MUKILTEO MULTIMODAL PROJECT

Draft Environmental Impact Statement

Cultural Resources Discipline Report

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Washington State Department of Transportation

U.S. Department of Transportation Federal Transit Administration

Washington State Ferries

MUKILTEO MULTIMODAL PROJECT

ENVIRONMENTAL IMPACT STATEMENT
CULTURAL RESOURCES DISCIPLINE REPORT
MUKILTEO, SNOHOMISH COUNTY, WASHINGTON

July 20, 2011

REDACTED VERSION

Northwest Archaeological Associates
SWCA ENVIRONMENTAL CONSULTANTS

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MUKILTEO, SNOHOMISH COUNTY, WASHINGTON

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Prepared for
U.S. Department of Transportation, Federal Transit Administration
and
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EXECUTIVE SUMMARY

Washington State Ferries (WSF) plans to renovate, rebuild, or relocate the existing Mukilteo Ferry Terminal in Mukilteo, Snohomish County, Washington—a project referred to as the Mukilteo Multimodal Project (MMP). Four MMP construction alternatives have been developed: the No-Build, Existing Site Improvements, Elliot Point 1, and Elliot Point 2 alternatives. The No-Build alternative proposes maintenance and replacement of existing buildings and structures as needed, the Existing Site Improvements alternative plans construction of new ferry terminal facilities at or near their present location, while the Elliot Point 1 and Elliot Point 2 alternatives propose construction of new facilities on the United States Air Force (USAF)-owned Tank Farm property east of the existing ferry terminal.

This document assesses impacts of the alternatives on cultural resources. It is prepared in compliance with the National Historic Preservation Act (NHPA) and its implementing regulations (36CFR800) with the Federal Transit Administration (FTA) as the lead federal agency. The assessment identifies five cultural resources within the MMP area of potential effects (APE), listed in, determined eligible, or recommended eligible for listing in the National Register of Historic Places (NRHP). These properties are:

- Mukilteo Shoreline Site (45SN393), stratified pre-contact shell midden deposits;
- Old Mukilteo Townsite (45SN404), archaeological remains of the early Mukilteo business district;
- Japanese Gulch Site (45SN398), archaeological deposits associated with early twentieth century Japanese mill workers;
- Point Elliott Treaty Site (45SN108), the site where the 1855 treaty between the U.S. government and Puget Sound Native American tribes was signed; and the
- Mukilteo Light Station (45SN123), a NRHP listed early twentieth century lighthouse complex.

In addition, Native American tribes have identified the project vicinity as a significant traditional cultural property. Consultation regarding traditional cultural properties within the project area is at an early stage.

Nine cultural resources within the APE are recommended not eligible for NRHP listing: the Mukilteo Explosive Loading Terminal (MELT) Barracks (MM-04), MELT Pier (MM-02), MELT Firehouse (MM-01), MELT Superintendent's Office (MM-06), Defense Fuel Supply Point (DFSP) Tank Farm (MM-03), SR 525 Overpass, Diamond Knot Ale House, Ivar's at Mukilteo, and the existing Mukilteo Ferry Terminal (31-339). One resource [redacted], the Japanese Gulch Community Site (45SN575), remains unevaluated.

The Mukilteo vicinity, with a Salish name meaning "a good place to camp," 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. Earlier, pre-contact use of the area as a base for hunting, fishing, and gathering activities is demonstrated by discovery of the Mukilteo Shoreline Site (45SN393). 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, and a store, saloon, hotel, and a post office soon followed. In 1903 the Mukilteo Lumber Company established a mill on the Mukilteo waterfront, within the project APE, 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 were 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.

The first cultural resources study completed for an earlier iteration of the MMP assessed the potential for both pre-contact and historic cultural resources within the APE and reviewed the regional and local environment, prehistory, and history (Kaehler et al. 2006). In 2006 WSDOT contracted with the Northwest Archaeological Associates, Inc./Environmental History Company (NWAA/EHC) team to conduct further archaeological and historical investigations in the project APE (Miss et al. 2008). These additional investigations had three goals: to determine eligibility of the Mukilteo Shoreline Site (45SN393) for listing in the National Register of Historic Places, to determine if additional NRHP eligible resources existed in the APE, and to assess the potential for the various project alternatives to adversely affect these historic properties. In 2007, additional subsurface exploration was conducted related to design changes then under study, as well as archival research and oral history interviews to provide Native American perspectives on the historic events of the Point Elliott Treaty signing.

The presence of deep fill, placed in the APE prior to the 1960s, required the team to test the area with four-inch diameter solid cores, mud rotary bores, and backhoe trenches to acquire information about the original landform configuration and the archaeological deposits. A total of 16 trenches and 135 boreholes were excavated across the study area during 2006-2007 studies. The three types of excavation provided stratigraphic profiles with exposures from the ground surface down to pre-occupation basal sediments as well as information about the condition and physical parameters of the archaeological sites.

Following the 2006-2007 investigations, the boundary of the Mukilteo Shoreline Site (45SN393) was enlarged to encompass newly discovered portions of the site. The shell midden, covered by one to six feet of fill, was found to vary from an inch to well over three feet in thickness. Although the midden has been disturbed in places by historic and modern construction, most trench and core profiles within the site indicate intact stratigraphy. Eight radiocarbon dates on charcoal obtained from the trench profiles suggest that the site was initially occupied about 1,000 years ago and more widespread human activity commenced around 600 years ago. The radiocarbon dates indicate human use of the site continuing into effectively historic times.

Screened backhoe spoils yielded numerous artifacts and faunal and botanical remains. These specimens provide information about the culture history and lifeways of the Native Americans who occupied Point Elliott prior to Euroamerican settlement of Mukilteo. Several technological strategies were used at the site to make stone and bone implements for a variety of functions. Other artifacts show fine workmanship applied to more exotic materials, including a projectile point made of petrified wood and a ground nephrite adze blade. Ground bone and tooth artifacts reflect sea mammal hunting, fishing, and tool- or implement-making activities. Faunal and botanical remains are evidence of diverse subsistence pursuits that occurred at the site throughout the year. Shellfish found in the midden are locally available and were collected in large numbers. Fish remains are primarily salmon, although other near-shore and deeper-water species are also represented. Bird bones reflect a focus on marine species, including ducks, loons and grebes, while mammal bones are evidence of a hunting effort balanced between terrestrial game and sea mammals. Charcoal and seeds recovered from botanical samples are primarily of locally common coniferous and hardwood tree species, grasses, and fruit-bearing plants such as blackberry and elderberry.

The 2006-2007 test excavations also explored historical remains associated with early Euroamerican settlement of Mukilteo, the later town, and the lumber mills. These tests provided information that enlarged the boundaries of previously identified archaeological site 45SN404, and expanded its characterization from the Crown Lumber Company store to a portion of early Mukilteo's commercial district. Several of the test trenches and boreholes yielded structural remains of buildings, wooden decking from the mill, and artifacts from domestic and commercial contexts including ceramics, glassware, metal and leather items, and butchered meat bones. Diagnostic artifacts within the assemblage and the context of some artifacts above and below the mill decking allowed division of the site into two components: pre- and post-mill Old Mukilteo.

The 2006-2007 assessment also included in-depth historical research regarding the Point Elliott Treaty of 1855 and treaty-related activities. The nature of the landform of Point Elliott, its ethnographic stature as an important camping and gathering place, and the historic record all suggest that a broader geographic definition of site 45SN108, which was initially created as a surrogate for the actual treaty-signing location, is warranted. The 45SN108 site boundary was consequently expanded to reflect this new information.

All three sites were recommended eligible for listing in the National Register of Historic Places. Site 45SN393 was shown to contain data useful in addressing important research questions regarding pre-contact and proto-historic Native American settlement, subsistence, and technology, and was recommended eligible under NRHP Criterion D. Site 45SN404 was also recommended eligible, under Criterion D, for its ability to answer research questions regarding the economic and social development of early Mukilteo. The Washington State Historic Preservation Office (Department of Archaeology and Historic Preservation) concurred with the NRHP eligibility recommendations for both 45SN393 and 45SN404 in January 2011. The Point Elliott treaty site, 45SN108, is also recommended NRHP eligible, under Criterion A, for its association with the treaty-era and patterns of settlement in the Pacific Northwest and with the history of Indian-white relations both regionally and nationally. The treaty site is also recommended eligible under National Register Criterion B, for its association with the first governor of Washington Territory, Isaac Ingalls Stevens, and with the prominent Native American leaders Seattle, Patkanim, Goliah, and Chowitshoot. Potential for archaeological deposits associated with the treaty suggests significance under Criterion D as well. The State Historic Preservation Office has not yet evaluated the NRHP eligibility of site 45SN108.

Studies undertaken in 2007 for non-WSF projects investigated a fourth cultural resource [redacted], the Japanese Gulch Site (45SN398). Testing and data recovery excavations at the site yielded a great variety of cultural materials, shedding light on the early twentieth-century Mukilteo Japanese community. This site, also, was shown to contain information valuable in addressing important historical research questions, and was recommended eligible for listing in the NRHP under Criterion D. The State Historic Preservation Office concurred with the eligibility recommendation for 45SN398 in January 2011. The Mukilteo Light Station (45SN123), a property already listed in the NRHP under Criteria A and C, was reassessed in 2008 during City of Mukilteo development projects and its NRHP status reaffirmed. The Japanese Gulch Community Site (45SN575), a cultural resource [redacted], was identified in 2010 during archaeological monitoring of another non-WSF project; the NRHP status of this site currently remains unevaluated.

Based on construction information available at this time, each of the project alternatives has the potential to adversely affect historic properties (see table below). All archaeological sites within the MMP are presently covered with fill of various depths, deposited during the historical/modern period. If MMP construction excavation will not penetrate through the existing fill, the project will not adversely affect these archaeological resources. If MMP excavation will penetrate through the fill over an archaeological site, additional fill can be added to prevent adversely affecting the archaeological resource. Addition of more fill and careful design can eliminate most of the adverse effects listed below. Monitoring of any excavation deep enough to intersect one of the archaeological sites and data recovery are proposed as mitigation for unavoidable adverse effects to archaeological resources.

Construction of the MMP, under any alternative, would not change the characteristics that qualify the Point Elliott Treaty Site (45SN108) or the Mukilteo Light Station (45SN123) for the National Register. The Treaty Site's location, association, and setting would remain unchanged, while the Light Station's location, association, setting, design, materials, and workmanship would remain unaltered. Project effects to traditional cultural properties and appropriate mitigation measures must be determined in consultation with the interested tribes.

Table A. Assessment of Potential Adverse Effects by Alternative.

ACTION	**POTENTIAL EFFECT**			
	No Build	**Existing Site Improvements**	**Elliot Point 1**	**Elliot Point 2**
Demolition	Redacted	Redacted	Redacted	Redacted
Construct Buildings				
Install New Utilities				
Bulkhead Construction				
Install Structural Earth Retaining Wall				
Install Storm Sewer System				
Demolish Existing Containment Pad, Dike Wall, and Tank Foundations				
Install Water Main and Sanitary Force Main				
Daylight Japanese Creek				
Install Overhead Loading System				

+ = Activity is part of the alternative but will have no effect on NRHP-eligible resources.
-- = Activity is not part of the alternative.

TABLE OF CONTENTS

LIST OF FIGURES

Cover: Oblique air photo of Mukilteo, 1946. Museum of History and Industry, *Seattle Post-Intelligencer* Collection, Image No. 1986.5.5836.2

LIST OF TABLES

1 INTRODUCTION

Washington State Ferries (WSF), a division of the Washington State Department of Transportation (WSDOT), and the Federal Transit Administration (FTA) propose to upgrade, expand, and perhaps relocate the existing Mukilteo Ferry Terminal. The Mukilteo-Clinton ferry link is part of State Route (SR) 525, a major transportation corridor between the Puget Sound mainland and Whidbey Island. The route is currently one of the busiest in the state and usage is expected to increase 73 percent over the next 20 years. The proposed Mukilteo Multimodal Project (MMP) would allow WSF to replace the aging and inadequate terminal buildings and loading structures, increase the facility's vehicle holding capacity, and improve safety and security. The project is designed to link the ferry with Sound Transit's Mukilteo Commuter Rail Station, providing multimodal transit capabilities. Preliminary environmental studies were initiated more than six years ago for a similar undertaking in the same area, but in 2007 the project was placed on hold due to funding and feasibility issues. WSF and FTA recently reinstated environmental review and planning for the MMP (Washington State Department of Transportation [WSDOT] and Federal Transit Administration [FTA] 2011). Four alternatives are currently being considered: a No-Build alternative and three Build alternatives. Under two of the Build alternatives, the Mukilteo Ferry Terminal would be moved to the Department of Defense (DOD), United States Air Force (USAF) Tank Farm property immediately east of the existing ferry terminal.

A draft cultural resources discipline report was prepared in 2006 for the proposed ferry terminal project, documenting efforts undertaken to complete the identification and evaluation component of Section 106 of the NHPA and to determine if construction or operation of the facility would adversely affect any historic property (Kaehler et al. 2006). This study identified the Mukilteo Shoreline Site (45SN393), a pre-contact period shell midden; the Mukilteo Explosive Loading Terminal (MELT) Barracks (Field Number MM-04), a residential facility in a 1942 Army installation; and the previously recorded Mukilteo Light Station (45SN123), a 1906 lighthouse complex, as historic properties, eligible or potentially eligible for listing in the NRHP. Ten additional historical buildings and structures were deemed not eligible for listing in the NRHP. (The MELT Barracks was later altered, leading to the current not eligible recommendation.)

Subsequent to this assessment, archaeological monitoring of utility line trenching on the Tank Farm, unrelated to the ferry terminal project, identified two historical archaeological sites[redacted], the Japanese Gulch Site (45SN398) and the Old Mukilteo Townsite (45SN404) (Shong 2006a, 2006b). In addition, consulting Native American tribes raised concerns regarding the historic significance of the MMP area, based on its association with signing of the 1855 Point Elliott Treaty. Additional investigations by the NWAA/EHC team in 2006 and 2007 were directed at assessing the extent and significance of archaeological sites 45SN393 and 45SN404 [redacted], as well as the historical significance of the location in relation to the 1855 Treaty. During these investigations, the boundaries of archaeological sites 45SN393 and 45SN404 were enlarged to encompass newly discovered cultural material, and site 45SN108, originally one of the Point Elliott Treaty markers, was expanded to include the entire Point Elliott landform (Miss et al. 2008; White et al. 2009).

Cultural resource investigations for the City of Mukilteo in 2007, 2008, and 2009, for Reid Middleton/Buzz Inn Landing, Inc. in 2009, and for WSF in 2010 provided additional information regarding previously identified cultural sites 45SN123 and 45SN108 and again expanded the boundaries of 45SN393 and 45SN404 (Ferland et al. 2010; Gillis 2007; Rinck 2009, 2010; Rinck and Heideman 2008).

Another archaeological site, the Japanese Gulch Community Site (45SN575), was identified [redacted] in 2010 during archaeological monitoring for construction of a City of Mukilteo fish ladder (Valentino 2011). In 2011 the Mukilteo Ferry Terminal (31-339) was formally recorded and evaluated. All of these studies and sites will be further addressed in the present report.

This document revises the 2008 Northwest Archaeological Associates, Inc./ Environmental History Company (NWAA/EHC) draft cultural resources technical report, which detailed additional investigations of 45SN393, 45SN404, and 45SN108 within the MMP (Miss et al. 2008). In addition to reporting those 2006-2007 investigations, the present document updates cultural resource conditions, adds the results of other cultural resource investigations in the area, and assesses possible adverse effects from construction of each of the current alternatives, to create a comprehensive cultural resources discipline report. The report proceeds from the introductory material, through pertinent regulatory, environmental, and historical background information, to the methods and results of the research projects, and their management implications. In this report, the spelling of Point Elliott follows the original designation given by the Wilkes Exploring Expedition of 1841 and the subsequent Point Elliott Treaty, except when referring to the Elliot Point 1 and Elliot Point 2 project alternatives.

1.1 Project Location and Description

The MMP is in Snohomish County in Section 4 of Township 28 North, Range 4 East and Sections 33 and 34 of Township 29 North, Range 4 East, Willamette Meridian (Figure 1). The project extends east from Point Elliott along the shores of Possession Sound, affording views of Whidbey Island, the southern tip of Camano Island, Gedney Island and the Tulalip Reservation. The Burlington Northern Santa Fe (BNSF) railroad borders the MMP on the south, separating the low lying industrial/commercial shorelands from the sloping residential areas to the south. Two of the Build alternatives include development in an area of the shoreline currently owned by the USAF and formerly used as a fuel Tank Farm. The fuel tanks, numbered 1 to 10 from west to east, have been removed, leaving only the concrete pads. The greater part of the project APE, including areas of proposed construction, is within the Mukilteo city limits. The City of Mukilteo-City of Everett boundary passes between the former locations of Tanks 9 and 10.

The project alternatives have been narrowed to the No-Build alternative, the Existing Site Improvements alternative, the Elliot Point 1 alternative, and the Elliot Point 2 alternative. WSF and FTA describe these alternatives in their January 2011 *Mukilteo Multimodal Project Scoping Report* (Washington State Department of Transportation and Federal Transit Administration [WSDOT and FTA] 2011).

No-Build Alternative

The No-Build Alternative provides a baseline against which to compare the effects of the action (or Build) alternatives. The No-Build Alternative includes what would be needed to maintain the existing ferry terminal at a functional level. Under the No-Build Alternative, an improved multimodal transportation facility to meet future demand or operational needs would not be developed. Instead, the No-Build Alternative assumes that maintenance and structure replacements would occur in accordance with legislative direction to maintain and preserve ferry facilities. There would be no investments to improve the operation, safety, security, or capacity at the terminal. See Figure 2 for an illustration of the planned maintenance and preservation activities currently assumed.

Figure 1. Project APE.

Figure 2. The No Build Alternative.

As called for by the WSF Long-Range Plan, a system-wide vessel replacement will be conducted independent of the Mukilteo Multimodal Project. WSF plans to reassign the current 124-vehicle vessels operating on this route to other routes, and replace them with 144-vehicle vessels. This is assumed to occur with the No-Build Alternative or with any of the Build alternatives. The schedule for replacing the vessels for the Mukilteo-Clinton route is to replace one vessel in 2014/2015 and the other in 2027.

Marine Components

Nearly all of the ferry docking, loading, and unloading facilities would need to be replaced because they will have reached the end of their lifespan by 2040. Replacement wingwalls and fixed dolphins would be constructed. A new transfer span, including hydraulic lifting mechanisms/structures and a bridge seat foundation would be constructed. The existing timber trestle extending from the land to over the water would be replaced with a concrete trestle, and an existing bulkhead would be reconstructed. The replacements would also include removal of existing creosote timber piles supporting the structures, and installation of replacement piles.

The Port of Everett's existing fishing pier would remain at its current location near the ferry dock. During the replacement of the ferry docking facilities, when normal ferry service is unavailable, WSF may use this facility to provide passenger-only service, which would require modification of the fishing pier.

Land Components

The existing vehicle holding area would remain at the same location as it is today. The terminal supervisor's building, passenger building, and the three existing toll booths would be replaced at their current locations. Employee parking would also remain at its current location. This alternative would not allow the terminal areas to be fully secured between the entrance and the ferry, which would limit the ability of WSF to respond to heightened marine security directives from the U.S. Coast Guard.

Access by buses to the ferry terminal and by vehicles to waterfront businesses and parks and the NOAA Mukilteo Research Station would be largely unchanged. There is currently a stoplight on the trestle to allow periodic gaps in the queue of vehicles leaving the ferry in order to improve operations at the intersection of SR 525 and Front Street. Other than improved signing and striping, no further improvements are included in this alternative.

The two existing bus bays would remain at the same location near the SR 525/Front Street intersection. Access to Mukilteo Station would be unchanged. No terminal components would be located on the Mukilteo Tank Farm.

Existing Site Improvements Alternative

This alternative would reconstruct the terminal and its related facilities at the current site, which would be expanded and realigned. This would improve some local traffic, safety, and security features at the terminal facility and improve some of the multimodal transportation connections. It would provide capacity for growth in transit service at the terminal and would place buses closer to the Mukilteo Station than they are at the existing terminal. Key features of the Existing Site Improvements Alternative are shown on Figure 3.

