alternative and approximately five times more piles than the No-Build and Existing Site Improvements alternatives, creating an increased potential for noise to affect aquatic species.

Elliot Point 1 and 2 Alternatives

Both Elliot Point 1 and 2 alternatives would remove the Tank Farm Pier. Pier removal would likely mobilize sediments under the pier that, like other pile locations, could be contaminated by the creosote-treated wood in the pier. Pile removal would also generate turbidity, as would dredging an area underneath the pier to create a channel deep enough for the ferry.

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, 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 all 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 becomes the preferred alternative. 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

Transfer of the Mukilteo Tank Farm to the Port of Everett is not likely to contribute to higher cumulative impacts on ecosystems, compared to conditions today. The transfer is expected to be generally "as is" with no further improvements, although it could come with conditions for future development, and any further development would have to comply with various natural resource permitting requirements. This would tend to reduce impacts compared to existing conditions, with or without the Mukilteo Multimodal Project.

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

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 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 develop 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 if chosen as the preferred alternative. However, the 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 habitat shoreline at the new location depending on the conditions at the new site.

4.12.6 Mitigation Measures

Mitigation for Long-Term Impacts

Common to All Alternatives

Long-term impacts on terrestrial and marine resources would be addressed through avoidance and minimization measures and replanting vegetation. All alternatives currently incorporate mitigation measures in their definition because they would remove creosote piles and overwater coverage at the existing terminal site, which would help offset the impacts of new or replacement structures. Avoidance and minimization include reducing the project footprint to the extent possible and using materials that require the least amount of maintenance and replacement. In addition, mitigation measures could be incorporated into the project design. For example, lighting of the terminal facilities could be directed away from the water to reduce the potential for increased juvenile fish predation during the night.

Common to All Build Alternatives

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.

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 to Possession Sound.
- Using concrete 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 will also comply with any minimization measures developed during consultation with NOAA Fisheries Service and U.S. Fish and Wildlife Service in compliance with the ESA, the Magnuson-Stevens Fishery Conservation Management Act, and MMPA. The EIS process has included coordination with the Services and FTA expects to enter formal consultation for the project after the Draft EIS is complete and a locally preferred alternative is identified. The project will also meet the permit requirements of local, state, and federal agencies with jurisdiction over aquatic lands and shoreline areas; these permits typically include commonly applied mitigation measures or BMPs as well as project-specific mitigation requirements.

No-Build Alternative and Existing Site Improvements Alternative

These alternatives 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.

Elliot Point 1 and 2 Alternatives

Both Elliot Point 1 and 2 alternatives would result in an increase of over-water structure compared to the footprint of the existing ferry terminal. Removal of the Tank Farm Pier would help to mitigate that increase, resulting in a net reduction over over-water cover of 2.6 acres (Elliot Point 1 Alternative) or 3.1 acres (Elliot Point 2 Alternative). Demolition of the pier would also remove approximately 3,000 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. Sediments would be tested prior to project construction and any contaminated sediments would be remediated appropriately.

Construction Impacts

Mitigation for construction impacts would include best management practices (BMPs), conservation measures, and avoidance and minimization measures. Standard construction BMPs would be implemented in all alternatives to avoid or minimize impacts on ecosystem resources from construction activities.

Noise impacts will be minimized and mitigated through redesigning project components with adverse impacts to the extent possible, including scheduling in-water work during appropriate wildlife windows, 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, using lower level warning sounds and ramping up noise to warn wildlife of pending noise increases, and using bubble curtains or other devices to attenuate unavoidable noise generation.

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

Measures to minimize general construction impacts could include:

- Development and implementation of 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.
- Selection and use of construction equipment and techniques to minimize surface impacts, noise, and disturbance to or transport of bottom sediments. Also, both Elliot Point 1 and 2 alternatives would remediate contaminated sediments at the Tank Farm Pier prior to construction.
- Selection and implementation of BMPs to properly prevent pollutants from entering the water due to construction activities or pile removal.
- Monitoring and 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*.

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 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 the study area and the surrounding communities.

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 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.

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. The 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. The two schools in the study area are Mukilteo Elementary School and Olympic View Middle School, about 1.5 miles south of the proposed ferry terminal sites.