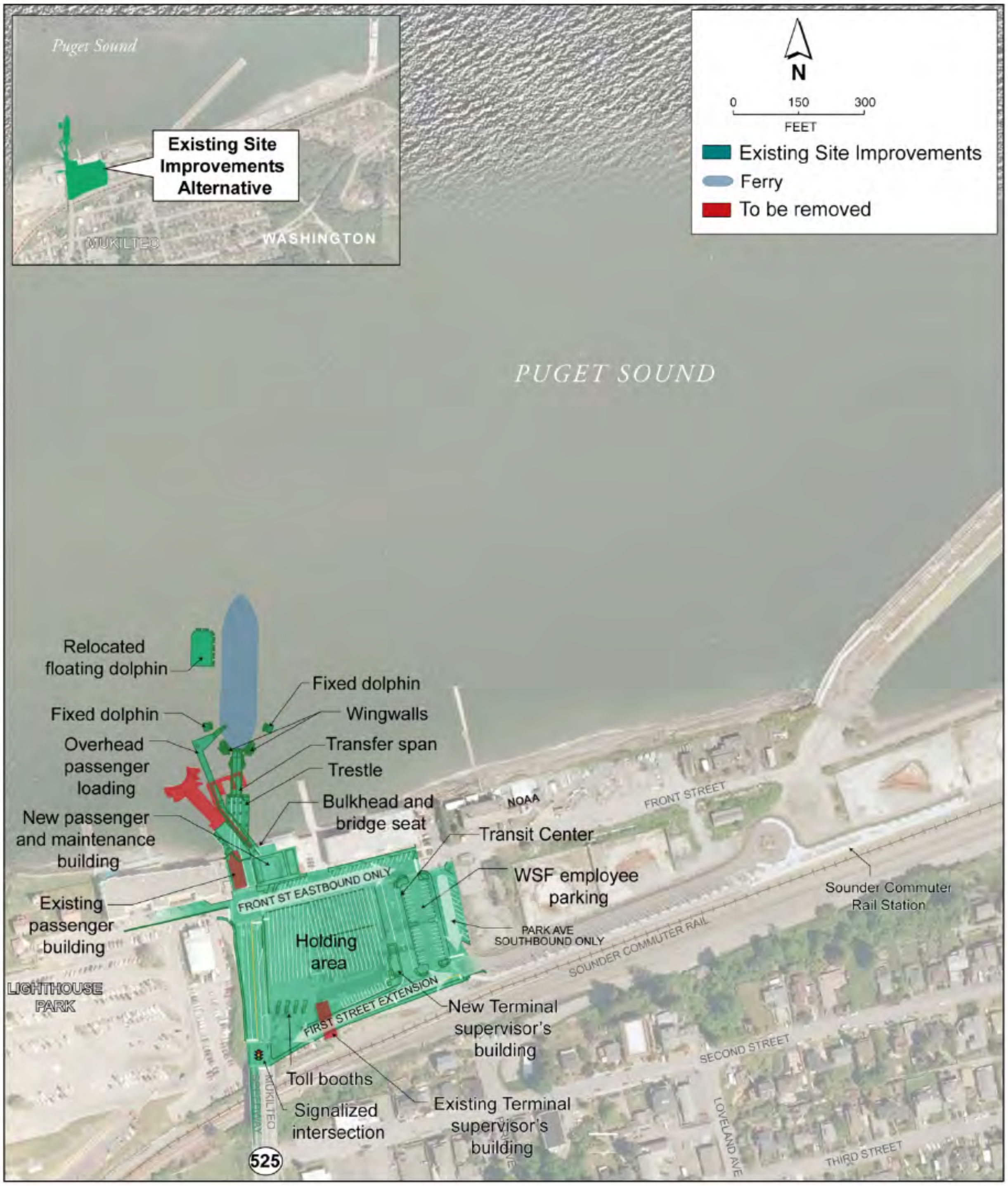

Figure 3. The Existing Site Improvements Alternative.

Marine Components

All of the existing ferry facility features would be replaced. The new facility would be constructed with an orientation nearly due north to allow for the potential development of a future second slip (in the existing footprint) and better alignment with SR 525, which would address line-of-sight issues among Front Street traffic and passengers and vehicles unloading from the ferry.

The new facility would include the construction of new wingwalls and fixed dolphins, with an estimated 36 new piles. The floating dolphin would be relocated from the current facility. Construction would include a new concrete trestle; a transfer span, including hydraulic lifting mechanism; and a bridge seat foundation requiring about 30 drilled shafts. The bulkhead beneath the trestle would be reconstructed, as would the bulkhead beneath the adjacent parcel to the east, where the new passenger building would be located.

To accommodate construction of the new marine components, the Port of Everett's existing fishing pier beside the current ferry dock would be removed. Construction of a replacement pier would not be part of the Mukilteo Multimodal Project.

Land Components

The existing vehicle holding area would remain at the same general location, and would still store the equivalent of one-and-a-half 144-vehicle vessels, or 216 vehicles. The currently leased holding area would be acquired for permanent ferry holding use.

New toll booths (for a total of four) would be constructed near the existing toll booth location. Employee parking would be relocated to a new lot in the transit center. To accommodate the space needed for the new toll booths, a small building that holds the office for the terminal supervisor would be rebuilt slightly east of its current location, and oriented north/south.

A new passenger building would be constructed east of ferry access road on property to be acquired for the project. Overhead passenger loading ramps would connect to the second story of the new passenger building.

Access and circulation to and from the ferry terminal would be revised. Front Street and Park Avenue would be converted to one-way streets. First Street would be extended westward to a new signalized intersection with SR 525, providing an outlet for vehicles circulating from the waterfront area on Front Street and Park Avenue, but also providing a more direct route for vehicles, bicycles, and pedestrians to and from Mukilteo Station to the east. There would be minor improvements to SR 525, including continuous sidewalks. A stoplight would remain on the trestle, which would continue to provide gaps in the queue of offloading ferry traffic, facilitating passenger vehicle access to the waterfront area. An area would be provided along Front Street for ferry passenger drop-off and pick-up. This alternative also includes stormwater management improvements and other utility upgrades needed to accommodate transit and roadway improvements.

This alternative would not allow the terminal areas to be fully secured between the entrance and the ferry, which would limit the ability of WSF to respond to heightened marine security directives from the U.S. Coast Guard.

Transit Facilities

A new transit center would be constructed east of the holding lanes, combined with an area that would provide parking for ferry employees. The transit center would serve scheduled bus routes as well as paratransit service, and includes six new bus bays, and passenger areas. Compared to the existing bus stops on SR 525, the new transit center would be closer to Mukilteo Station but farther from the ferry. The new transit center would be designed to meet the increased demand for transit expected in the future.

Inbound vehicles, bicycles and pedestrians to the Mukilteo Station could follow the same path as existing trips (using Front Street and Park Avenue to reach First Street), but they could also use the new First Street extension and signalized intersection at SR 525.

Elliot Point 1 Alternative

This alternative would build a new ferry terminal at the eastern portion of the Mukilteo Tank Farm. This alternative would increase areas available to queue vehicles waiting to reach the terminal, and provide adjacent bus facilities, but slightly increase the distance from the ferry to Mukilteo Station compared to today. Key features of the Elliot Point 1 alternative are shown on Figure 4.

Marine Area Components

New wingwalls and fixed dolphins would be constructed, and the floating dolphin for the existing ferry dock would be relocated to serve this site. A new transfer span, including hydraulic lifting mechanism and a bridge seat foundation, would be constructed. A new concrete trestle and bulkhead would be constructed. Because the shoreline slopes more gradually in this location, the ferry slip would need to be located about 250 feet from the top of the current bank. This would require a longer trestle leading to the transfer span and towers, and about 85 piles to support the trestle. The wingwalls and dolphins would require about 36 additional piles.

A new passenger building and a maintenance building would be located overwater upon the new concrete trestle. Ultimately, as part of a phased construction, an overhead passenger loading ramp would connect to a second story of the new passenger building.

The Tank Farm Pier, which U.S. Air Force records indicate may contain about 3,000 to 4,000 pilings, would be removed up to its existing bulkhead. In addition, a channel approximately 400 feet wide and 26 feet deep would need to be dredged under part of the area currently occupied by the pier.

The existing ferry terminal on the Mukilteo waterfront would be removed, but the fishing pier at the current terminal site would remain.

Land Components

The alternative also would include parking areas, toll booths, ferry vehicle holding areas, and shoreline promenades on each side of the new ferry dock. Pedestrians would not be allowed to cross in front of the trestle to travel between the promenades. The site would have several vegetated areas that would be used for stormwater management. Japanese Creek, which currently runs in a culvert below the Mukilteo Tank Farm, would be restored to an open stream north of the extended First Street, with a 50-

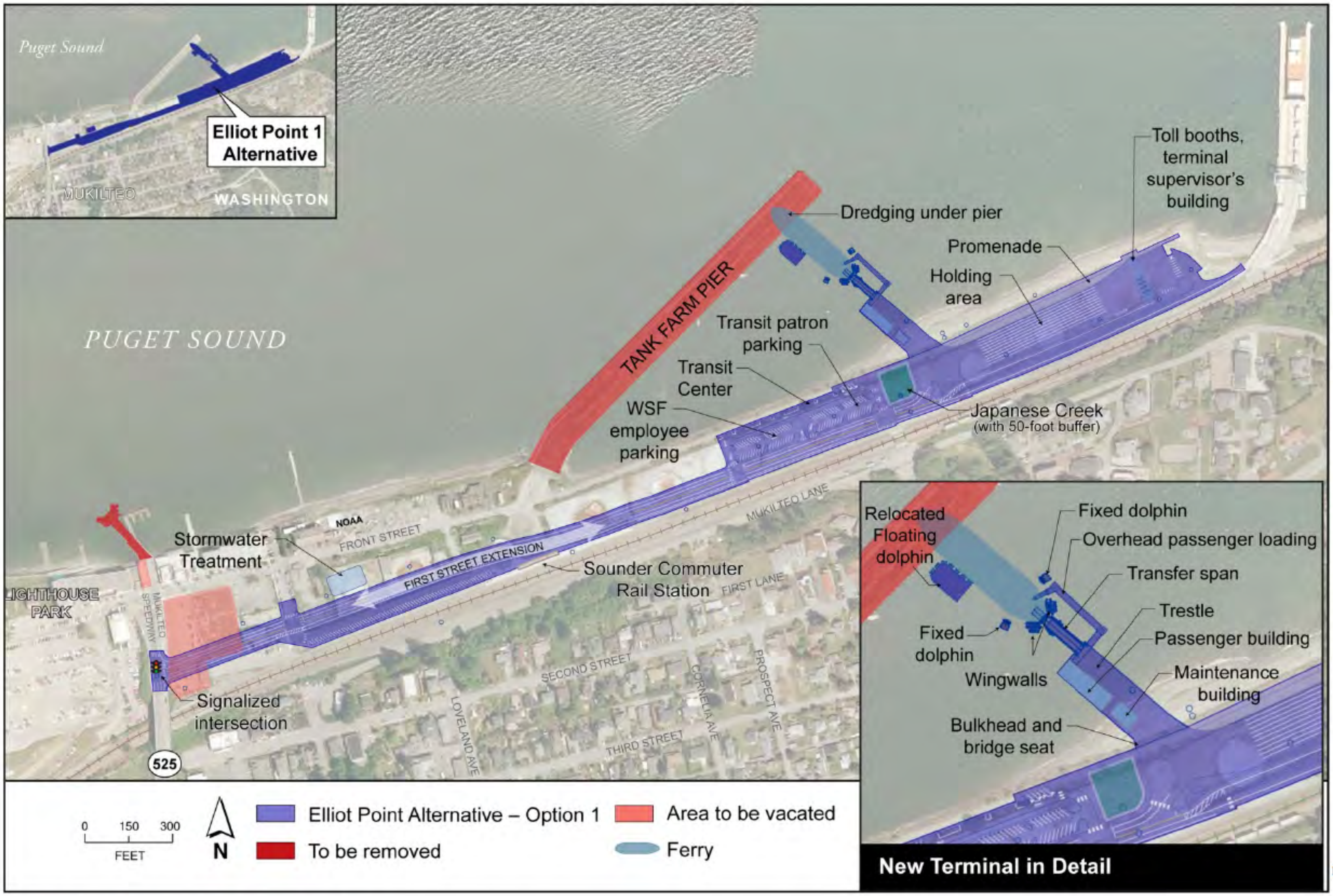

Figure 4. The Elliot Point 1 Alternative.

foot buffer on either side. The creek would be crossed by a pedestrian bridge near the shoreline. New lighting would be added to illuminate First Street and the terminal facilities, including holding areas.

The vehicle holding areas would have capacity for 216 vehicles, which is 1.5 times the capacity of the 144-vehicle vessels to be used on the Mukilteo-Clinton route. Four new toll booths, with a terminal supervisor's building above, would be located east of the holding area. These structures would be oriented north/south and would need to be up to 35 feet high to provide vehicle clearance while fitting all necessary facilities within the physically constrained site.

WSF employee parking would be provided west of the holding area and Japanese Creek, providing 40 spaces. A public parking area would be provided to serve the existing public shoreline area at the Mount Baker Terminal.

First Street would be realigned and extended as a four-lane roadway from SR 525 to the Mount Baker Terminal. A new signalized intersection with SR 525 would be constructed. The First Street/Park Avenue intersection would be reconstructed to provide access to a reconfigured parking and access area for Mukilteo Station. The new roadway, which would generally be along the southern portion of the Mukilteo Tank Farm, would also provide sidewalks and bike lanes, and it would have two new signalized intersections for internal circulation.

Security fences and gates would be constructed to allow WSF to secure the holding area during periods of heightened security, as required by the U.S. Coast Guard.

The upland elements of the existing ferry terminal on the Mukilteo waterfront would be removed, including its buildings, and the holding area and the existing WSF employee parking area would be vacated.

Transit Facilities

A transit center with six new bus bays serving scheduled routes and paratransit service would be constructed on the waterfront west of the new terminal. Compared to the existing bus stops on SR 525, the new transit center would be approximately the same distance to Mukilteo Station, but slightly farther from the ferry. An area would be provided near the transit facility for ferry passenger drop-off and pick-up.

Several elements of Mukilteo Station would be modified. The alternative would modify the surface parking area, and add driveways to and from the realigned First Street. The project would also provide sidewalk connections to the new bus bays and ferry terminal to the east.

Elliot Point 2 Alternative

This alternative would build a new ferry terminal at the western portion of the Mukilteo Tank Farm. It has a more compact footprint than Elliot Point 1, largely because it would not need a roadway extending all the way to the east end of the Mukilteo Tank Farm. Key features of the Elliot Point 2 Alternative are shown on Figure 5.

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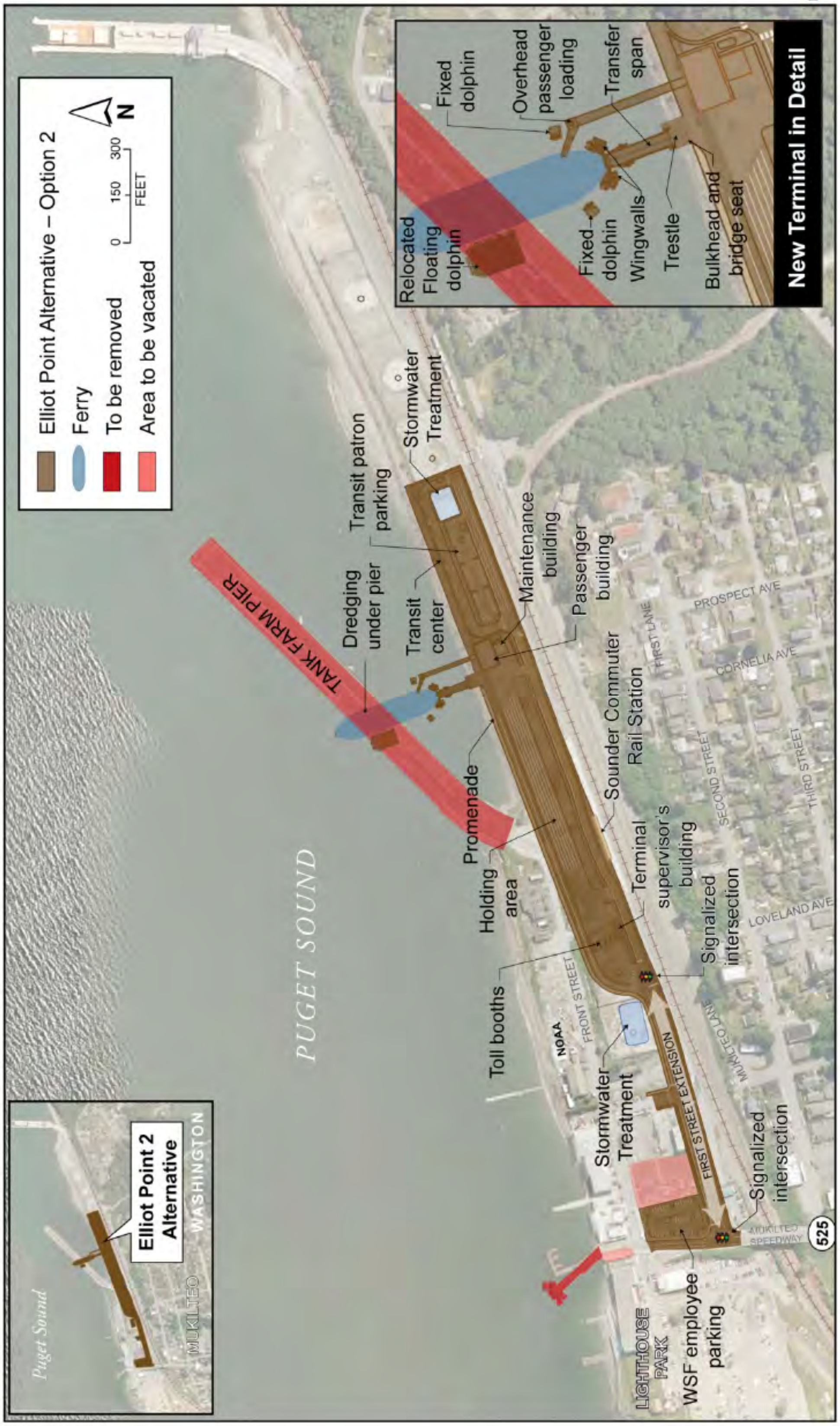

Figure 5. The Elliot Point 2 Alternative.

Marine Components

This alternative would develop similar types of marine facilities as Elliot Point 1 but it would be located primarily in the western portion of the Mukilteo Tank Farm. New wingwalls and fixed dolphins would be constructed, and the floating dolphin would be relocated from the existing ferry terminal. A new transfer span, including hydraulic lifting mechanisms/structures and a bridge seat foundation, would be constructed. A new concrete trestle and bulkhead would be constructed. Because there is no beach and the water is deeper at this location, the ferry slip can be nearer to the shore, allowing a smaller area with overwater structures, compared to Elliot Point 1. This also would allow fewer in-water elements, with about 36 piles for berthing structures (wingwalls/dolphins), 14 piles for the trestle, and 2 drilled shafts for the lift mechanism.

The Tank Farm Pier, including approximately 3,000 to 4,000 pilings, would be removed up to the pier's existing bulkhead. In addition, a channel about 500 feet wide and 26 feet deep would need to be dredged under part of the area currently occupied by the pier. The existing ferry facility on the Mukilteo waterfront would be removed, but the Port of Everett's fishing pier would remain.

Land Components

The vehicle holding area would be constructed near the center of the Mukilteo Tank Farm, with the holding capacity equivalent to one-and-a-half 144-vehicle vessels, or typically 216 vehicles. The terminal supervisor's building would be located west of the holding area adjacent to four new toll booths.

WSF employee parking would be moved to a portion of the area on the east side of SR 525 currently used for ferry holding, which would be reconfigured for parking.

A new passenger building and maintenance building would be located immediately upland of the ferry dock. An overhead loading ramp would connect to the second story of the building.

First Street would be realigned and extended as a four-lane roadway from SR 525 to a signalized entrance to the new ferry terminal. First Street would continue as a two-lane road to a new bus transit and paratransit facility and a relocated parking area for Mukilteo Station. The parking area would be east of the ferry dock.

The First Street improvements would include a new signalized intersection with SR 525 and a reconstructed intersection with Park Avenue. The extended roadway would generally be along the southern portion of the Mukilteo Tank Farm, and would occupy more of the areas currently used for Mukilteo Station parking and pick-up/drop off activities than the First Street extension in the Elliot Point 1 Alternative.

First Street would feature sidewalks and bike lanes. At the driveway for the ferry terminal, a walkway would be built along the edge of the terminal from First Street to a shoreline promenade located west of the ferry slip. Other sidewalks would continue to provide access to the existing Mukilteo Station and to a commuter rail parking and bus transit facility that would be located east of the ferry dock. A waterfront promenade would run along the transit facility. A separate promenade would run along the holding area. Pedestrians would not be allowed to cross in front of the trestle to travel between the promenades.

New overhead lighting would be added to illuminate First Street and the terminal facilities, including the vehicle holding area, the commuter rail parking area, and the new bus bays. The site would have several vegetated areas that would be used for stormwater management, including a stormwater facility located on part of the Mukilteo Tank Farm, east of the First Street/Park Avenue intersection.

As with Elliot Point 1, this alternative would feature security fences and gates surrounding the holding area and to the terminal, allowing WSF to meet U.S. Coast Guard requirements during periods of heightened security.

The eastern portion of the Mukilteo Tank Farm, including the area around Japanese Creek, would not be occupied by this alternative.

The upland elements of the existing ferry terminal on the Mukilteo waterfront would be removed, including its buildings. The unused portion of the vehicle holding area and the existing WSF employee parking area would be vacated.

Transit Facilities

A transit center with six new bus bays and a transit passenger area, serving scheduled routes and paratransit, would be constructed along the waterfront east of the new terminal. Compared to the existing bus stops on SR 525, the new transit center would be approximately the same distance from Mukilteo Station and would be approximately the same distance from the ferry. An area would be provided near the transit facility for ferry passenger drop-off and pick-up.

The extended and realigned First Street would include an inbound bus and paratransit stop for the existing Mukilteo Station, with transit vehicles continuing their routes to the ferry terminal. Outbound transit routes would board in the new transit center east of the ferry terminal. Other passenger pick-up or drop-off activities would be accommodated at the relocated commuter rail passenger parking area east of the ferry terminal.

1.2 APPLICABLE REGULATIONS AND GUIDELINES

The National Historic Preservation Act (NHPA), as amended, requires federal agencies, in this case the 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, and objects. A 1992 amendment to Section 101 of the NHPA also explicitly allows properties of traditional religious and cultural importance to be eligible for inclusion in the NRHP. Such properties are referred to as traditional cultural properties (TCPs), properties eligible for inclusion in the National Register of Historic Places because of their association with the cultural practices or beliefs of a living community that (1) are rooted in that community's past and (2) are important in maintaining the community's continuing cultural identity (National Park Service 1998:1).

The NHPA Section 106 review process consists of four steps. The first is initiation of the process, which involves determining if the action meets the definition of an undertaking, determining whether that action has the potential to affect historic properties, and identifying consulting parties. The second step is identifying historic properties. In order to complete this step, the project Area of Potential Effects (APE) must be identified, the scope and results of previous identification efforts must be reviewed, and appropriate studies to identify and evaluate historic properties must be completed. The third step is application of the criteria of adverse effect to determine if such effects are likely to occur. An adverse effect is found when an undertaking alters any of the characteristics that qualify the historic property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. The fourth step, implemented if historic properties will be adversely affected, is resolution of adverse effects, including consideration, through consultation with the state historic preservation officer (SHPO), tribal historic preservation officers (THPOs), concerned tribes or other consulting parties, of measures to avoid, minimize, or mitigate such effects. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the National Environmental Policy Act (NEPA) review process and with other statutes.

1.3 AREA OF POTENTIAL EFFECTS

FTA determined the project Area of Potential Effects for archaeological resources and historic buildings and structures, in consultation with the SHPO at the Washington State Department of Archaeology and Historic Preservation (DAHP). The APE encompasses an area beginning west of SR 525 at Point Elliott and extending 0.75 miles (1.2 kilometers) east along the shoreline, well beyond the end of the Tank Farm property. The BNSF railroad and the SR 525 BNSF overpass mark the southern boundary of the APE (Figure 1). Although the project's direct, physical impacts will be limited to a smaller area, the APE was drawn large to accommodate potential indirect effects to cultural resources, such as visual and auditory changes and vibration. The vertical APE for archaeological resources extends from the ground surface to a maximum of 5 feet (1.5 meters) below surface in land and shore portions of the project, while off-shore structures (pilings) may extend to depths of 150 feet (46 meters) below the sea floor.

1.4 TRIBAL COORDINATION

According to the NHPA implementing regulations, certain people or groups are automatically entitled to consulting party status, including appropriate federally recognized Indian tribes (36CFR800.2). The FTA initiated consultation for the MMP with a number of groups, including all tribes signatory to the Point Elliott Treaty and other potentially interested federally recognized tribes. Formal consultation with those tribes was initiated in 2004. From the period of 2005 through 2007, the project focused on conducting cultural resources assessment efforts, with draft reports completed in 2006 and 2007. Based upon tribal and other comments regarding the 2007 cultural resources report, additional heritage studies were undertaken to address the Point Elliott Treaty signing and other significant aspects of the Mukilteo project area. The results of that effort were added to the draft report and distributed in 2008 as the Results of Additional Heritage Resources Investigations at the Mukilteo Multimodal Ferry Terminal Project Site, prepared by Northwest Archaeological Associates and The Environmental History Company (Miss et al. 2008).

In 2010, the FTA, working with the Mukilteo Multimodal Tribal Liaison, formally contacted potentially affected tribes to determine whether they continued to have interest in the Mukilteo Multimodal Project. Through this outreach, the following tribes were contacted: Lummi Tribe of the Lummi Reservation, Muckleshoot Indian Tribe of the Muckleshoot Reservation, Nooksack Indian Tribe of Washington, Samish Indian Tribe, Sauk-Suiattle Indian Tribe of Washington, Snoqualmie Tribe, Stillaguamish Tribe of Washington, Suquamish Indian Tribe of the Port Madison, Swinomish Indians of the Swinomish Reservation, Tulalip Tribes of the Tulalip Reservation, and Upper Skagit Indian Tribe of Washington; Two non-federally recognized tribes were also contacted**:** Duwamish Tribe, and Snohomish Tribe of Indians.

In addition to being invited to the NEPA/SEPA Reinitiation Meeting on February 10th, the Workshop on June 10th, and the Scoping Meeting on September 29th, FTA offered to meet individually with all potentially affected tribes. The Suquamish, Swinomish, Stillaguamish, Lummi, and Samish Tribes met with FTA and the project team between February 10th and June 10th. The Snoqualmie and Tulalip Tribes met with FTA and the project team in September prior to the September 29th Scoping Meeting. On December 10th, FTA reviewed the alternatives that would be analyzed in the EIS with the tribes. The Nooksack Tribal Chair indicated that they are not interested in the Mukilteo Multimodal Project as it is outside of the Usual and Accustomed (U&A) area.

FTA and WSF have also invited all potentially interested tribes to act as participating agencies throughout the development of the Environmental Impact Statement (EIS) (WSDOT and FTA 2011).

The effort to identify and record existing or possible traditional cultural properties (TCPs) within the area of potential effects is in its early stages (the definition of traditional cultural property is given in section 1.2 of this report.) FTA and WSF have been involved with formal cultural resources consultation for this project for a number of years. The results of that consultation in regard to traditional cultural properties are summarized below.

In 2007, FTA received a letter from the Tulalip Tribes, describing substantial traditional cultural significance placed upon the project area. The Tulalip Tribes stated:

> The project site at Point Elliott is culturally and spiritually significant to the Tulalip Tribes. Both the pre-treaty site, which was extensively used by our ancestors for at least a thousand years, and the site of the treaty signing are important cultural, spiritual and historic sites of our people. They should be treated not only as historic sites, but as sites eligible for inclusion on the register as traditional cultural properties. See 16USC§470a(d)(6), National Register Bulletin 38, *Guidelines for Traditional Cultural Properties*.
>
> To the Tulalip people, this is not an archaeological site, and its value is not in scientific analysis. This is a living site of our ancestors, and it has immeasurable cultural and spiritual values. Many, if not most, of our important off-reservation cultural and historic sites have been decimated or destroyed by non-Indian development. The investigation done at the site reveals a good portion of this site, although impacted by prior development, remains intact under previously placed fill. Places where the remains of our villages and gathering places remain intact must be preserved, in order to preserve the living culture of the Tulalip Tribes.

In 2010, during a formal consultation meeting between the Suquamish Tribe, FTA, and WSF, a Suquamish representative stated, "The site is a traditional cultural property..." although additional details outlining the importance of the area to the Suquamish have not yet been disclosed. More recently, FTA met with the Tulalip Tribes and were advised that additional work was necessary to assess cultural resources within the Tank Farm property.

FTA and WSF are consulting with interested tribes to identify and record all traditional cultural properties within the area of potential effects. Current consultation efforts have not yet been successful in creating a clear understanding of the project's possible effects upon traditional cultural properties. Additional information is needed from the tribes to ensure that any potential effects to traditional cultural properties are fully considered during project planning.

2 SETTING

The following sections review environmental factors that influenced pre-contact and historical period people in their selection of habitation and activity sites, as well as factors that affected subsequent preservation of the resulting archaeological deposits. The sections also provide discussions of patterns, themes, and trends in regional prehistory and history through which a property's meaning and significance can be understood.

2.1 NATURAL SETTING

The structure of the natural environment largely determines human use of any landscape, conditioning the availability of food and shelter. Locations and kinds of resources are dependent on geologic substrates, topography, geographic relationships among landscape features, solar exposure, rainfall, and a host of other factors. Environmental changes have consequences for the archaeological record in terms of the numbers of sites and their type, distribution, visibility, and preservation.

Geologic and Geomorphological Setting

The study area is on Point Elliott along the shore of Puget Sound. Puget Sound lies within a large north-south elongated structural trough between the Olympic Mountains to the west and the Cascade Range to the east. This trough, known as the Puget Lowland, extends from southwestern British Columbia to the interior valleys of western Oregon. The Puget Lowland was subjected to multiple glaciations during the 1.8 million years of the Pleistocene Epoch. The last glaciation, known in the Pacific Northwest as the Vashon Stade of the Fraser Glaciation, originated as glaciers in the mountains of British Columbia coalesced and spread southward into the Puget Lowland as a broad, continental sheet called the Cordilleran ice sheet (Easterbrook 2003). At the Olympic Peninsula the ice sheet separated into the Puget lobe, which continued south into the Puget Lowland, and the Juan de Fuca lobe, which extended west into the Strait of Juan de Fuca north of the Olympic Mountains. The Puget lobe reached its maximum southern extent near the town of Centralia, south of Seattle, about 14,500 years before present (BP) (Kovanen and Slaymaker 2004; Porter and Swanson 1998). The Juan de Fuca lobe terminated about 60 miles (100 kilometers) west of Washington's present coast.

Retreat of the Juan de Fuca and the Puget ice lobes at the end of the Vashon Stade was rapid. The Puget lobe reached Whidbey Island by about 13,400 years ago while the Juan de Fuca lobe probably began recession earlier and retreated more rapidly than the Puget lobe due to a combination of rising global sea level and isostatic depression of the land (Dethier et al. 1995; Easterbrook 2003; Mosher and Hewitt 2004). As the ice sheet thinned and retreated north of Seattle, marine water entered from the Strait of Juan de Fuca to flood the lowland now containing Puget Sound. The remaining ice, floating on sea water, rapidly disintegrated northward to Canada except for a narrow band along the eastern margin of the lowland (Easterbrook 2003).

When the ice sheets began their retreat, global sea level, which had lowered considerably during the glacial maximum because of the tremendous amounts of water locked up in the ice sheets, began to rise. Initial rates of sea level rise were rapid; between 13,000 and 6,000 years ago, sea level rose from about 390 feet below present sea level (bpsl) to about 30 feet bpsl. After 6,000 years ago the rate of sea level rise slowed so that by 5,700 years ago sea level was about 16 feet bpsl (Dragovich et al. 1994).

Local sea level change, that is, change in relative sea level as experienced at local shorelines, varied from the overall trend exhibited by the global rise in sea level during the postglacial period. The changing relationships of sea level and shoreline in Puget Sound during the early Holocene was a function of land rebounding after the weight of the ice sheet was removed; and the amount and rate of rebound, in turn, was a function of the thickness of the overlying ice sheet. For example, the amount of rebound was less at the outer, thinner limits of the ice sheet relative to the thicker more northerly sections in the central and northern Puget Sound basin. There is an overall trend of increasing rebound going north under the thicker portions of the Puget lobe, and in the north-central and northern Puget Lowland differences in the amount of rebound range between 197 and 262 feet. Rebound appears to have halted by 9,000 years ago, at which time global sea-level rise began to overtake the uplift created by isostatic rebound and marine waters drowned the early Holocene shorelines (Dragovich et al. 1994).

Point Elliott is a triangular-shaped shoreline landform in the northern Puget Lowland on the east shore of Possession Sound. These landforms, known as cuspate forelands, are accretionary shore features typically bounded by a barrier berm enclosing a small wetlands or lagoon. Cuspate forelands are formed, and subsequently maintained, by longshore transport and angle outward from the generalized plane of the shoreline directional trend (Collins and Sheikh 2005).

Puget Sound shorelines are low-energy environments composed of mixed sand and gravel beaches. A two-part beach profile is typical, characterized by a steep foreshore often composed of coarse sand or gravel and a lower-gradient sand or mud low-tide terrace. Most of the sediment on the upper foreshore of a typical beach is too large to be moved by suspension in wave or tidal currents, and instead is transported as bedload in the swash zone, making its way along the beach a little bit with each successive wave. The major source of sediment coming to the shore is probably derived from erosion of coastal bluffs, and as a result, the erosion and reworking of coastal exposures of till, outwash sediments, and glaciomarine and glaciolacustrine deposits leads to large variation in beach sediments.

Recent geological research has shown the project is in a tectonically active area of the northern Puget Lowland and lies adjacent to and just north of the active Southern Whidbey Island fault zone. Other faults in the region include the Utsalady Point, Strawberry Point, and Devils Mountain fault zones. There is evidence for movement on the Southern Whidbey Island fault during Quaternary times, but Holocene activity seems subdued (Johnson et al. 1994). Because of the lack of damaging historic earthquakes in this region, less is known about the location, number, and magnitude of Holocene earthquakes than for the Seattle and Tacoma fault zones farther south, but recent coring in two salt marshes on Whidbey Island indicate that the last major known rupture along the Southern Whidbey Island fault was about 2,800-3,200 years ago (Kelsey et al. 2004). Trenching on the Utsalady fault, on the northern tip of Camano Island, showed that one, and possibly two, ground-rupturing earthquakes occurred along this fault (Johnson et al. 2003) about 100-400 calibrated years before present (cal BP) and between 1100-2200 cal BP.

The Snohomish delta just north of the town of Everett preserves evidence for a number of earthquake events (Bourgeois and Johnson 2001). Radiocarbon ages from buried contexts show the delta was affected by a tsunami and portions of the delta experienced liquefaction dating from around A.D. 800 to 980, close to the time that a large earthquake occurred on the Seattle fault, 30 miles (50 kilometers) to the south. Bourgeois and her colleagues also recorded evidence for at least three episodes of liquefaction, at least one episode of abrupt subsidence, and at least one tsunami that have affected the delta since A.D. 800. Localized subsidence, accompanied by abrupt surface lowering, was generated by earthquake-induced compaction and liquefaction, with variable changes in elevation across the delta ranging between 20-30 inches (50-75 centimeters).

Just north of the project, a newly discovered fault may underlie the coastal plain between Mukilteo and Everett. Though research is ongoing, linear features visible on the postglacial surface suggest the fault has been active during the Holocene (Molinari and Burk 2003).

Point Elliott is also in the Whidbey Island sub-basin in northern Puget Sound, which has one of the greatest concentrations of tidal wetlands in Puget Sound (Collins and Sheikh 2005). The river estuaries feeding into this portion of Puget Sound are larger and more diverse than elsewhere in the Sound, and recent research has shown tidal wetlands associated with accretionary landforms such as spits, cuspate forelands, tombolos, and barrier wetlands account for about 25% of the total wetlands complexes in northern Puget Sound (Collins and Sheikh 2005). The accretionary and barrier shore landforms support more than half the wetlands outside of the river valleys in Puget Sound as a whole, and account for considerably more in the northern region (Collins and Sheikh 2005).

The delta of the Snohomish River lies about five miles (eight kilometers) north-northeast of Point Elliott. Maps from the period 1884-85 show that almost the entire Snohomish delta plain was wetland, totaling 15 square miles (39 square kilometers), making it the largest of the delta areas in the Whidbey sub-basin (Bortleson et al. 1980). Most of the wetland has now been converted to other land uses through diking, drainage ditches, or landfill, with the result that only about 3.8 square miles (10 square kilometers) of the delta remains in wetlands. The lower margin of the intertidal wetlands along the delta front formerly extended southward along Port Gardner Bay to the vicinity of the Naval Reservation about four miles (seven kilometers) north of the present project (Bortleson et al. 1980).

A small fan delta formed at the mouth of Japanese Gulch partially within the present APE. Fan deltas are unique environments where the fluvial processes typical of alluvial fans interact with shoreline processes, and are characterized by active, frequently high-energy, sedimentation. The subaerial (above-ground) portion of a fan delta is an alluvial fan, and in humid environments the dominant sedimentary processes appear to be debris-flows and other types of mass wasting events triggered by intense rainfall, which results in depositional sequences dominated by poorly-sorted, mud-supported gravels (Wescott et al. 1990).

Point Elliott is backed on the south by an inactive coastal bluff and to the east and southwest by actively eroding bluffs. The coastal bluffs of Puget Sound are relatively recent, and probably have only developed after sea level stabilized about 5,000 years ago (Downing 1983; Shipman 2004). Bluff retreat is typically a cyclic process in which wave action removes material accumulated at the toe of the slope creating an unstable bluff profile that eventually leads to renewed erosion and accumulation of new material at the base of the slope. Because of the large amounts and variety of glacial sediments on Puget Sound, this process is complex (Downing 1983; Komar 1998; Shipman 2004). Wave-induced erosion directly attacks the toe of the bluff and is controlled by the width and height of the beach and berm in front of the bluff. Berm width depends primarily on sediment availability, whereas berm height depends on tide range, wave exposure, and sediment type. For waves to directly attack the base of the bluff, water levels must either exceed the height of the berm, which requires storm waves to coincide with unusually high tides, or the berm itself must be eroded away (Shipman 2004).

Faunal and Floral Resources

Point Elliott is ideally situated for access to a wide variety of animals and plants. Prior to extensive Euroamerican settlement and development, the wooded uplands to the south and east of the point hosted elk, deer, black bear, coyote, bobcat, and mountain lion. Small mammals, including rabbit, squirrel, chipmunk, raccoon, weasel, beaver, and river otter were also resident (Ingles 1965). Species of ducks, geese, swans, loons, and other migratory waterfowl are seasonally abundant in saltwater bays, lakes, sloughs, and river deltas. Other birds found in the vicinity of Point Elliott include cormorants, owls, and raptors such as eagles and ospreys, and woodland birds such as ruffed grouse (Angell and Balcomb 1982; Larrison and Sonnenberg 1968).

The protected bays, inlets, and open waters of Puget Sound and Possession Sound provide ideal habitats for resident and migratory marine mammals (Angell and Balcomb 1982). Large cetaceans observed near Point Elliott in modern times include minke whales and occasional wayward gray whales. Orcas, or killer whales, are found in both resident and migratory pods that prey on salmon, birds, and smaller marine mammals. Other cetaceans more commonly found in Puget Sound are harbor and Dall's porpoises and Pacific white-sided dolphins, which are most abundant while rearing their young in the summer months. Harbor seals are resident and ubiquitous throughout Puget Sound, and spend July through September pupping and rearing their young. Elephant seals and northern California sea lions are migratory and more commonly observed in the winter and spring months. The closest modern haul-out sites to Point Elliott are Gedney Island to the north for harbor seals, Possession Point on Whidbey Island to the southwest for California sea lions, and Everett Harbor to the northeast and Edmonds to the south for both harbor seals and California sea lions (Jeffries et al. 2000).

The variety of shellfish and fish found near Point Elliott is a reflection of diverse local habitats in Possession Sound (Kozloff 1996; Miller and Borton 1980). Substrates in the intertidal and subtidal zones range from fine silty sand to gravel, brought to shore by moderate wave energy and providing an ideal environment for bivalves, gastropods, and other invertebrates such as crabs and sea urchins (Anchor 2005; Kozloff 1983). The abundant eelgrass beds in the narrow sandy sub-tidal margin along the shore of Possession Sound near Point Elliott quickly give way to much deeper water just a few hundred feet from the shore. Species of small flatfish, sculpin, surfperch, and other kinds of fish that prefer the protected eelgrass beds are abundant along the shores of Possession Sound. Other fish taxa can be found near-shore and in deeper water off the subtidal shelf, including rockfish, dogfish, skate, and greenling (Anchor 2005). Herring congregate in many near-shore shallows throughout Puget Sound in the spring to spawn. Several runs of salmon pass Point Elliott on their way to the Snohomish, Stillaguamish, and Skagit Rivers and smaller nearby streams to spawn. Returning Chinook salmon can be caught near Point Elliott usually between late April and early June (FTA and WSDOT 2006:10-7; Haring 2002; Smith 2003; Washington State Conservation Commission 1999). In September and October, Coho salmon enter Japanese Gulch Creek which is one of the few mainland streams within several miles of Point Elliott that currently supports an anadromous fish population (Haring 2002).

Native vegetation across most of the Puget lowlands consists of forests of the *Tsuga heterophylla* (western hemlock) zone, which is characterized by western hemlock, western red cedar, and Douglas fir with a dense shrub and herbaceous understory (Franklin and Dyrness 1988). These plants include bracken fern, salmonberry, oceanspray and red and evergreen huckleberry. Parklands and prairies were common into the early historic period. Many of these were created or maintained by Native Americans who used controlled burning to enhance the productivity of certain plant foods and forage that would attract animals such as deer (Norton 1979; White 1980). Along stream courses red alder, black cottonwood, bigleaf and vine maple, and other riparian taxa predominate. Wetlands supported taxa such as cattail, reeds, and wapato. Plants useful for food found near the site include blackberry, serviceberry, cranberry, thimbleberry, huckleberry, ferns (bracken, wood, and sword), wild carrots, rose hips, tiger lilies, hazelnuts, camas, wapato, acorns, and crab apple (Gunther 1945). Numerous other plants, shrubs, and trees provided fuel, medicines, and materials for making tools, shelter and transportation. Ravines leading to the bluff-tops south of Point Elliott host typical *Tsuga heterophylla* zone vegetation.

2.2 Cultural Setting

The cultural history of the Mukilteo vicinity covers thousands of years representing primarily Native American occupation and only about 200 years of Anglo-American presence. This history is one of changing economic strategies, residence patterns, and population growth for each entity.