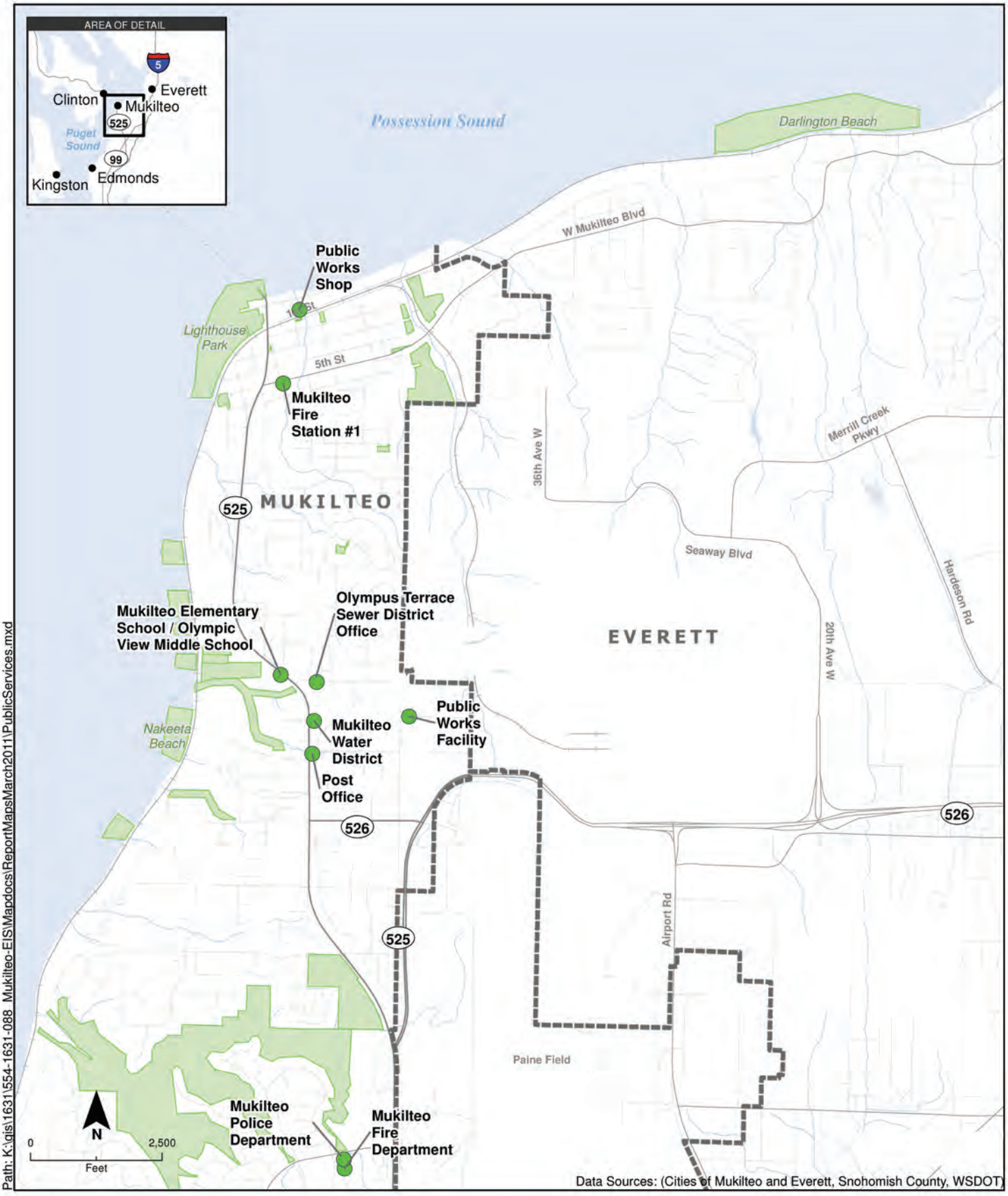

Figure 4.13-1. **Public Services**

Solid Waste and Utilities

Solid waste and refuse service is provided by the Regional Disposal Company (formerly Rabanco), which has a contract with Snohomish County. Water, sewer, electric power, natural gas, phone, 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 result in increased traffic congestion along SR 525 and in Mukilteo's downtown and waterfront area. 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.

Existing Site Improvements Alternative

The Existing Site Improvement Alternative would not generate additional demand for police, fire, emergency medical services, schools, community facilities, or solid waste services. The alternative would include some improvements to 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 and 2 Alternatives

The Elliot Point 1 and 2 alternatives are not expected to generate additional demand for police, fire, emergency medical services, schools, community facilities, or solid waste 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, especially for the Elliot Point 1 Alternative, 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 demand for services from utility providers, and the project includes the connecting infrastructure needed to convey water and wastewater to serve the new terminal and multimodal center.

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 service could occur during these activities.

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 and 2 Alternatives

Increased traffic congestion resulting from construction vehicles using local roadways has the greatest potential to affect public services. These delays are not expected to substantially affect emergency service response times or access to public service facilities. Flaggers would be used to direct construction traffic and can interrupt construction traffic to allow emergency vehicles to move through the area.

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. While not likely, minor service disruptions could occur during construction of intersection improvements proposed at SR 525 and First Street, or for the construction of connections needed for utilities serving the multimodal center.

4.13.5 Indirect and Secondary Impacts

Few indirect impacts to 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 Elliott Point 1 and 2, removing the existing ferry terminal features and operations at Front

Street could provide the opportunity for redevelopment of the waterfront area, and utility replacements or upgrades may be necessary to serve other land uses. 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 to 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 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 (March 2010) 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

WSF 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 onsite 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. Although treatment plans and mitigation measures would be applied to minimize the effects, any damage to significant resources would be considered adverse.

4.14.2 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 and constrained transit capacity. 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 Elliot Point 1 and Elliot Point 2 alternatives 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 tank farm for construction, the removal of 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. Elliot Point 1 and 2 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 Elliot Point alternatives 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 tribal and/or historical archaeological sites. Each has its own potential effects on different resources. 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, this project would only proceed in consultation with interested tribes and DAHP, and include commitments to prevent or address potential adverse effects on historic resources. The project's federal approval would also stipulate how the project would protect resources and mitigate for unavoidable impacts. This approval could also be a vehicle for developing project elements to commemorate the area's significant cultural and historic sites and increase public understanding of their importance. The Elliot Point alternatives being developed on vacant land offer more opportunity for including these other project elements.