Pre-Contact Record

Human occupation of the Puget lowlands began sometime after glacial retreat, possibly as early as 12,000 years before present (Carlson 1990; Nelson 1990). The earliest well-established cultural period in North America, designated the Paleoindian period, is poorly defined and poorly dated based on the few archaeological sites found across the region. Distinctive fluted projectile points characterize this time period, and have been recovered as isolated finds in upland settings as close as [redacted] (Avey n.d.; Meltzer and Dunnell 1987; Stein et al. 2004). Lacking anything more than isolated finds of stone implements and their rare association with large mammal remains, explanations about Paleoindian lifeways are highly speculative. Given the rapid region-wide rise in relative sea-level after the retreat of Pleistocene glaciation, coastal Paleoindian settlements were likely inundated.

During the early and middle Holocene, when rising relative sea-level began to stabilize, occupation of the region is understood in terms of several archaeological sites found mainly in upland settings in the Puget basin and Strait of Juan de Fuca. Although this culture-historical period is given different names under different prehistoric sequences that have been constructed over the past several decades, it is generally referred to as the Early period, a span from about 8000 BP to about 5000 BP. Artifacts found in the region attributed to this period were originally called "Old Cordilleran" (Butler 1961) but are now usually termed "Olcott" when found in the Puget lowlands, named after the type site [redacted] (Kidd 1964). Olcott assemblages may include large leaf-shaped and stemmed points, scrapers, and flake tools, often of heavily weathered volcanic rock such as basalt or dacite (Carlson 1990). Olcott sites have usually been found on older fan-delta settings or on river or lake terraces (e.g., Mattson 1985; Morgan 1999). Features such as hearths or structural remnants, or plant and animal remains that would offer a better picture of subsistence economy or settlement patterns, are absent from Olcott sites investigated to date.

During the Middle period, from approximately 5000 BP to 2500 BP, the human population across western Washington grew and socio-economic organization of communities became more complex (Ames and Maschner 1999). Social groups utilized a wider range of marine resources, including sea mammals, fish, and shellfish, and the kinds of archaeological sites that date to this period are more diversified with respect to setting and inferred function, suggesting an established seasonal round of economic pursuits. Intensified use of specific local environments such as prairies and salmon streams is apparent from site distributions and artifact types. Ground stone implements appear in both coastal and inland sites after 5000 BP. Bone and antler tools, including toggling harpoons, found in shell midden sites suggests marine mammal hunting.

By the Late prehistoric period, from about 2500 BP until widespread Euroamerican contact in the early nineteenth century, three distinct cultural patterns were found in the region: marine-oriented cultures on the Pacific coast, a mixed marine and terrestrial economy along the shores of Puget Sound, and inland terrestrial mammal hunting and riverine fishing traditions (Ames and Maschner 1999). More populous communities apparently congregated at river confluences and along tidewater shorelines in permanent or semi-permanent winter villages, while seasonal use of upland and lowland camps that could focus on harvesting of particular resources, such as salmon, shellfish, and camas, increased as well. Archaeological evidence for these settlement and subsistence patterns can be seen in greater diversity of hunting, fishing, plant processing, and woodworking tools found in Late period sites. Cedar plank houses occupied by a large semi-sedentary population are well-represented in this period (Blukis Onat 1987), in which Matson and Coupland (1995) view the final development of the broad cultural patterns observed at the time of initial Euroamerican contact. This contact in the late 18th century led to drastic changes in Native American populations and community structures, primarily caused by disease pandemics (Boyd 1998).

Ethnohistory

Point Elliott and 45SN393 lie within the traditional territory of the Snohomish, presently the largest Native American group that occupies the Tulalip Indian Reservation north of the city of Everett and Possession Sound. The lifeways of the Snohomish were oriented primarily towards the sea and river of the same name, which served as means of transport and sources for food and raw material. The prominence of Point Elliott as a landmark would have made it an area that likely witnessed interaction between the Snohomish and neighboring Native American peoples. These groups included the Snoqualmie who lived inland and upstream along the Snohomish and Snoqualmie Rivers and their tributaries; the Suquamish, who traditionally occupied northern Kitsap peninsula; the Duwamish, who lived further south near present-day Seattle and the Duwamish River valley; and the Swinomish, Lummi, Skagit, and other tribal communities living on the islands and mainland to the north (Figure 6). Although dependence on a marine economy varied somewhat among these people, Puget Sound was a fundamentally important means of transportation, communication, and subsistence for all of them (Tweddell 1974:25).

During the ethnohistoric period, the Snohomish lived along the Snohomish River, from present-day Monroe to the mouth of the river near Everett, and along the shoreline of Possession Sound northward to the Stillaguamish River, along much of Camano Island, and on the southern half of Whidbey Island (Ruby and Brown 1992:212). Four major Snohomish winter villages, several camp sites, and other geographic place names are known from this period. The villages were at *He'bolb* near [redacted]

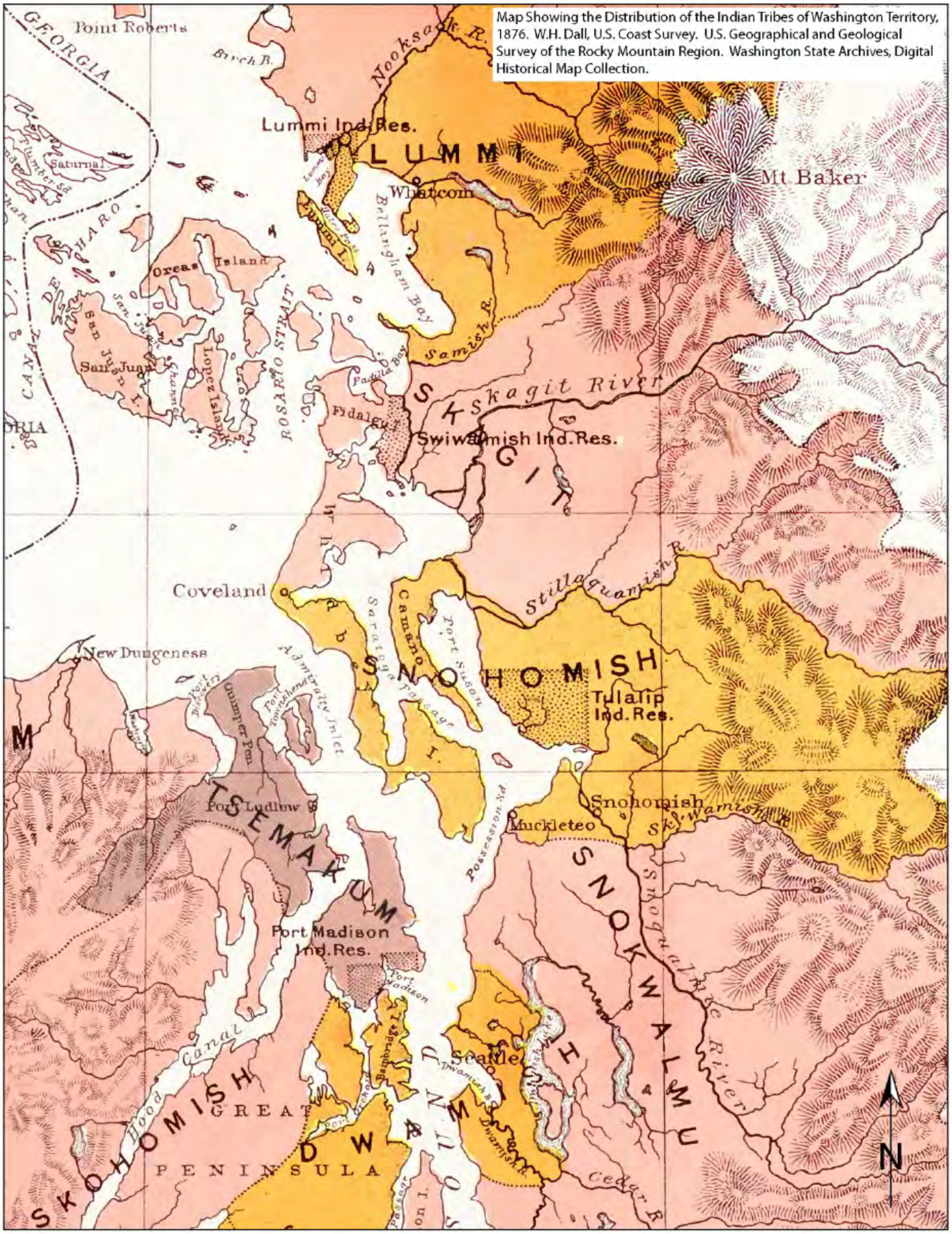

Figure 6. Distribution of Native American tribes and reservations, 1876.

(Haeberlin and Gunther 1930:7). Waterman noted three traditional place names near Point Elliott: 1) *Beka'ltiu* corresponds with [redacted] and was anglicized as Mukilteo when the town site was named in 1862 (Phillips 1971:94). Waterman noted it was an excellent fishing locale and frequently used as a camp site (Waterman 2001:344). Tweddell recorded the meaning of the name as "to swallow" or "narrow passage" (Tweddell 1974:622). 2) *Sklels*, or "dirty rocks," was the name used to describe [redacted] where the beach cobbles looked dirty and muddy. 3) *HuxuktL!a^{3}al* (*hwEtL* meaning "broken") was the name used to describe [redacted] where the tops of the trees had broken off (Waterman 2001:343-344).

Subsistence of Puget Sound Native Americans focused heavily on marine resources, including salmon, herring and other fish, shellfish, birds, and marine mammals. Shellfish were both eaten as food and used for bait to catch fish (Lane 1975a:28). Plant foods, including berries and camas, along with terrestrial animals and birds supplemented the diet (Tweddell 1974:56). At the time of Euroamerican contact, the Snohomish, like other Puget Sound Salish-speaking groups, lived in permanent villages of cedar plank houses during the winter and traveled to seasonal camps in the spring, summer, and fall to fish, hunt, and gather shellfish and plants.

Spanish and English explorers were the earliest known Europeans to visit the Puget Sound region. Among them was Captain George Vancouver, who led an expedition that surveyed the area, mapping and naming a number of its land and water features in 1792. The seamen who first sailed throughout Puget Sound were part of a broader worldwide competition to claim new territories that could enhance the influence of major European nations. Maritime traders soon followed these explorers as worldwide attention began to focus on the economic potential of the Northwest’s vast natural resources. Initially, the valuable pelts of the sea otter were the most sought-after commodity, and British merchantmen vied with their American counterparts, known as Boston men, to trade with coastal tribes. In the early nineteenth century the high prices paid for other fur-bearing animals like the beaver also drew overland explorers, who were generally representatives of large trading companies in both Canada and the United States. Most dominant along the Northwest coast was the Hudson’s Bay Company, which established forts at strategic locations and set up far-reaching networks of exchange with Indian people throughout the region. These trade relationships brought changes to Native American socio-economic patterns without significant loss of autonomy. More damaging was the role Europeans played in the spread of disease throughout the area, and a number of major epidemics, including smallpox and malaria, had a devastating effect on Native populations by the early nineteenth century (Scott and DeLorme 1988:15; Whitebrook 1959:65-67; 76-78; Carpenter 1986:25, 26, 30, 35-38; 64-66; Crooks 2001:12; Cole and Darling 1990:128-133; Boyd 1999:4-5, 262-263).

American interest in the Pacific Northwest grew substantially following the publication of information gathered by the 1804-1806 Lewis and Clark expedition. Congress authorized naval exploration of the Pacific in 1828, but another decade elapsed before the United States Exploring Expedition under the command of Lieutenant Charles Wilkes began its four-year voyage along the West Coast. As Wilkes and his men sailed throughout Puget Sound in 1841, they mapped and named many of the geographic features of the area. The flood of American settlers who headed to the Pacific Coast soon after the Wilkes expedition caused tensions with the indigenous residents as well as with the Hudson’s Bay Company traders. In 1850 the U.S. Congress passed a measure called the Donation Land Law, which provided very generous land grants to current residents of the territory and encouraged even more migration to the region. Settlers quickly moved onto land that was important for the subsistence patterns of Native peoples. When Washington Territory was created out of the northern portion of

Oregon in March of 1853, Isaac Ingalls Stevens was appointed as the first territorial governor and also named *ex officio* Superintendent of Indian Affairs. Stevens had a mandate to make treaties with the Indian peoples of Washington and extinguish their title to lands American settlers had claimed (Richards 1993: 194-195).

Stevens held a series of treaty-making sessions with various tribal groups throughout Western Washington in the winter of 1854-1855. Point Elliott, the jutting piece of land named for the Wilkes expedition crew member, Samuel Elliott, was chosen as the site for one of these meetings. On January 22 and 23, 1855, Governor Stevens and his aides met with over 2,000 Indians of the northeast Puget Sound region, including representatives of the Snohomish as well as the Snoqualmie, Skopahmish (Muckleshoot), Stillaguamish, Kikiallus, Skagit, Lummi, Suquamish, Sauk-Suiattle, Duwamish, and other tribes (Appendix A). This treaty promised payment to the tribes, retention of hunting, fishing, and shellfish gathering rights, and services in exchange for aboriginal lands. The treaty also proposed several reservations. The Snohomish were to join the Snoqualmie, Stillaguamish, and Skykomish on the new Tulalip Reservation, while the Sammamish were to move either to the Port Madison Reservation or the Tulalip Reservation. Smaller reservations were established for the Swinomish and Lummi on the Skagit and Nooksack Rivers (Figure 6) (Haskett 1974:1-3; Hitchman 1985:233; Records of the Proceedings of the Commission to Hold Treaties with Indian Tribes in Washington Territory, microfilm, UW, Seattle; Lane 1975b:3-4).

The combined tribes, who became known as the Tulalip Tribes of Washington, were assigned to a mainland reservation with Tulalip Bay, west of the town of Marysville, as its geographical center. In recent times, the Snoqualmie and Stillaguamish have split from the Tulalip Tribes and have gained federal recognition. The remnants of Native American occupation of Point Elliott are no longer visible, having been covered in successive layers by late nineteenth century historic development of the Mukilteo waterfront, early twentieth century construction and expansion of the Mukilteo Lumber Company/Crown Lumber Mill, and mid-twentieth century military use.

History

Anglo-American settlement at Mukilteo began soon after the Point Elliott Treaty council. Morris Frost, who held the position of customs collector at Port Townsend and was active in territorial politics, made the first claim, in 1857 according to some sources (Phipps 1965; Whitfield 1926). Frost had traveled throughout the region and noted that Point Elliott was a prime site for trading because of its location on the Sound between Bellingham and Seattle, and its proximity to the mouth of the Snohomish River and large Indian populations in the area (Cameron et al. 2005:62).

Frost encouraged Jacob Fowler, a fellow New York native who was running a store and hotel on Whidbey Island, to move to Point Elliott. Fowler filed a claim to the north of Frost's along the waterfront and the partners established their own store and saloon, primarily under Fowler's management. In 1862 Fowler also applied for a permit to establish a post office at the site, which he called Mukilteo. Mukilteo was the only trading post between Seattle and Penn's Cove on Whidbey Island at this time, and initially Indians of the region were probably their primary customers (Figure 7). Most additional activity in the area was limited to small-scale agricultural enterprises that sustained the few homesteaders who had settled there.

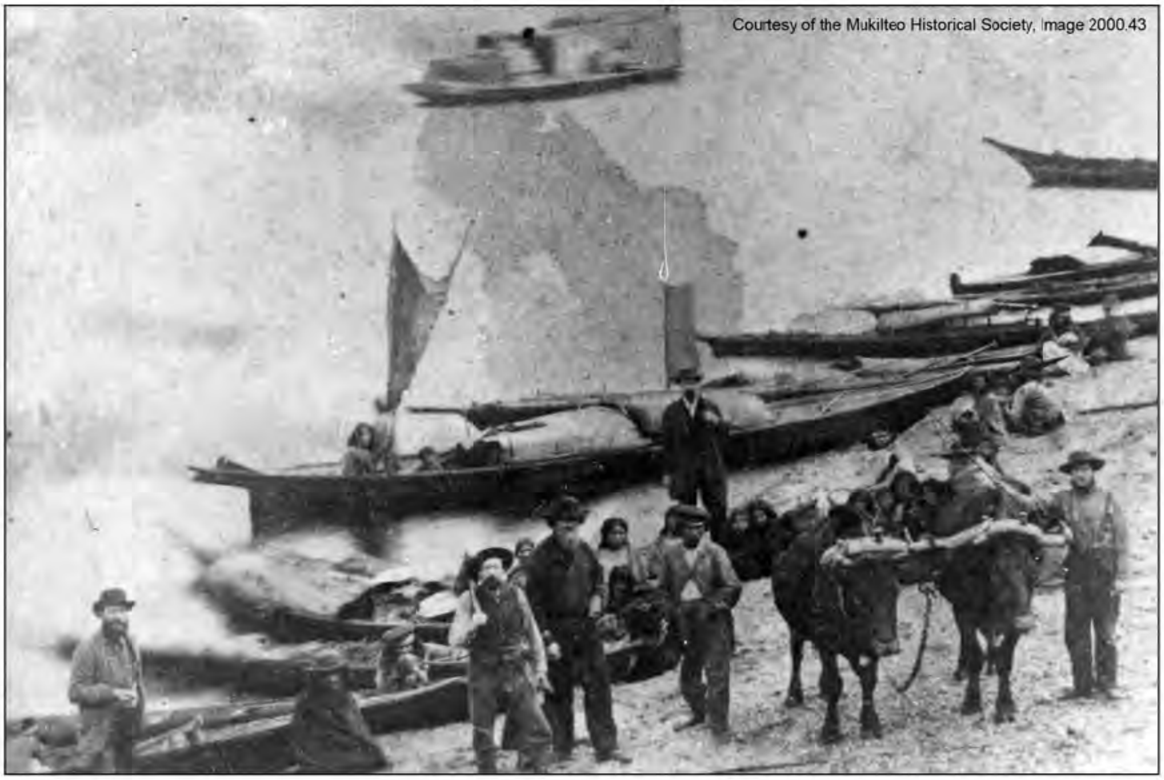

Figure 7. Photo showing Indians, canoes, early settlers, and J.D. Fowler with his oxen at Mukilteo.

Sources apparently based on Fowler's early diaries indicate that the very first commercial and residential buildings of the Mukilteo settlement were located on the southwest side of Point Elliott on land that would later become part of the state park (Figure 8). This exposed location was subject to bad weather and tides and thus the partners quickly moved their buildings to a more protected area along a rough trail that eventually became Front Street. As logging developed in importance, newcomers began to have sufficient interest in the region for Frost and Fowler to develop a hotel as well as their store and saloon at the intersection of Park Avenue and Front Street and to plan for other ventures to build a more substantial community. Mukilteo was the first town of any size in what became Snohomish County and later historians noted that it also established many other "firsts," including first county seat, first manufacturing center, first post office, first telegraph station, and the first real estate partnership (Interstate Publishing 1906:369; McConnell 1977:4-8; Whitfield 1926:I-584-587). For a short period after its founding, Mukilteo was the major trading point in Snohomish County. Fowler and Frost developed several businesses that involved harvesting, manufacturing, and shipping local products. A diary kept by Fowler evidently indicated that the pair started a saltery sometime prior to September 1867 and sold barrels of salted salmon to individuals and businesses around the Sound. They also were involved in shipping other local products, including berries, flour and ice, on several sailing vessels they had purchased: the Tibbals, the Pigeon, and the Gazelle (Interstate Publishing Company 1906: 258, 369; Phipps 1965: 2-4; McConnell 1977:8).

The area's rich forests also provided logs that could be sold to large sawmills operating around Puget Sound at Port Ludlow, Port Gamble, and Utsalady. The first sawmill near the mouth of the Snohomish River was built in 1853 on land along Tulalip Bay. Closer to Mukilteo, a small sawmill began operations

Figure 8. The original Frost and Fowler store location on the south side of the point, no date.

in the mid-1860s on the Livingston claim, a short distance from the settlement. It lasted only a few years because it was unable to compete with the bigger mills across the Sound. The valleys of the Snohomish and Stillaguamish rivers were logged most intensively during these early years, and Frost and Fowler's Mukilteo hotel quickly became a home for woodsmen during the winter months. A few individuals also ran logging operations in the immediate vicinity of Mukilteo, including Morris Frost, who employed a crew of ten men with eight oxen in 1876 (Whitfield 1926:I-678; Dilgard 2007:1; Interstate Publishing 1906: 256, 258, 259, 261, 586).

Fowler's and Frost's enterprises sustained Mukilteo, but the partners hoped that new transportation access to a transcontinental rail link would enhance its growth. The Northern Pacific Railroad evidently sent a surveyor, General James Tilton, to stake out a potential terminus at Mukilteo in 1871, setting off speculative activity in the buying and selling of town lots. One of the earliest maps of the Mukilteo area, drafted in 1872 for the US Coast Survey, shows a structure and fenced yard at the southeast corner of the intersection of Front Street, Park Avenue and the city dock, corresponding to the location of Bay View Hotel, owned by Frost and Fowler (Figure 9). An early photograph includes the hotel and a few other buildings along Front Street with only an empty field to the south, bordered by Park Avenue and a picket fence (Figure 10). When in 1873 Tacoma was selected as the terminus and a financial panic gripped the nation as a result of the default of Northern Pacific financier Jay Cooke, area businesses soon felt serious financial constraints. The partnership of Mukilteo's founders, Frost and Fowler, went into receivership in 1876, and V. B. Stacy of Seattle began to handle the company's land holdings and other affairs (Armbruster 1999:30, 36, 37; Whitfield 1926: 587; Interstate Publishing 1906:370).

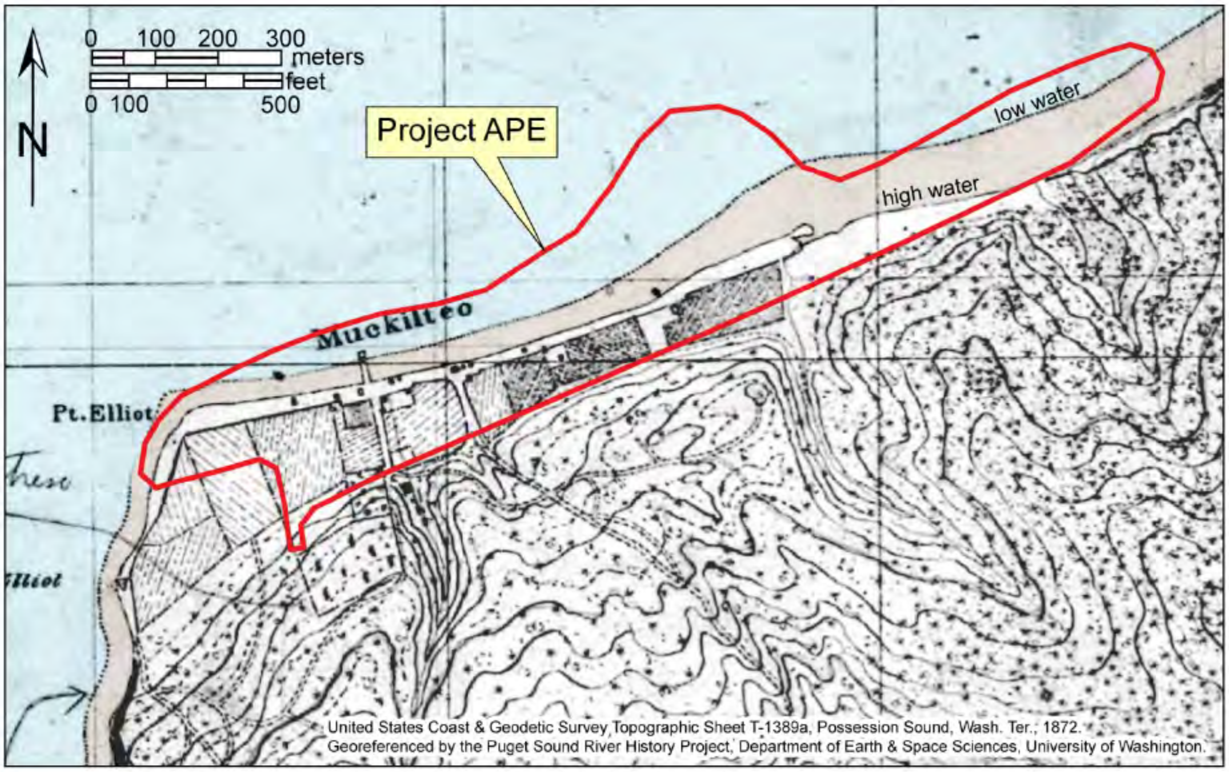

Figure 9. Map showing early Mukilteo, 1872.

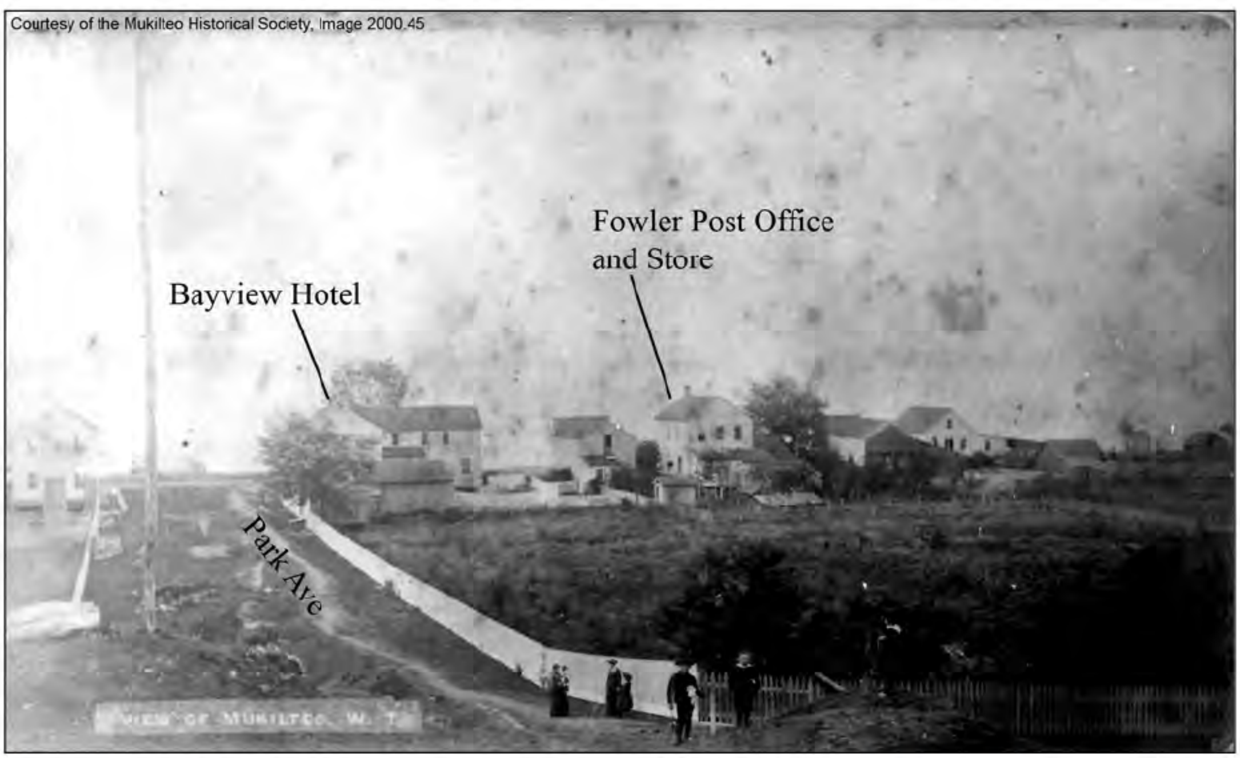

Figure 10. Early Mukilteo looking north from approximately Park Avenue and Second Street, c. 1878.

As a result of these financial difficulties, the Bay View Hotel closed for a short period of time, but was soon purchased by P. Trana and continued to be the focus of the Mukilteo townsite. A photograph from 1878 shows that in addition to the hotel, several other businesses had been added along the south side of Front Street during this period (Figure 11). The town also became the site of a brewery as early as 1875, although sources differ on who was involved in these early efforts. According to some historians, Joseph Butterfield founded the Eagle Brewery in that year, selling it a year later to Frost and Fowler. Another source indicates that George Cantrini built the town's first brewery in 1878, selling 240 barrels his initial year of operation and nearly doubling his production the following year. S. N. Snyder was said to have rebuilt the brewery in 1882 after it had burned down, and he operated it until 1884 (Phipps 1965: 4; Interstate Publishing 1906:370; Whitfield 1926:588; Meier 1991:90).

Along the waterfront, fish processing also became an important industry in Mukilteo during this period. The partnership of Rheinbrunner and H. C. Vining picked up the salting business that Frost and Fowler had begun and shipped barrels of their product to the East Coast in 1875. Vining evidently continued the business on his own for several years, primarily hiring Indians to bring in the salmon. The first cannery on Puget Sound was established at Mukilteo in July 1877 by George Myers and Company (sometimes called Jackson, Myers, and Company), which also operated another cannery on the Columbia River. The Mukilteo facility, according to newspaper accounts, was built on the wharf, and boats drew up underneath and unloaded their catch, which was processed there. H. C. Vining, who was one of the townspeople who evidently encouraged the company to develop a cannery at the site, directed a crew that provided some of the fish for the enterprise. Another crew, which was primarily composed of Chinese fishermen, was run by a Mr. Tull. Any fish that were not used by the cannery were

Figure 11. Looking east down Front Street from Park Avenue, showing the Bay View Hotel, 1878.

salted by the two men. Although newspapers suggested that the company might also can fruits and vegetables grown by area farmers, there is no information that any other kind of canning actually occurred (*Northern Star*, July 28, 1877:4; Sept. 8, 1877:4; Whitfield 1926:I-588; *Northern Star*, September 22, 1877:4).

Myers was said to have taken a ten-year lease on his cannery site in 1879. In 1887 a new cannery and wharf were built by a man named Coleman, who used Chinese labor despite strong anti-Chinese sentiment in the region. In the following year, Frank L. Tuttle ran this cannery and evidently made a number of improvements to the plant, built some fish traps and added to the fishing fleet. Sources vary but evidently Tuttle remained there for at least two seasons and possibly until the mid-1890s, when an economic downturn led to the closure of Mukilteo's canneries (Whitfield 1926:590).

Aside from its canning industry, Mukilteo experienced little economic growth during the 1880s, and its population evidently peaked at about 75 residents. The town did have regular steamboat service during this period, so its waterfront location made it a possible tourist destination. In the late 1880s entrepreneurs attempted to establish vacation resorts in the area. Walter Keyes and his wife brought property at Mukilteo to build what he called the "Long Branch of Puget Sound," a resort community probably patterned after Long Branch, New Jersey, which was a popular celebrity vacation spot in the nineteenth century. Keyes dedicated the facility in May 1887 with picnics and music by a National Guard band and encouraged excursions from Snohomish, Seattle, and other Puget Sound towns. The Long Branch did not appear in city directories by 1893, so it is likely that it was a short-lived venture. In contrast, the Bay View Hotel, which was remodeled in 1888 and initially boasted a dance pavilion, croquet court and other amenities, remained a Mukilteo landmark for many years. Located at the center of community activity on the corner of Front and Park Avenue, the Bay View eventually served as a boarding house for local workers (Whitfield 1926:I-589; Polk 1893:281-283).

When Washington achieved statehood in 1889, the economy of the region experienced a brief revival and Mukilteo followed suit. The town's renewed prospects were based on the possibility of a long-awaited transcontinental rail link. Mukilteo, like most other towns on the Sound, was eager to welcome James J. Hill of the Great Northern Railroad. Hill and his associates secured a foothold on the Seattle waterfront in 1890 and oversaw construction of a railroad, called the Seattle and Montana, which ran northward to Bellingham and provided a link with lines running south from the Canadian Pacific. The 78 miles of track constructed in 1891 primarily followed the shoreline of the Sound and passed through Mukilteo, which became one of its stops (Hidy et al. 1988:78; Cameron et al. 2005:106-108).

In anticipation of growth because of its railroad connection, Mukilteo was platted in 1890 and another flurry of sales in town lots began. In addition to the construction of several buildings that housed real estate offices, stores, restaurants and another hotel, a new telegraph office also opened in the town. Lower Park Avenue was the site of a railroad depot, transfer station, drugstore, restaurant, barber shop, confectionary, butcher shop and a general store. Residents expected even more growth and bonded themselves for $10,000 to build an elaborate new school. The building was completed in 1893, but initially served only 29 students (Whitfield 1926:I-589-590; McConnell 1977:144).

Several other towns along the Seattle and Montana were platted at the same time, but it was Everett that experienced the greatest growth at the end of the nineteenth century. The prospect that the Great Northern's transcontinental line, which crossed the Cascade Mountains to the coast over Stevens Pass, would use Everett as its terminus fueled even more speculative interest. When the line was completed in 1893, James J. Hill chose Seattle instead, but Everett continued to expand as the center of the burgeoning lumber industry. Demand for wood products from the Puget Sound area was also boosted by the rush to the Klondike gold fields beginning in 1897. Investments by the Rockefeller interests and later the Weyerhaeuser Company helped to continue this growth so that soon after the turn of the century Everett had nine sawmills and thirteen shingle mills (Cameron et al. 2005: 11-112, 119, 135-136; Interstate Publishing 1906:283-284).

Mukilteo was initially overshadowed by this phenomenal development, and by 1899, steamer service even bypassed the declining town. Eventually, however, some of Everett's success spilled over into other towns on the railroad and helped to revive Mukilteo. Sawmilling became the primary source of jobs and income for the town after 1903 with the construction of the Mukilteo Lumber Company. Investors in this enterprise included several former Midwest lumbermen who also owned a couple of Everett mills. As soon as the new mill's foundation was in place, the company also began work on a dock to replace the deteriorating structure that had long been Mukilteo's main shipping access. When completed, the plant included both a shingle and a lumber mill, which was said to include "a double band, with resaw, edgers, slashers and trimmers" (*Pacific Lumber Trade Journal* April 1903:52). These new facilities once more made Mukilteo a desirable port, and the Seattle-Everett steamship line reinstated regular service along with other transportation companies (*Everett Daily Herald*, April 17, 1903:4; April 24,1903:3; May 28, 1903:7; Sept. 4, 1903:2; September 24, 1903:5; Nov. 11, 1903:1).

As many as 100 construction workers helped to build the mill and most evidently came to Mukilteo from Everett by ferry and returned home by train. On November 1, 1903, the Great Northern added a new Mukilteo station, which provided better access to the mill. By that time much of the machinery was in place and crews had erected a new burner as well as a smokestack 100 feet in height and eight feet in diameter. In addition, five dry kilns were built from concrete blocks manufactured on the site. The company had also begun construction of a company store near the wharf and company housing on the bluff above the tracks (Everett Herald, Sept. 28, 1903).

The 1904 city directory lists only 34 residents living in Mukilteo in addition to the mill owners and supervisors, most of whom made their homes in Everett or out of state. By 1907, however, the population of Mukilteo was 350 and it had grown to a reported 600 by 1909. Of the residents enumerated in 1907, at least 53 worked directly for the Mukilteo Lumber Company, while others were employed by the small Ira Heath mill, the Doucette and Sons and Mukilteo Shingle Company operations, and the Elliott Bay Logging Company. A number of longshoremen who loaded and unloaded the lumber vessels were also involved in the industry and lived in Mukilteo. In addition, the town had four hotels and two general stores as well as a saloon, meat market, real estate company and boat building concern. Other residents included a few fishermen and Great Northern Railway workers, ranchers, and a chicken producer (Polk 1904:392-394; 1907:445-450; 1909: 597-603; 1912:537).

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 (Everett Herald, Feb. 15, 1904:8; March 1, 1904:1; March 28, 1904:1; Interstate Publishing 1906:370).

The Mukilteo mill's entire workforce grew to well over 200 after 1909, when California investors purchased the facility and renamed it the Crown Lumber Company. The new ownership group, which included A. A. Baxter and James Tyson of San Francisco and H. W. Jackson of Eureka, California, had long experience in the industry. Primary control appeared to be in the hands of Tyson, who was the nephew of Charles Nelson, a Danish ship captain who built the Nelson Steamship Company and the Nelson Lumber Company into some of the most successful corporations on the West Coast. The sale included the Mukilteo mill property and employee housing as well as interests in three boats, a lumber yard in San Francisco and approximately 2,400 acres of the company's timber lands. Newspapers of the period reported that the mill machinery included "three large bandsaws, one roller band, two edgers and a gang, besides automatic trimmer, slab slasher and a lath mill" with a capacity of over 200,000 board feet of lumber and 40,000 board feet of lath per day (*Pacific Lumber Trade Journal* Sept. 1909:36; Everett Herald, Aug. 26, 1909:1; Kaiser 1990:3-4).

The Crown Mill was classified as a cargo facility, and its main products included untreated lumber and timbers, which were primarily in demand for export (Figure 12). The mill also had dry kilns and planers, which gave the company flexibility to produce specialty products like railroad ties and flume stock as well as finished lumber for domestic markets. Statistics recorded by timber industry publications suggest that in the first decade after its purchase, the Crown Lumber Company expanded its foreign exports, shipping to markets in Mexico, the West Indies, the Cook Islands, Hawaii, and Australia. Later in the 1920s it also sent lumber to South American and East Coast destinations (*The Timberman* Jan. 1912:29; May 1913:55; May 1913:63; Nov. 1929:202).

Figure 12. The Crown Mill during operations, no date.

Most of the mill's foreign shipments were carried by large steamship lines or tramp steamers that could pick up partial loads. During the early years, much of its lumber production bound for Pacific ports was also carried on sailing schooners. The company eventually operated its own small fleet of steam vessels that transported lumber to California. After World War I, several steel-hulled ships that had been owned by the government were purchased for use as lumber carriers (Kaiser 1990:14-17).

During peak periods of operation, Crown Lumber employed between 200 and 240 mill workers. Most skilled jobs were held by Caucasians, but the company continued the Mukilteo Lumber Company's policy of hiring Japanese workers for most of the other positions at the plant. The 1910 census figures for Mukilteo precinct indicate that there were at least 86 men of Japanese descent listed as sawmill employees and ten years later the number was only slightly higher at 94. Many of these men were single while working at the mill, although the number of families living in the mill's Japanese community had grown considerably by 1920. Crown's Japanese workers had their own settlement, which included single-family residences, boarding houses, a community hall, boy's club, and a small store (Kaiser 1990:4; Thirteenth Census 1910; Fourteenth Census 1920). The Crown Mill continued to operate in Mukilteo and was its primary employer for more than twenty years (Kaiser 1990:4, 27-30; McConnell 1977:29).

In addition to the Crown plant, several other timber-related businesses were also important employers in Mukilteo during this period. Shingle-making in Snohomish County had begun as a small cottage industry for local ranchers who need extra income, but the introduction of more sophisticated machinery totally changed the business. With new demand in the Midwest after good rail connections were established, Snohomish County had 97 shingle mills on its tax rolls by 1903, with a third of those built after 1900. Mukilteo accounted for several shingle mills during this era, including one operated by the Doucette brothers, the Mukilteo Lumber Company's shingle-making facility, and the Mukilteo Shingle Company, incorporated in 1907 and run by G. A. Bergstrom and E. A. Haynes. At least one or two shingle mills continued to operate along the Mukilteo waterfront during the next few decades, including Haynes Floyd shingle manufacturers, the Yukon Lumber and Shingle Company, and later the Superior Lumber Company, which was incorporated in 1915, but does not appear in city directories until the late 1920s (Figure 13) (Whitfield 1926: I-687 Ficken 1987:105; *Everett Daily Herald*, April 20, 1903:1; Polk 1906:326-328; Polk 1908:646; Polk 1910:764; Polk 1928-29: 697; Secretary of State, Domestic Corporations For-Profit History Cards, Washington State Archives, Olympia).

Another local enterprise that had ties to the timber industry was the Puget Sound and Alaska Powder Company. The plant, which was organized in 1909 by Peter David, produced dynamite and other types of explosives for use in railroad logging and land clearing as well as railroad construction and mining . Puget Sound and Alaska Powder employed about 30 men, many of whom lived in a nearby boarding house owned by the company (Kaiser 1990:3; McConnell 1977:111).

The growth of new industries also led to increased shipping traffic both to Mukilteo and to Everett and the need for construction of a lighthouse and fog signal at Point Elliott by the federal government. The land was surveyed and then plans and specifications prepared in 1904-1905. The station was completed in 1906 and became an important landmark for Mukilteo (US Army Corps to Engineers to Lighthouse Board, March 29, 1904; Coast Guard chronology of Mukilteo Point lighthouse in Lighthouse File, Mukilteo Historical Society, Mukilteo).

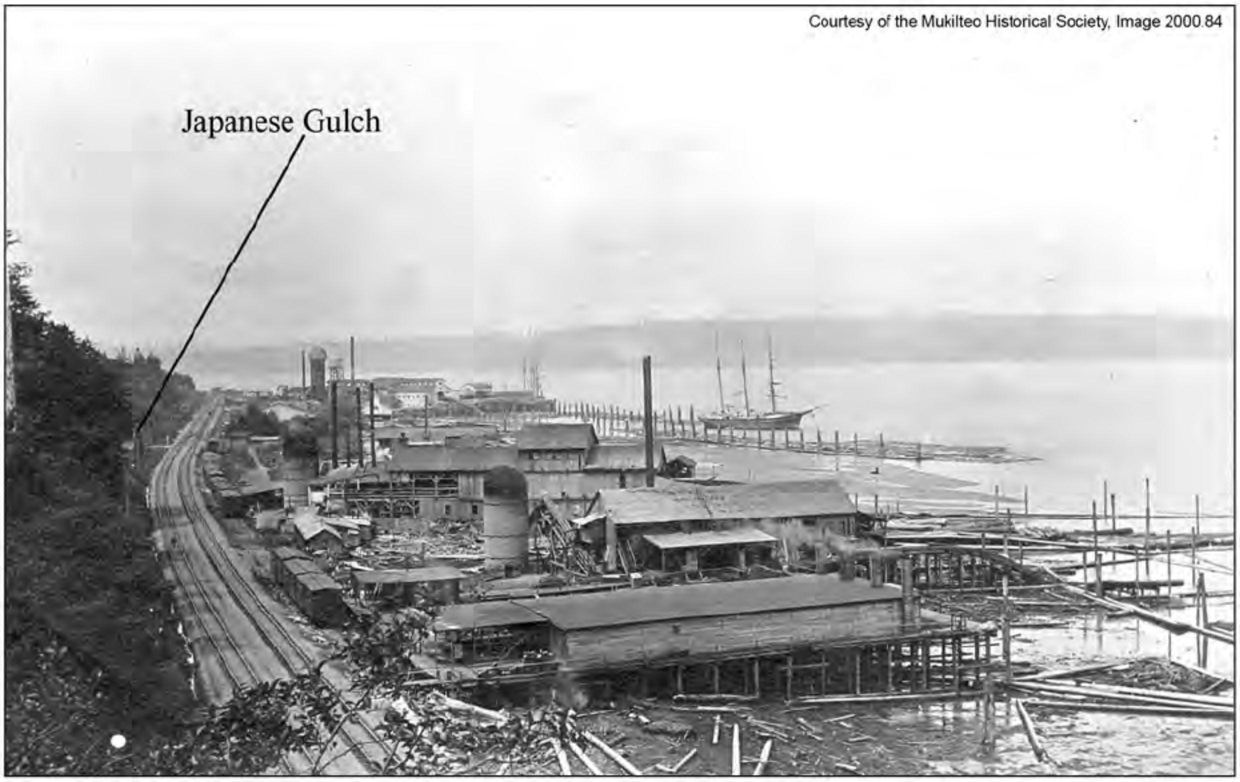

Figure 13. Mills along the beach at Mukilteo, c. 1915, looking west.

As a result of continuing development, the town's population had expanded to approximately 800 by 1910. An Anderson map of this year indicates the Bay View hotel was vacant, but the 1912 Sanborn Fire Insurance Company map shows the hotel in greater detail and thus possibly in use once again. The hotel was later converted to a barracks for soldiers during World War I, and then evidently served as temporary accommodations and the site of occasional boxing matches. Other business in the downtown core along Park during this period included a general store, meat market, and warehouse at the south end of the block; and a small vacant building between the hotel and store (Kaiser 1990:12-13).

By 1920, Mukilteo was home to over 1,100 people, most of whom were employees of Crown Lumber Company. The Crown Lumber Company supported a working community centered on housing along Second Avenue, south of the mill and railroad tracks. A second community of company housing for Japanese mill workers existed near the mouth and lower portion of Japanese Gulch, southeast of the mill (Figure 14). The company store and butcher shop supplied mill workers of various socioeconomic and ethnic backgrounds with groceries, meat, and other necessities (Kaiser 1990:27-30).

Business in Mukilteo remained fairly steady until the end of the decade. Then the effects of the Great Depression and a declining lumber market led to the closure of the Crown Lumber Company plant on September 10, 1930. Problems for Mukilteo were compounded when just a few days after later, an explosion heavily damaged the powder company. Over time, most of the lumber mill machinery was sold or removed, but in August 1938 the remaining mill buildings burned down (McConnell 1977: 93, 111; Kaiser 1990:4)

Figure 14. Aerial view of Mukilteo, looking west, c. 1935.

Sometime after 1940, Park Avenue and the surrounding vicinity (former tidal marsh) were filled with local sand and gravel to its current elevation. During World War II, the mill property was sold to the United States Army, which established the Mukilteo Explosive Loading Terminal (MELT) (Figure 15). The United States Air Force acquired the Army property in 1951 and constructed the Tank Farm for jet fuel storage as well as facilities for fuel transport and experimentation. The Tank Farm ceased operations in the late 1980s and the tanks have since been removed.

In the late 1960s Boeing constructed its manufacturing center for assembling jetliners three miles from Mukilteo at Paine Field. A railroad spur was built from the Mukilteo waterfront to the Boeing plant up through Japanese Gulch to transport parts shipped by water and rail. The current Port of Everett Rail-Barge project at the extreme east end of the Tank Farm is intended to update and continue this supply function (McConnell 1977:72).

2.3 Status of Cultural Resources Research in the Puget Sound Region

Despite a relatively high Native American population density in the Puget Sound region at the time of Euroamerican contact and an abundance of pre-contact archaeological sites found over the past 100 years, very few sites have been investigated in any detail. Most investigations have been limited to identification, boundary definition, and occasionally further testing to determine content and chronology. Pre-contact patterns of Native American settlement have been reasonably well-defined based on these investigations and the somewhat biased data from the few shoreline sites which were excavated because of their susceptibility to damage from development. Extrapolation from the

Figure 15. Overview of project area, 2006, showing Rail-Barge pier, pads from fuel tanks, and the MELT Pier.

archaeological record of neighboring areas, particularly the Gulf of Georgia, is a third contributor to formulations about the Puget Sound region's past. Many broad culture-historical schemes have benefited from this data set with respect to placing the pre-contact archaeology of Puget Sound within the larger context of the Pacific Northwest (e.g., Ames and Maschner 1999; Carlson 1990; Matson and Coupland 1995).

The first archaeological investigations in the Puget Sound were those by Harlan I. Smith and his colleagues with the Jesup North Pacific Expedition led by Franz Boas in the 1890s (Smith 1907). Although the surveyors did not mention any "shell-heaps" in the vicinity of Point Elliott, they were the first to characterize Puget Sound shell middens in the region in terms of their dimensions, matrix, and cultural contents. The descriptive paradigm was the main focus of archaeological research in central Puget Sound through much of the twentieth century, in both systematic surveys (e.g., Bryan 1963; Mattson 1971) and more intensive site-level investigations (e.g., Gaston and Jermann 1975). The increasing volume of archaeological data generated from cultural resource management contexts has been applied, however, to more lines of inquiry as culture-historical frameworks become more refined.

Over the past several decades, archaeological data from Puget Sound have been increasingly directed toward questions regarding cultural and natural processes, both from a broader geographic scale such as subsistence and resource depression throughout the Northwest (e.g., Butler and Campbell 2004), and on local scales such as the interplay of tectonic processes and cultural adaptation in particular locations along Puget Sound (e.g., Troost and Stein 1995). Adequate treatment of these questions requires sufficiently large samples of archaeological material and intact exposures of archaeological deposits. To date these data have come from just a few sites.

[redacted] site (45KI428/429) has provided one of the largest archaeological samples in Puget Sound, spanning over 5,000 years (Larson and Lewarch 1995), and has consequently been used as an interpretive guide for much regional archaeological research over the past 10 years. Data recovery excavations at the Duwamish No. 1 site (45KI23) have also yielded a large amount of information, pertaining to settlement in a more estuarine setting than [redacted] (Campbell 1981). Further upstream, a complex of sites [redacted] provides data on Native American settlement in a riverine setting in the Puget lowland (Lewarch 2006).

[redacted] Shell Midden (45IS2), located [redacted], represents intensive Native American use of a landform comparable to the Mukilteo Point Elliott spit. Between 2004 and 2006, data recovery excavations were conducted at the [redacted] site, one of the most extensive shell middens in the Puget Sound-Gulf of Georgia region (Schalk and Nelson 2010). These investigations documented the complex evolution of the landform and changing human use of the area's resources. Native American occupation of the beach berm and foreshore and backshore sides of the spit began around 1600 radiocarbon years BP, as soon as the landform was above the reach of the tides. The extensive artifact assemblage from the site as well as 47 radiocarbon dates indicates that, prior to approximately 1100 rcybp, the site served as a spring/summer fishing and shellfish gathering camp, probably used by people resident along mainland rivers. After that date, a more permanent settlement apparently developed on the spit, which had, by that time, expanded to the north enclosing a sheltered lagoon. According to authors of the excavation report, evidence suggests that this settlement was associated with a saltwater-based winter village somewhere in the vicinity (Schalk and Nelson 2010). The change in settlement pattern from riverine-based villages to saltwater-based villages is believed to have accompanied population growth in the region and the resulting trend toward resource intensification that occurred in the 2,000 years preceding European contact. Counter to the current view of that period as a time of cultural stability, however, the [redacted] assemblage shows evidence of ongoing culture and subsistence change. Faunal remains indicate increasing dependence on marine resources over time, including exploitation of greater numbers of fish species, and decreasing dependence on terrestrial fauna. Additional evidence of subsistence and culture change is the lithic assemblage, which shifts from hunting tools such as projectile points, large utilized flakes, and choppers to woodworking tools such as adze blades (Schalk and Nelson 2010).

Recent decades have seen an increasing use of archaeological field methods in historical period (post-contact) Puget Sound research. Excavations conducted at historical archaeological sites have provided valuable information regarding the lifestyles of little-known segments of historical period populations, including Euroamerican, Native American, and other ethnic groups.

Knowledge of human use of the Puget Sound region increased following passage of the National Historic Preservation Act of 1966. This legislation requires cultural resource studies prior to implementation of federally assisted undertakings, and has resulted in identification and documentation of thousands of pre-contact and historical period sites.

3 INVESTIGATIONS AND RESULTS

The goal of the cultural resource investigations undertaken for the MMP was to determine whether significant historic properties are present within the APE and, if present, whether they would be damaged by construction or subsequent operation of the ferry terminal. In the context of a federal undertaking, such as this project, significance is measured against the National Register of Historic Places evaluation criteria (36 CFR 60.4).

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of four criteria of significance (National Park Service [NPS] 1997:2):

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.

During previous cultural resources assessments within the MMP APE, six cultural sites were identified as significant or potentially significant historic properties, that is, resources eligible or potentially eligible for listing in the National Register of Historic Places. These properties are the Mukilteo Shoreline Site (45SN393), Point Elliott Treaty Site (45SN108), Old Mukilteo Townsite (45SN404), Japanese Gulch Site (45SN398), Mukilteo Light Station (45SN123), and Mukilteo Explosive Loading Terminal (MELT) Barracks (Field No. MM-04). Ten cultural sites in this area were recommended not eligible for the NRHP—the MELT Pier (Field No. MM-02), MELT Firehouse (Field No. MM-01), MELT Superintendent's Office (Field No. MM-06), DFSP Tank Farm (Field No. MM-03), SR 525 Overpass, Diamond Knot Ale House, Buzz Inn, the Seahorse Owner's House, Multi-family Dwelling, and Ivar's at Mukilteo, while one property—the Mukilteo Ferry Terminal (31-339)—remained unevaluated. One recorded property, McConnell's Boat House (31-244), was demolished prior to the 2003 survey.

During the present phase of the project updated information was obtained for five buildings/building complexes in the MMP APE. The MELT Barracks (Field No. MM-04), one of the properties originally identified as potentially significant, has been altered and is no longer recommended eligible for the NRHP. The Mukilteo Ferry Terminal was determined to be over 50 years old. The complex is documented in this report and recommended not eligible for NRHP listing. Three buildings have been demolished since the 2003 cultural resources survey: Buzz Inn, the Seahorse Owner's House, and the Multi-family Dwelling.

All of these cultural resources are addressed below. The properties are arranged by type—the pre-contact archaeological site first, followed by historical period archaeological sites, the historical event location, and historical period buildings and structures. The Mukilteo Shoreline Site (45SN393), Old Mukilteo Townsite (45SN404), and Point Elliott Treaty Site (45SN108) are described in greater detail than the other resources since this document revises the earlier report (Miss et al. 2008).

3.1 MUKILTEO SHORELINE SITE (45SN393)

Site 45SN393, the Mukilteo Shoreline Site, was identified in 2005 during initial cultural resource studies for the Mukilteo ferry terminal project (Kaehler et al. 2006). The project area is an urbanized environment, with most original landforms obscured by pavement and buildings or buried beneath deep fill. Due to lack of ground visibility, archaeological monitoring of geotechnical boreholes was used to supplement traditional visual surveys of the APE. [redacted] the archaeological monitor observed intact, stratified shell midden deposits in two bore holes. The positive bores were about 575 feet (175 meters) apart, in [redacted] The midden was found beneath historic fill ranging from [redacted] in depth, suggesting substantial variability in the original topography and/or historic ground surface modification. The archaeological midden deposit in one borehole was [redacted] thick, and in the other [redacted] thick. Because the archaeological deposits are buried beneath deep fill, the site could only be characterized in preliminary terms. The horizontal site dimensions, [redacted], were based on the distance between the two positive boreholes and the negative evidence of a series of bores across what had been the tidal marsh. Following these initial studies, the extent of the site remained unknown (Kaehler et al. 2006).

In 2006 WSDOT, on behalf of WSF, commissioned additional studies of the Mukilteo Shoreline Site (45SN393) in an effort to determine the site's extent and eligibility for listing in the National Register of Historic Places. Significance, that is, National Register eligibility, of archaeological properties is generally judged under NRHP Criterion D, the property's potential to provide information important in understanding history or prehistory. Importance of the information is measured by relevance to identified research questions that can be addressed through analysis of particular data types. A property, therefore, is judged on the basis of the availability or potential availability of specific data classes necessary to address particular research questions and domains. Five research domains, each with supporting research questions, were formulated during the initial phase of the investigations. These research questions guided the subsequent archaeological and geoarchaeological fieldwork and served as the basis for the National Register eligibility recommendations. These domains and questions are summarized below.

Research Domains and Questions

Site Structure - the Lithostratigraphic Framework: The geoarchaeological component of investigations concentrates on establishing the presence of adequate data to provide a preliminary lithostratigraphic sequence for understanding the physical sequence of geomorphic events in the site and its immediate area. The specific questions and goals of the research include:

- Determination of the range of lithofacies types for both archaeological and sedimentary deposits;
- Construction of lithofacies assemblages;

- Definition and description of environments of deposition;
- Establishment of a chronostratigraphic framework based on relative or absolute chronometric data;
- Relation of the sedimentary bodies to the archaeological deposits;
- Description of the internal structure and character of the archaeological deposits.

Data classes from the site that may be applied to these questions include the stratigraphy of deposits, datable materials, and the character of the archaeological deposits.

Landform History: Reconstruction of the landscape is carried out on several scales and relates site microenvironmental interpretations to local environmental characteristics, and ultimately, to broad landscape changes. At this higher scale, analysis focuses on topographic setting and landforms used directly for subsistence and makes use of bioarchaeological evidence to examine the relationship of the site to the surrounding landscape mosaic. The specific questions and goals of the research include:

- When did the modern cuspate foreland begin to emerge above the tidal limit?
- After supratidal emergence, what was the rate and character of lateral growth and vertical accumulation of the spit?
- Are there periodicities in spit growth and stability?
- Are there related in-tandem changes in the character of archaeological deposits?
- Is there evidence for earthquake-induced changes to the configuration of the landform?
- Is there evidence for buried paleo-shoreline features and associated archaeological deposits?

Data classes from the site that may be applied to these questions include the stratigraphy of deposits, character of the archaeological deposits, datable material, artifacts, and faunal and botanical remains.

Site Formation: The study of site formation is critical for understanding the context of archaeological materials (Stein and Farrand 2001; Wood and Johnson 1978), and is used to generate formation histories for archaeological sites based on the physical sequence of sediments and archaeological deposits. Since site formation processes operate in both the natural and cultural realms (Schiffer 1987), a site formation history includes identifying and interpreting archaeological materials in terms of 1) transport and transformation by human activities; 2) the effects of post-occupation, pre-burial taphonomic processes; and 3) changes imposed by post-depositional alterations.

Considerable variability exists in size, internal composition, function, and occupational history of shoreline archaeological sites. Since the specific history and function of shoreline archaeological sites may vary across both space (function of location) and time (function of landform evolution), this facet of the geoarchaeological analysis will use aspects of site structure, internal constituents, and spatial distribution to address the following issues:

- What are the horizontal and vertical boundaries of the site within the Air Force property?
- What is the range of internal stratification expressed within the archaeological deposit?
- How much place-to-place variability is exhibited by the archaeological deposits, and can this be related to micro-habitat substrates on the cuspate foreland?
- Are potential habitat substrate changes represented through time in the archaeological record?
- How old is the site and for how long was it occupied?

- What post-depositional processes have occurred at the site?

Data classes from the site that may be applied to these questions include physical site parameters, the stratigraphy of deposits, the character and content of the archaeological deposits, datable materials, and the historic record.

Cultural Processes: Aspects of the site occupants' lifeways include such parameters as demography and cultural processes such as economy, subsistence, and cultural continuity. Answers to questions about the people who lived at the site require adequate samples of the implements they made and used, the remains of food they ate, and evidence of their dwellings or other structure or features they built. Additional information about the times of the year that the site was occupied can be found in seasonally diagnostic animal and plant remains and microscopic analysis of seasonal indicators on shells. How the lifeways of the pre-contact occupants of 45SN393 compared to the Indian communities living in the vicinity of Mukilteo after contact can be investigated by comparison of archaeological data with ethnohistoric and ethnographic observations, Native American oral tradition, and information from contemporary tribal members. The specific questions and goals of the research include:

- How many people lived at the site? Is there evidence of the intensity of human occupation at the site, or that it changed over time?
- Is there evidence for dwellings or other structures at the site?
- Is there evidence for particular seasons of occupation?
- Can specific site activity areas be differentiated at the site?
- What were the economy and subsistence of the occupants, and did they change over time?
- Is there evidence for continuity in occupation from pre-contact occupants, to the Native American communities recorded by ethnographers, to modern Tribal communities?

Data classes from the site that may be applied to these questions include structural remains, activity areas, features, faunal and botanical remains, artifacts, artifact residues, oral testimony, and data from previous investigations.

Regional Syntheses: Site 45SN393 is part of a larger settlement pattern that was used by its occupants, and also part of the larger network of settlements in which different Native American communities interacted. Placing this site into a larger temporal-spatial framework involves addressing questions of culture history and exchange. Quantitative and qualitative comparison of data from other sites in the region provides information on how 45SN393 relates chronologically and culturally to the rest of Puget Sound.

- Do the data collected from this site allow it to be placed within larger patterns of Native American occupation of the Puget Sound region, including existing culture-historical frameworks?
- Is there evidence of exchange or other external relationships?

Data classes from the site that may be applied to these questions include structural remains, activity areas, features, faunal and botanical remains, artifacts, artifact residues, oral testimony, and data from previous investigations.

Geoarchaeological and Archaeological Field Studies

Geoarchaeological investigations in 2006-2007 focused on retrieving data pertinent to establishing the physical framework of the site deposits, identifying the extent and context of the archaeological deposits, and constructing a preliminary landform history. Goals of the archaeological studies overlapped the geoarchaeological goals, and included finding archaeological material beneath historic fill; establishing site boundaries, content, and integrity; and evaluating research potential. The study area for these investigations was the portion of the APE [redacted] (Figure 16).

Archaeological Testing Methods – Trenching and Coring

Initial archaeological field methods were designed to accomplish the goal of testing archaeological deposits within the project APE for eligibility to the National Register of Historic Places. Testing involved defining the site boundaries and assessing the data potential and integrity of the deposits. The field methods were somewhat unconventional for archaeological testing given that, 1) much of the ground surface across the APE is impermeable (e.g., [redacted]), 2) the archaeological deposits are under [redacted] of modern and earlier historic fill in most places, 3) the likelihood of encountering sediments contaminated with petroleum and other hazardous materials during the investigation was considered high, and 4) the effects of tides on ground water elevations was difficult to predict. The impermeability of the ground surface and inaccessibility of the underlying archaeological deposits precluded hand-excavation techniques, and the presence of contaminated sediments required close monitoring of all field activity and samples taken.

Field work was scheduled to coincide with the lowest possible tides. A combination of backhoe trenches and solid four-inch diameter cores were excavated throughout the APE to accomplish the goals of testing. Data from eight previously excavated geotechnical boreholes reported by Anchor Environmental, L.L.C. (2006) in the study area and off-shore immediately north were also reviewed. The trench profiles provided quantitatively comparable midden samples, radiocarbon dates, and an indication of the integrity of the site deposits. The spoils from archaeological layers in the trenches provided a source of archaeological material that would possibly have been missed in small midden bulk samples, such as artifacts and larger mammal bone. Stratigraphic sequences from solid cores provided geological information about the landform on which the site is situated and presence-absence data on the spatial extent of site deposits.

Fieldwork was conducted by WSDOT backhoe and mud-rotary drill operators and sub-contracted sonic core operators, supervised by NWAA archaeologists. Prior to the commencement of fieldwork and several times during the project, a representative from Herrera Environmental Consultants, Inc. oriented the field crew to potential on-site hazards and monitored all of the trenches and many of the cores with a Photo Ionization Detector (PID), a portable vapor and gas detector that can sense organic compounds. All WSDOT safety protocols were followed. Standard daily work record forms were completed by NWAA archaeologists, along with photograph logs and artifact and sample bag catalogs. Mapping of features and test units was completed using a Trimble GeoExplorer hand-held global positioning system (GPS) receiver.

This image has been redacted.

Figure 16. Location of boreholes, trenches, and cross sections (see Appendix B for core and trench numbers).

Trench Excavation

Sixteen trenches were excavated between July 20 and July 26, 2006, timed to minimize the effect of tidal inundation on stratigraphic profile exposures (Figure 16). Trenches were dug with a backhoe using a four foot-wide bucket initially equipped with teeth but later replaced with a straight blade to provide cleaner exposures of the trench wall and base. The trenches were excavated 4.5 feet (1.4 meters) deep before metal shoring boxes were inserted. NWAA archaeologists periodically halted excavation to examine the exposure of the trench profile. Excavation of each trench ceased when at least several feet of sterile beach deposits were encountered or the water table was reached. A schematic of the stratigraphy for the roughly three-foot wide profile at the head of each trench was recorded on a standard Trench Description Form, which included a graphical representation of the deposits to vertical scale, narrative descriptions of the deposits, and a list of samples and artifacts taken from the profile. Depths of profile strata below ground surface were based on a datum spike or point placed as close to the head of the trench as possible, and recorded with the GPS unit.

[redacted]

Spoils from the trenches in which Native American midden deposits were encountered were screened, including those from [redacted]. Sediment from the archaeological layers, identified by their dark, charcoal-rich staining and association with fire-modified rock, shell, and bone, were stockpiled separately from the overburden and deeper sterile beach sediments. The archaeological sediments were passed through ¼-inch mesh screens by NWAA archaeologists supervised by an osteology specialist who examined each bone fragment to determine whether or not it was from a human. All artifacts and unmodified mammal bone fragments from the spoils were bagged with the general provenience of trench number, and brought to the NWAA lab for cataloguing and further analysis. Spoils from [redacted], which encountered a concentration of early historic artifacts and faunal remains below plank decking of the Crown Lumber Company mill, were stockpiled and examined by hand. Diagnostic historic artifacts and faunal remains were collected from this pile.

Supervising NWAA archaeologists examined each trench profile and took samples from cultural strata. Constant-volume samples of one liter were obtained. CVS samples either came from a column at regular 10-centimeter intervals to obtain a continuous sedimentary sequence, or from within a specific layer to characterize the midden stratigraphy. Botanical samples were also taken from some profiles, either as isolated charcoal fragments or as bulk samples of charcoal-stained sediments.

Archaeological Borehole Sampling Program - 2006

The borehole sampling program drilled 85 boreholes [redacted] between August 7 and September 9, 2006 (Figure 16). Forty-five boreholes were drilled using mud rotary methods; the remaining 40 were excavated using a truck-mounted sonic drill. Total depths of the boreholes ranged from 6.7 feet to 40 feet deep for a total of 1469.7 drilled linear feet (Appendix B).

The mud rotary drilling system drove a four-inch-diameter sampler in two-foot or five-foot increments using a 140-pound hammer (Figure 17). Because of difficulties with retaining samples in the core barrel and due to percolation of groundwater and drilling mud through the sample, which removed the fine fraction sediments, use of the mud rotary drilling system was limited to the areas of the project where archaeological deposits were likely to be absent.

The sonic drilling method (also called vibracoring) used a rapidly oscillating drill head to advance a 20-foot-long core barrel (Figure 18). Coring started at two feet below the surface, the barrel was advanced to 15 fbs, and the resulting core sample was extruded directly from the core barrel in two to five-foot increments into plastic sleeves. The sleeves were then laid out in order, cut open, logged, and if midden was present, sampled (Figure 19).

For both mud rotary and vibracore drilling methods, sections of core samples in which midden was found were photographed and bulk samples were collected in 4-inch (10 cm) long increments through the length of the midden. Radiocarbon dating samples were retrieved and bagged separately.

The borehole sampling program followed a drill plan drawn up before fieldwork began. As drilling proceeded, locations of selected individual boreholes were modified depending on the field results showing the spatial extent of deposits. Each borehole was numbered in the field with an AH or other letter designation

Figure 17. The mud rotary drilling rig.

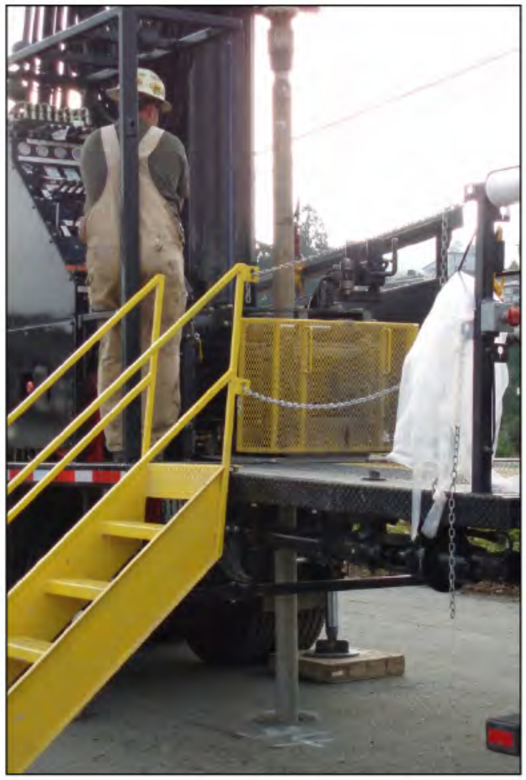

Figure 18. The sonic drilling or vibracore rig.

Figure 19. Inspection of vibracore samples.

followed by an Arabic number, but for purposes of reporting the results, the AH/letter designations were dropped in favor of using a way to refer to the drilling method at each borehole. Boreholes preceded by MR were drilled using the mud rotary method, and those preceded by VC were drilled using the vibracore method.

The borehole drill plan extended from the entrance to the Tank Farm at the corner of Park Avenue and Front Street east to Tank Pad 4. Cores obtained by mud-rotary excavation were [redacted] Since the cores obtained by the sonic drill (vibracore method) provided complete stratigraphic sequences, these cores were [redacted] (Figure 16; Appendix B). No boreholes were drilled in Tank Pad 1 or in the northwestern half of Tank Pad 2 during the 2006 investigations because there was about one foot of standing water on the tank pads.

Geotechnical Explorations – 2007

Additional archaeological borehole sampling was conducted in conjunction with geotechnical explorations completed by WSDOT in 2007 to assess load-bearing stability for proposed structures in the study area. During two phases of field work between March and October 2007, archaeologists logged 22 archaeological cores and monitored 28 geotechnical boreholes in the study area (Figure 16). Archaeological cores were drilled using the vibracore method described above, while the monitored

Table 1. Trench Summary, Mukilteo Multimodal Ferry APE.

TRENCH NO.	LOCATION OF TRENCH PROFILE FROM FRONT GATE	MAX DEPTH (CM)	DEPTH OF FILL (CM)	TRENCH LENGTH (M)	CONTENTS (SEQUENTIAL WITH DEPTH)	APPROX. VOLUME OF DEPOSITS SCREENED (CU. M)
1	Redacted	250	Redacted	15	This data has been redacted	-
2		255		7		-
3		252		8		2.5*
4		225		5		-
5		305		5		5
6		320		4.5		6
7		340		4.5		-
8		370		4		6.5
9		210		6		-
10		275		4.5		-
11		255		7		5
12		305		7		-
13		330		5		3.5
14		290		5		6
15		270		4		-
16		275		6		-

* About 2.5 cu. m of the historic debris concentration in [redacted] was stockpiled and examined by hand, but not screened.

geotechnical boreholes used mud rotary or hollow-stem auger drilling methods. All boreholes were recorded by archaeologists in the field using the methodology devised for the 2006 borehole sampling program; however, bulk samples were not retrieved from the boreholes during geotechnical explorations in 2007.

Between March 6 and April 22, 2007, three archaeological boreholes were logged and seven geotechnical boreholes were monitored on the Tank Farm Property, and 11 geotechnical bores were monitored off-shore immediately north of the property. Between October 9 and 24, 2007, a total of 19 archaeological boreholes were logged and 10 geotechnical boreholes were monitored at the Tank Farm Property and in the vicinity of the existing ferry terminal on Front Street. Boreholes were logged or monitored to total depths between 12 and 110 fbs (Table 2).

Table 2. Summary of Archaeological and Monitored Geotechnical Boreholes.*

TYPE OF BOREHOLE	NO. OF BOREHOLES	NO. OF MONITORED LINEAR FEET
2006 Boreholes		
Archaeological Mud Rotary	45	869.7
Archaeological Vibracore	28	600.0
	73	1469.7
2007 Boreholes		
Archaeological Boreholes	22	333.0
Geotechnical Boreholes	28	2497.9
Sub Total	50	2830.9
TOTAL	123	4300.6

*Archaeological boreholes are dug for archaeological purposes, while geotechnical boreholes are dug for geotechnical exploration. Geotechnical boreholes, however, like those noted here, may be monitored (examined) 1by archaeologists.

Archaeological borehole sampling completed during 2007 WSDOT geotechnical explorations included 17 cores in the Tank Farm property (Figure 16). Three cores were excavated in [redacted]

Due to proposed alterations to the existing ferry terminal, geotechnical explorations in October 2007 expanded the study area westward to include the vicinity of the existing terminal. At this time five additional archaeological cores were excavated on [redacted].

The geotechnical boreholes were archaeologically monitored to further examine site stratigraphy near the site boundaries. Boreholes were monitored along Front Street just north of the tank pads and at the ferry boat loading ramp near the existing ferry terminal. In order to provide additional context for developing a landform history, boreholes off-shore immediately north of the study area were also monitored.

Classification of the Deposits

The trenching and coring programs revealed a complex array of individual depositional layers (lithofacies or facies) representing single depositional events. The facies are lateral changes in the lithologic characteristics of deposits within a stratigraphic unit and are defined using physical properties of the sediments, hence the term lithofacies (Boggs 1995; Reading 1986). Facies analysis derives environmental interpretations from depositional sequences based on the principle that lateral shifts through time in the boundaries of adjacent depositional environments are represented vertically in the stratigraphic record by corresponding shifts in facies boundaries.

The facies type is the fundamental depositional unit in a spatial hierarchy that locates the individual facies type relative to the surrounding deposits, thus providing a way to determine the environment of deposition for an individual layer. The concept of facies association or assemblage provides the organizing principle for analysis at the next higher level in the depositional hierarchy. The facies types grouped into assemblages are considered to have been deposited adjacent to each other or in vertical succession in the same environmental setting. The lithofacies can be formed into assemblages because they represent the range of depositional events that frequently occur together in the same overall depositional environment. Lithofacies become stacked into stratigraphic units because the environments shift through time, permitting different lithofacies to accumulate along a vertical axis (Miall 2000:150).

Facies assemblages are the basic unit of analysis for this project and are defined by facies that share distinctive lithologic features or by stratigraphic relationships (that is, by the nature of their vertical or lateral boundaries). The advantage of this level of analysis is that it allows one to see more clearly associations between sediments and landforms (Bennett and Glasser 1996; Miall 2000). These larger, more inclusive units share common attributes such as gross geometry, shape of the units, and structure. Like the concept of facies, a facies assemblage is descriptive and is used to represent various types of depositional events that frequently occur together in the same overall depositional environment (Miall 2000). For the analysis of 45SN393 these facies assemblages are called strata, and each is composed of any number of individual lithofacies.

Table 3 shows how the classification system has been organized, and shows both the strata designations and the lithofacies nomenclature. Lithofacies are designated by a capital letter that indicates the dominant or primary grain size of the deposit. This capital letter is followed, in most cases, to its right side by a small letter describing a distinct secondary property of the same deposit. Secondary properties can be added indefinitely. For example, a gravelly sand would be designated Sg, and gravelly sands may be found as a component in a number of strata. Stratum II and Stratum IV, for example, both contain gravelly sands, but Stratum II is distinguished from Stratum IV by having archaeological facies such as sandy midden (Sae) or shell-rich sandy midden [S(ae, sh)], whereas Stratum IV does not contain archaeological layers but does have a few thin layers of detrital wood (Wd) or thin peat (Pw or Pf).

The system's purpose is to provide adequate descriptive data at small scales while sustaining geomorphic and landscape analyses at larger scales. Analogous to landscape elements in ecology, facies assemblages can be thought of as elements, or minimal homogenous parcels of land (Forman and Godron 1986; Stafford 1995), that are often arranged in patterns and exhibit varying degrees of connectivity and heterogeneity (Forman 1995). The geomorphic expression of facies assemblages at a larger scale are often referred to as geomorphic units, for example beaches, fans, and spits, which actually consist of smaller, well-defined, elements.

Table 3. Naming System Used to Classify the Depositional Sequence at 45SN393.

STRATUM DESIGNATIONS	LITHOFACIES	
	Modal Grain Size	**Modifiers**
I – Fill	**G** = Gravel (> 2 mm)	**Midden facies modifiers:**
II - Midden	**S** = Sand (0.62 mm - 2 mm)	**Ah** = humic A horizon (may be charcoal-enriched as well)
III - Sandy barrier/berm deposit	**Z** = Silt (< 0.62 mm)	**ae** = generalized, or undifferentiated, midden; also used to designate archaeological layers in Stratum III.
IV - Beach sediments	**P** = Peat	**f** = highly fragmented shell (“hash”).
V - Submerged sandy barrier/berm?	**W** = Wood	**sh** = high amount of shell
		Secondary Lithologic Properties
		g = gravelly
		s = sandy
		z = silty
		m = massive
		sh = shell or shelly
		o = organic-rich
		p = peaty
		w = woody peat
		f = fibrous peat
		d = detrital wood (sea wrack, driftwood)
		h = historical wood
		om = organic layer, but not a peat
		tr = trace amount

The geomorphic concept of elements fits in nicely with the archaeological concept of place, defined as a set of landscape elements configured in a way that offers a higher probability of serving as a stopping point within a group’s given settlement and economic system (Binford 1982; Wandsnider and Sullivan 1998). A landform may exhibit many elements but only a subset of the elements may actually possess the requisite characteristics to serve as attractive places for human hunters and gatherers. Furthermore, over time, different human mobility strategies in a region may share the same configuration of elements, creating localized high-density accumulations of artifacts at places due to re-use over long periods of time (Dewar et al. 1992; Stafford et al. 1992). By describing the geomorphic elements of a landform, the facies system provides a framework for relating cultural deposits to a geomorphic context.

Borehole Data Analysis

After completion of the initial fieldwork in 2006, the borehole data was compiled using Rockworks 2006 software. The lithostratigraphic classification of the deposits was used to create profiles of the archaeological deposits and to model site stratigraphy. The configuration of the boundary of the pre-contact archaeological site was determined based on the location of boreholes in which midden deposits were identified. Archaeological work completed during geotechnical explorations in 2007 extended the site boundary and further clarified the structure of the site deposits. Once a comprehensive model of site stratigraphy had been created, the borehole lithologic sequences were reevaluated based on expectations of the stratigraphic positioning of the midden deposits at the base of Stratum I, within Stratum II, and at the top of Stratum III.

Artifact and Sample Processing Methods

Artifacts and samples were brought to the NWAA lab from the field, and after being screened or sorted, were catalogued with unique numbers for artifacts and separate sample constituents (Appendix C). Artifacts were dry-brushed to remove dirt, and all samples were placed on trays and dried using a low power drying oven. Constant-volume samples were passed through nested ¼-inch, ⅛-inch, and 1/16-inch sieves. In most cases, the 1/16-inch fraction was bagged without further sorting, and the ⅛-inch fraction was sorted into major constituents (shell, bone, charcoal, lithics, unmodified pebbles) and the artifacts and bone fragments analyzed further. The ¼-inch fraction was sorted into major constituents, and all faunal remains and cultural materials were analyzed. Bulk samples, primarily obtained for charcoal and other macrobotanical remains, were also placed on trays, dried, re-bagged and then sent to a paleoethnobotanist for further analysis.

All artifacts were analyzed at the NWAA laboratory, including lithic and bone artifacts and historic artifacts. The bulk samples for botanical analysis were split into two equal volumes. One half of each of 13 samples, plus one charcoal sample, were sent to Demeter Research, who separated and identified charcoal from the samples and assessed their suitability for radiocarbon dating. Later, the remainder of each sample was recombined with the other half of the original sample for a more comprehensive botanical analysis. Eight charcoal samples from the top and bottom of midden deposits exposed in four of the test trenches were submitted to Beta Analytic, Inc. for radiocarbon assay. These samples were of charcoal separated from the bulk samples and judged moderately suited or well-suited for dating.

Shell from the ¼-inch fraction and animal bone from the ¼-inch and ⅛-inch fractions of each trench CVS were analyzed, along with all bone collected from the trench spoils screening. Borehole bulk samples were screened in the laboratory and raw shell counts were obtained from the ¼-inch fraction. Shell and fish bone analysis was completed using NWAA comparative collections, which contain modern specimens of most representative taxa of these classes found throughout Puget Sound. Mammal bones were sorted in the NWAA laboratory and then taken to the Mammalogy skeletal collection at the Burke Museum of Natural History and Culture for further analysis by the NWAA zooarchaeologist. Bird remains were analyzed by Dr. Kristine Bovy (University of Rhode Island) using comparative material at Department of Ornithology of the Harvard Museum of Comparative Zoology. Analytical methods specific to material type are described in the individual results sections below or accompanying appendices.

Stratigraphy

The physical structure of the site was resolved into six strata with each stratum consisting of one or more facies. Stratum I, representing deposits associated with historic and modern land use, was not subdivided into individual facies. Strata II, III, IV, and V consisted of several distinct facies types related in complex ways. Stratum VI, the deepest deposit identified at the site, was observed in a limited number of boreholes and consisted of only a few facies types. Table 4 summarizes the composition of each stratum and the inferred environmental conditions under which each stratum was formed.

Table 4. Composition of Site Strata and Inferred Environments of Deposition.

STRATUM	DESCRIPTION	LITHOFACIES	INFERRED ENVIRONMENT OF DEPOSITION
I	Deposited since the beginning of historical occupation of the landform; includes early historical debris.	Not formally subdivided	Fill
II	The culture-bearing facies assemblage representing archaeological deposits created by pre-contact cultural activities on the landform.	**S** - sand; **Sg** - gravelly sand; pebble-sized gravel; **Aae** and **ae** - Undifferentiated midden matrix; **Ah** - A thin A horizon formed between occupations; **cs** - charcoal-stained; **sh** - shell/shelly	Archaeological midden on emergent portion of spit.
III	Moderately well-sorted sand containing few pebbles and fragmented natural shell; upper portion occasionally contains isolated archaeological deposits.	**S (ae)** - Culture-bearing sand **S (cs)** - Charcoal-stained sand **S (sh)** - Sand with crushed shell layer **Sg** - Gravelly sand **Zs** - Sandy silt	Beach barrier/berm cap overlying Stratum IV.
IV	Loosely consolidated pebbly sand and sandy pebble-gravel with detrital wood fragments (driftwood) and sea wrack; in places, submerged wetlands deposits.	**Sg** - Gravelly sand **Gs** - Sandy gravel **Wd** - Detrital wood (driftwood) **P** with **f** or **w** - Fibrous (f) or woody (w) peat.	Beach and spit
V	Moderately well-sorted medium sand containing fragmented natural shell.	**S** - Sand	Too few exposures to determine; may represent a submerged older barrier/berm.

Stratum I

Stratum I consists of all sediments deposited on the landform resulting from land use activities associated with the historic era and later by the Air Force (Figure 20). Formally, the deposits associated with the early town of Mukilteo and the operation of the Crown Lumber Company are included with this stratum, since this represents land use activities that have affected the archaeological deposits associated with pre-contact land use activities. In most places on the landform it is presumed that the top of Stratum II has been truncated, to an unknown depth, by activities associated with deposition of Stratum I.

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Figure 20. Typical expression of Stratum I, note the brick fragment at center.

Stratum II

Stratum II is the well-stratified archaeological midden depositional sequence found [redacted] (Figure 21). This stratum includes archaeological facies (see Table 4) representing human-induced deposits associated with shifting locations of cultural activities during occupations of the spit. Figure 22 compares the stratigraphic sequences with the lithology from selected boreholes to show the internal structure of the midden and the high degree of place-to-place variability in the local depositional sequences; Figure 23 shows detailed profiles from selected backhoe trenches. Both figures show the archaeological deposits are periodically interbedded with a distinct moderately to well-sorted yellowish brown sand. Based on the lithology and the fact that they interbed with the archaeological deposits, the sand layers are interpreted to represent sandy overwash deposits created by waves breaking over the spit during storm events.

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Figure 21. Typical expression of Stratum II, showing well-stratified midden deposits.

Stratum III

This is a thin layer of sand mantling [redacted] and extending laterally beyond the boundaries of the overlying Stratum II (Figure 24). Sediments comprising this stratum are predominantly moderately well-sorted to well-sorted medium to fine sand, with few pebble-sized gravels. Although the overlying Stratum II is composed of archaeological deposits associated with development of the midden, culture-bearing deposits are also found in the upper portion of the Stratum III sand underlying Stratum II. The shell content of these layers is considerably lower than those associated with Stratum II, and the facies tend to be thin charcoal-stained layers, or if shell is present, it is expressed as an isolated thin layer of finely crushed shell. In general, the lower contact of Stratum II with Stratum III is defined by a rapid decrease in cultural shell content and by a decline in the overall amount of pebble-gravel. Figures 25 and 26 show a series of north-south cross sections beginning at the western end of the study area and progressing to the east to the vicinity of Tank Pad 4 (see Figure 16). As can be seen from these cross sections, in almost every case where the Stratum II midden was found in the backhoe trenches or boreholes, the midden is found resting directly on Stratum III.

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Figure 22. Stratigraphic sequences from selected boreholes showing the internal structure of the midden.

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Figure 23. Detailed profiles from selected backhoe trenches.

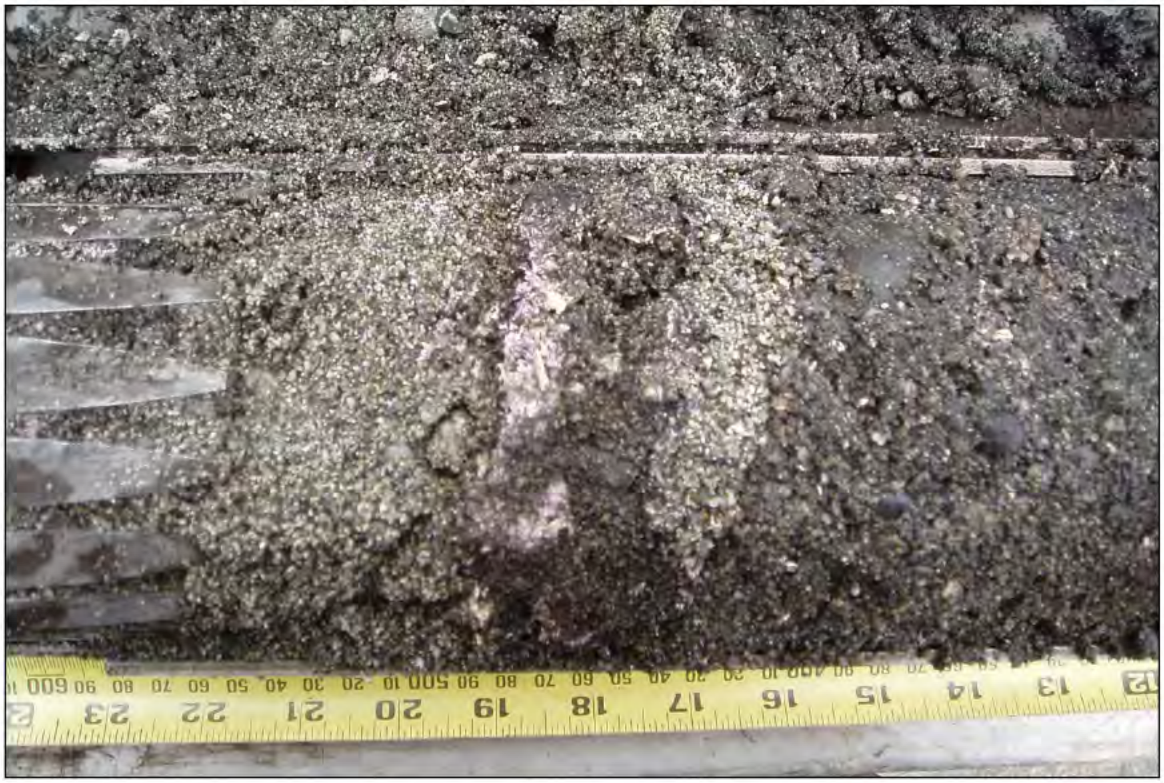

Figure 24. Typical expression of Stratum II (right) overlying Stratum III (left).

Stratum IV

By volume, Stratum IV is the most extensive stratum, occurring throughout the study area. The lithology is dominated by loosely consolidated sediments ranging between coarse sandy pebble-gravel and gravelly coarse sand (Figure 27). The vertical sequence, however, exhibits subtle bedding characterized by shifts in facies from woody debris to thin ephemeral fibrous and woody peats to muddy sand and gravel layers. Occasionally, a rip-up clast composed of weakly consolidated mud with dispersed granules (very fine pebbles) was retrieved, and in the eastern portion of the project area closer to the mouth of Japanese Gulch, there appeared to be a slight increase in the number of naturally fractured angular gravel.

These variations in the basic Stratum IV depositional sequence are thought to represent the formation of ephemeral driftwood zones or thin fringing wetlands during pauses in the accumulation of the stratum. The muddy rip-up clasts may be reworked glacial till introduced into the depositional sequence by erosion of the bluff to the south prior to emergence of the spit, or by debris flows coming out of Brewery Gulch and Japanese Gulch.

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Figure 25. Cross Sections A through C (see Figure 16 for cross section locations).

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Figure 26. Cross Sections D through F (see Figure 16 for cross section locations).

Figure 27. Typical expression of Stratum IV.

The isolated branches and twigs scattered throughout Stratum IV are interpreted to represent pieces of driftwood caught on the exposed beach through time as Stratum IV accumulated. A zone of fibrous peat, sea wrack, and driftwood was consistently found at depths ranging between about 12 and 17 feet below surface (fbs), and was best-expressed in a group of boreholes in an area centered on MR-59 east of Tank Pad 2 (MR-45, MR-48, MR-51, MR-52, VC-53, VC-57, MR-59, MR-66, MR-68, and MR-79). Figure 28 shows the stratigraphy and lithology for selected boreholes east of Tank Pad 2; the peat and detrital wood layers appear in the Stratum IV deposits in the boreholes near the southern boundary of the study area. The peat gradually thinned eastward and was replaced by branches and twigs probably representing driftwood accumulated around the edge of a small shallow lagoon. To the west, the peat was found in MR 10, in the southwest corner of the project area, and in MR-6, near the entrance to the parcel. A radiocarbon sample retrieved from a layer of organic matter, twigs, and fibrous peat in MR-6 at 16.8 fbs (Figure 25), returned an age of 1640 ± 40 radiocarbon years before present (rcybp) (the 2-sigma calibrated calendrical age is AD 1420 to 1500). This represents a relatively rapid accumulation rate of about 5.8 centimeters (2.3 inches) per year for the upper portion of Stratum IV.

In several boreholes in the southern portion of the project area, the top of Stratum IV (or Stratum III when present) is characterized by distinct bedding capped by silt or interbedded organic matter and silt, underlying the fill deposits (Figure 28). This upper sequence is interpreted to represent the emergence of the modern cuspate foreland, and the shift from an open beach to the formation of tidal wetlands.

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Figure 28. Cross Section G (see Figure 16 for cross section locations).

Stratum V

Stratum V was found in three archaeological boreholes at the deepest depths sampled by the archaeological borehole program, and in nine geotechnical boreholes along the northern boundary of the study area. Stratum V is a "clean" sand similar in composition to Stratum III, but with a greater amount of dispersed natural shell fragments. No archaeological materials were found at the upper contact of this stratum, and given the lithologic similarity to Stratum III, it is presumed the clean sand represents a former sandy barrier ridge or berm on a now-submerged spit. In some of the deeper boreholes, the clean sand was found overlying relatively poorly-sorted sequences of gravelly sand marked by an increase in pebble-gravels and higher lithologic heterogeneity. This lower gravelly sand may represent older deposits from the pre-Vashon or Vashon periods; however, the limited number of deep exposures of Stratum V was not sufficient to define the lower sand as a separate facies or stratum.

A facies sequence of fine sand interbedded with lenses of peat and peaty silt between 27 and 60 fbs was found along the northeastern boundary of the study area. The peat-sand sequences were thickest in A-11, A-12, A-13, and A-14 and thinned eastward to a single peat layer at 45-46.5 fbs in A-15. The thickest peat layers appear as individual facies in the lithologic sequence (Figure 29). The fine sand interbedded with the peat sequences is similar to the clean sand that occurs at a similar depth at the top of Stratum V, and the peat-and-sand sequences may represent an intermittent low-energy environment occurring during the formation of the now-submerged barrier or berm.

Stratum VI

The top of Stratum VI, identified in nine geotechnical boreholes in the northern portion of the study area between 79 and 110 fbs, is very dense, compact, silt and clay, often poorly sorted with varying small amounts of sand or scattered rounded pebble-gravels. The stratum represents glacial till sediments dating to the Vashon or pre-Vashon periods. Only 10 boreholes within the study area were drilled to the depth necessary to reach the contact with Stratum VI; however, it is presumed the till is laterally extensive throughout the study area and not solely confined to the northern portion of the study area. In the two boreholes drilled to 100 fbs in the vicinity of the existing ferry terminal (B-3 and B-4) at the east end of the extended study area, the contact with Stratum VI was not encountered, suggesting the upper surface of the till exhibits topographic relief.

Figure 30 illustrates stratigraphic relationships among the major geomorphic units. Stratum VI is comprised of glaciogenic till from the Vashon or pre-Vashon periods and represents the oldest deposits identified by archaeological explorations at the site. In its few exposures, Stratum V consistently overlies the till across the northern portion of the study area and appears to extend to the south. As noted above, Stratum IV is ubiquitously distributed across the project area overlying Stratum V. Strata II and III are much more confined in their areal distribution, and are limited to a slight barrier ridge or berm aligned along what is now Front Street, with Stratum III extending slightly laterally to the south. At the east end, towards the base of the spit, Stratum II extends laterally southward.

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Figure 29. Cross Section H (see Figure 16 for cross section locations).

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Figure 30. Stratigraphic model showing the relationship of the midden to the major site strata.

Historical Debris

Out of the total 107 archaeological boreholes drilled, 54 found historic debris [redacted]. The bulk of this debris consisted of wood of various kinds (Figure 31), often occurring in conjunction with burnt or charcoal-stained sediments. Wood debris most consistently appeared in [redacted], but boreholes drilled in [redacted] encountered demolition debris, including concrete, brick, and metal, resulting from dismantling of Crown Lumber Company facilities (Figure 12). Thick planking or decking was found between [redacted], and two boreholes encountered pilings [redacted], encountered planking overlying wood debris and sawdust.

A thin layer of black organic-rich pebbly sand containing small-sized historic debris such as wood and glass was observed at the base of the fill near [redacted]. This layer directly overlies the midden deposits and in some cases the sediments appear to be mixed with the upper midden lithology. Stratum I likely truncates Stratum II in these areas, indicating disturbance to the upper portion of the archaeological deposits by early historic activity.

Figure 31. Wood from borehole sample.

Site Formation History

Based on the vertical depositional sequences revealed in all exposures created during archaeological testing of the project area, a preliminary model of landform development can be offered. Stratum VI, the basement stratum identified at the site, represents glacially deposited till dating to the Vashon or pre-Vashon period. The absence of Stratum VI in the boreholes in the vicinity of the existing ferry terminal may evidence tectonic activity along the northern boundary of the Southern Whidbey Island fault zone, which has resulted in north side up vertical offsets of near-shore deposits in Possession Sound during the Holocene (that is, the north side of the fault rose due to earthquake activity) (Kelsey et al. 2004). However, the number of exposures of Stratum VI is too small to determine the true horizontal and vertical extent of the till.

Overlying the till, Stratum V gravelly sands are presumed to represent Vashon or pre-Vashon deposits, such as glacial outwash, while the upper clean sand with shell may represent a submerged spit formed during the Holocene.

The bulk of Stratum IV is believed to represent a thick accretionary deposit of loose beach sediments that accumulated along this section of shoreline due to alongshore drift during the late Holocene. The source of these sediments is from winnowing and reworking of the alluvial fan margin at the mouth of Japanese Gulch and from reworking of eroded bluff deposits east and south of the project area. During the period of time represented by Stratum IV, morphologically the shoreline was probably much more open to Puget Sound and characterized by a relatively narrow expanse of backshore area at the base of the southern bluff.

The presence of buried peat and a zone of fringing driftwood centered around a depth of 15 fbs within Stratum IV suggests that the area experienced at least one major increase in sediment influx, possibly in conjunction with a temporary reduction in the rate of sea level rise, that resulted in the temporary emergence of a paleospit above tide limit and enclosure of a small wetlands or shallow lagoon. After a brief period of subaerial exposure, the lagoon was buried about 1640 rcybp by additional loosely consolidated coarse-grained beach sediments. With renewed accumulation of sediments, the beach profile may have shifted southward toward the base of the southern bluff until the formation of the present spit isolated the bluff from direct wave attack. It is not known if the earlier spit formation was part of a larger paleo cuspate foreland like the modern landform.

Over the last 1,600 years, enough sediment accumulated that the eastern arm of the cuspate foreland forming Elliot Point emerged from the tidal limit and became a relatively stable landscape feature. Radiocarbon ages from the base of the Stratum II midden indicate the spit was fully emergent by at least 1,000 years ago. By the time human occupation of the spit began, sediment accumulation rates had slowed considerably, indicating the base of the southern bluff was now shielded by the spit from direct wave attack; reduction in sediment influx also may have been also due to decreasing frequency of debris flows in Japanese Gulch. The deposition of the Stratum III sand suggests that once the spit emerged, most of the coarser-grained sediment transported by alongshore drift passed along the front of the spit. The low amounts of shell in both Strata IV and III, but the high amounts in the archaeological deposits of Stratum II, further suggest that a sub tidal terrace, offering a suitable substrate for shellfish, also began to form in front of the spit shortly after emergence. Fine-grained sediments, such as silty peat, peaty silt, and organic streaks, at the top of Stratum IV in the southern portion of the study area indicate the creation of a low-energy depositional environment, presumably in conjunction with the formation of the cuspate foreland. The bedding also preserved in places at the top of Stratum IV suggests the spit was periodically breached and opened to the Sound, and that closure of the cuspate foreland to form a tidal lagoon and wetland was a gradual process.

The distribution of lithofacies within Stratum II indicates a high degree of place-to-place variability (that is, the composition of the archaeological midden is not constant across the landform). The matrices of the shell-rich lithofacies include high amounts of sediment (sand and fine pebbles) mixed in with the archaeological materials. The well-stratified nature of the depositional sequence indicates little to no erosion along the spit, but periodic deposits of sand or fine gravel lacking archaeological materials show the landform was occasionally subject to overwash, probably by storm waves. The underlying Stratum III was probably also deposited in a similar manner. The preservation of thin humic soil A horizons (Ah), which represent brief periods of soil formation on the calcium-rich shell-bearing deposits, is another indicator the site experienced little or no erosion until the beginning of the historic period.

At the eastern end of the midden deposit, Stratum II deposits are relatively thin and the configuration of the boundary of the midden indicates some variance in site formation history in this portion of the site. Former distributary channels on the alluvial fan at the mouth of Japanese Gulch southeast of the site may have reached westward towards the base of the spit, reworking the beach deposits near the edge of the fan. Periodic avulsion of these channels during flood episodes in Japanese Gulch during the historic period could have eroded sediments deposited near the base of the spit where it attached to the fan. Interaction between beach sediments and the alluvial fan may account for the less well-defined boundary at the east end of the midden deposit.

Several recorded sites in the Puget Sound and the greater Puget lowland occupy accretionary shoreline features analogous [redacted] 45SN393 (Table 5; Figure 32). Shell midden sites at [redacted] to the south provide comparative data from occupations of beach barrier berms associated with spits within the last 2,000 years. Hunter-fisher-gatherer use of changing sandspit landforms with berm and lagoon features in the Bellingham area share similar landform histories with the [redacted] of 45SN393 in Puget Sound (Lewarch et al. 1995:1.4). Locally, two historic village sites occupying spits are located [redacted] 45SN393 at [redacted]. Commonalities between spit sites in the region include well-stratified midden deposits deposited on or behind a beach berm, sometimes with evidence of occupation or utilization of protected wetland environments enclosed by the spits. Midden facies interbedded with sand layers deposited during inundation due to wave action along the landform are evidence of geomorphic processes at several spit sites. Further exploration of the midden deposits at 45SN393 would shed light on site formation in terms of the human occupation of an evolving landform.

Table 5. Radiocarbon Dates from Shell Middens in the Puget Sound Basin (selected numbers key to Figure 32).

MAP REF	SITE #	NAME	LOCATION	LANDFORM	EARLY DATE	REFERENCE
	45IS97	**Data has been redacted.**	**Data has been redacted.**	Bluff-Top	310 ± 60 BP	Luttrell et al. 2003
	45KP204			Bay Beach	320 ± 40 BP	Shong 2011 Pers. Comm.
	45IS119			Bluff-Top	610 ± 50 BP	Nelson et al. 2010
	45IS263			Bay Beach	640 ± 40 BP	Smith et al. In Preparation
	45IS71			Bluff-Top	680 ± 70 BP	Wessen 2004
1	45TN240			Bay Beach	ca 700 BP	Croes et al. 2005
2	45KP115			Bay Beach	810 ± 60 BP	Lewarch et al. 2002
3	45WH9			Spit	848 ± 108	Gaston and Grabert 1975
	45SJ507				880 ± 40 BP	Taylor et al. In Press
	45SJ120				900 ± 40 BP	Taylor et al. In Press
	45SJ277				930 ± 40 BP	Taylor et al. In Press
4	45WH67			Bay Beach	940 ± 40 BP	Shantry et al. In Preparation
	45SJ26				950 ± 40 BP	Taylor et al. In Press
	45SJ481				990 ± 40 BP	Taylor et al. In Press
5	45JE16			Spit	ca 1000 BP	Blukis Onat 1976
	45SJ95				1010 ± 40 BP	Taylor et al. In Press
6	45SN39			Estuarine	1020 ± 110	Dunnell and Fuller 1975
7	45IS13			Spit	1030 ± 60 BP	Luttrell 2005
	45SJ124				1040 ± 40 BP	Taylor et al. In Press
	45SJ47				1090 ± 40 BP	Taylor et al. In Press
	45SJ461				1090 ± 50 BP	Taylor et al. In Press
	45PI974				1110 ± 40 BP	Shantry et al. 2010
	45SJ150				1100 ± 50 BP	Taylor et al. In Press
	45SJ483				1120 ± 40 BP	Taylor et al. In Press
	45SJ60				1120 ± 40 BP	Taylor et al. In Press
	45SJ225				1120 ± 40 BP	Taylor et al. In Press
	45IS60			Bay Beach	1130 ± 40 BP	Luttrell et al. 2003
	45IS55			Bay Beach	1140 ± 40 BP	Luttrell et al. 2003
	45SJ61				1140 ± 40 BP	Taylor et al. In Press
	45SJ453				1160 ± 40 BP	Taylor et al. In Press
	45SJ6				1170 ± 40 BP	Taylor et al. In Press
	45SJ89				1170 ± 40 BP	Taylor et al. In Press
	45SJ202				1200 ± 40 BP	Taylor et al. In Press
8	45KI23			Estuarine	1200 ± 60 BP	URS and BOAS 1987
	45SJ451				1210 ± 40 BP	Taylor et al. In Press
9	45KI437			Spit	1230 ± 40 BP	Stein and Phillips 2002
	45SJ9				1300 ± 40 BP	Taylor et al. In Press
	45SJ460				1310 ± 40 BP	Taylor et al. In Press
	45SJ364				1340 ± 40 BP	Taylor et al. In Press
	45SJ147				1350 ±60 BP	Taylor et al. In Press
	45SJ509				1360 ± 40 BP	Taylor et al. In Press
10	45IS7			Bay Beach	1360 ± 60 BP	Kopperl In Preparation
	45SJ71				1380 ± 40 BP	Taylor et al. In Press

Table 5. Radiocarbon Dates from Shell Middens in the Puget Sound Basin (selected numbers key to Figure 32).

MAP REF	SITE #	NAME	LOCATION	LANDFORM	EARLY DATE	REFERENCE
	45SJ72				1420 ± 40 BP	Taylor et al. In Press
	45SJ307				1520 ± 40 BP	Taylor et al. In Press
	45SJ27				1540 ± 40 BP	Taylor et al. In Press
	45SJ251				1540 ± 40 BP	Taylor et al. In Press
	45SJ201				1570 ± 60 BP	Taylor et al. In Press
11	45IS2			Spit	1630 ± 50 BP	Schalk and Nelson 2010
12	45KP47			Spit	ca 1690 BP	Schalk and Rhode 1985
13	45KP2			Spit	ca 1700 BP	Schalk and Rhode 1985
	45SJ274				1860 ± 40 BP	Taylor et al. In Press
	45SJ421				1880 ± 40 BP	Taylor et al. In Press
14	45SN35			Estuarine	1910 ± 120	Dunnell and Fuller 1975
15	45WH11			Spit	1945 ± 98	Gaston and Grabert 1975
	45SJ23				1950 ±40 BP	Taylor et al. In Press
16	45WH100			Spit	ca 2410 BP	Grabert and Griffin 1983
17	45SN41			Estuarine	2040 ± 120	Dunnell and Fuller 1975
18	45WH114			Spit	ca 2040 BP	Grabert and Griffin 1983
	45SJ279				2100 ± 40 BP	Taylor et al. In Press
	45SJ239				2340 ± 40 BP	Taylor et al. In Press
	45SJ282				2400 ± 50 BP	Taylor et al. In Press
	45WH564			Bay Beach / Spit	2520 ± 60 BP	Baldwin and Arthur 2010
	45SJ450				2520 ± 40 BP	Taylor et al. In Press
	45SJ70				2550 ± 40 BP	Taylor et al. In Press
	45SJ2				2640 ± 40 BP	Taylor et al. In Press
	45SJ3				2670 ± 40 BP	Taylor et al. In Press
	45SJ169			Spit	2700 ± 120	Walker 2003
	45SJ407				3060 ± 40 BP	Taylor et al. In Press
	45SJ 165			Bay Beach	3440 ± 40 BP	Bard and Ballantyne 2007
19	45SN93			Bluff-Top	3600 ± 70 BP	Kopperl 2005
	45SK46			Bluff-Top	3650 ± 70 BP	Mather 2009
20	45WH17			Spit	ca 4100 BP	Grabert et al. 1978
21	45KI428/429			Spit	ca 4000 BP	Larson and Lewarch 1995
22	45PI72			Bluff-Top	5260 ± 70 BP	Wessen 1989

This image has been redacted.

Figure 32. Selected shell middens with radiocarbon dates coded by landform (numbers code to Table 5).