

***Thorndyke Resource Operations Complex
Central Conveyor and Pier
Biological Evaluation***

Jefferson County, Washington

***Prepared for
Reid Middleton, Inc.***

***March 17, 2003
Pentec #12007-47***

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Note: This report is subject to modification as a result of the completion of the SEPA analysis (Environmental Impact Statement) being undertaken as part of the governmental permitting process.

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THORNDYKE RESOURCE OPERATIONS COMPLEX CENTRAL CONVEYOR AND PIER

BIOLOGICAL EVALUATION

1.0 INTRODUCTION

Fred Hill Materials (FHM; the Applicant) proposes to construct and operate a conveyor to transport sand and gravel from an existing site (the Shine Pit) located in Jefferson County. The sand and gravel would be transported approximately 4 miles to a Pier located on the northwest shore of Hood Canal, approximately 5 miles southwest of the Hood Canal Bridge. This proposed project is collectively known as the Thorndyke Resource Operations Complex (T-ROC) Central Conveyor and Pier.

The materials to be transported are sand and gravel used for both environmental mitigation projects (specifically, beach restoration) and the construction industry. As an alternative to using trucks, these materials will be transported by the approximately 4-mile-long Conveyor and loaded directly from the conveyor to vessels at the Pier. The location for the Pier was chosen based on distance from the Shine Pit, existing and proposed land uses, and the presence or absence of environmentally sensitive areas.

The proposed T-ROC has the potential to affect Puget Sound/Hood Canal fish and wildlife species and their habitat. This biological evaluation (BE) has therefore been prepared to aid in evaluating this project's potential effects on anadromous salmonids, bald eagles, and other wildlife species listed, or proposed for listing, as threatened or endangered under the Endangered Species Act (ESA).

According to National Oceanographic and Atmospheric Administration Fisheries (NOAA Fisheries), Northwest Region Web site (<http://www.nwr.noaa.gov/>), the Hood Canal summer-run chum salmon (*Oncorhynchus keta*) Evolutionarily Significant Unit (ESU) and the Puget Sound chinook salmon (*O. tshawytscha*) ESU may be present in an area that could be affected by project impacts (i.e., the "action area" defined in Section 2.1). Chum and chinook are both threatened species. Other threatened or endangered species under NOAA Fisheries' jurisdiction that may occur in Puget Sound include the Steller sea lion (*Eumetopias jubatus*, threatened), the humpback whale (*Megaptera novaeangliae*, endangered), and the leatherback turtle (*Dermochelys coriacea*, endangered). The Steller sea lion, humpback whale, and leatherback turtle have not been reported in, nor are they considered likely to be found in, the action

area, but they are addressed in this BE because of their status as threatened or endangered species. NOAA Fisheries also identified the coho salmon (*O. kisutch*), a candidate for listing as a threatened species, as potentially occurring in the action area.

The U.S. Fish and Wildlife Service (USFWS) listed the anadromous form of the bull trout (*Salvelinus confluentus*), the bald eagle (*Haliaeetus leucocephalus*), and the marbled murrelet (*Brachyramphus marmoratus*) as threatened species that may occur in the action area (Berg, K., USFWS, personal communication, October 19, 2001; Appendix A). The Washington Department of Fish and Wildlife (WDFW) *Priority Habitats and Species* (PHS) Database indicates that a bald eagle nesting site exists less than 1 mile from the Conveyor and pier (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A).

Section 7 of the ESA requires that any action by a federal agency is “not likely to jeopardize the continued existence of any [listed] species or result in the destruction or adverse modification of habitat of such species...” Under ESA Section 7(c), the lead federal agency, in this case, the U.S. Army Corps of Engineers (Corps), must prepare a BE of the potential influence of their action (in this case, approval of the Pier and Conveyor described in Section 2.2) on listed species or their critical habitat. Depending on the conclusion of the BE, the Corps may be required to confer formally with NOAA Fisheries and the USFWS regarding the project.

2.0 PROJECT DESCRIPTION

2.1 Location of Project and Action Areas

The “project area” is the immediate area where the construction will take place. In this case the 1,000-foot Pier will originate from the Hood Canal shoreline and the 4-mile-long Central Conveyor will extend from the Pier to the Shine Pit through portions of the east halves of the following sections: Sections 6, 7, 8, 18, and 19, Township 27N, Range 1E, W.M., in Jefferson County, Washington (Appendix B, Sheets 1-16, C2.2, and C2.3). The waterfront project site is situated approximately 2 miles southwest of the community of Shine and approximately 1.25 miles west of the community of South Point (Appendix B, Sheet 1).

The “action area” includes all areas in and around the project area that could be affected directly or indirectly by the project. In this case, the action area includes Hood Canal, the shoreline, and upland areas within a 1-mile radius of

the proposed Pier. The action area also includes the area within 0.5 mile on either side of the Central Conveyor from the Hood Canal shoreline to the Shine Pit (Appendix B, Sheets 1,8-16).

2.2 Project Description

A detailed T-ROC Central Conveyor and Pier project description and fact sheet are provided in Appendix F at the end of this document.

The source of material for the conveyor is forestry land leased by FHM from Pope Resources, Inc., a Delaware Limited Liability Partnership. Olympic Resource Management manages the property. The current extraction site, the Shine Pit, is located south of Highway 104 on the Olympic Peninsula, approximately 5 miles south of Port Ludlow (Section 32, Township 28N, Range 1E) (Appendix B, Sheet 1). The Shine Pit is a fully permitted operation with a Surface Mine Reclamation Permit (No. 70-011936) issued by the Washington State Department of Natural Resources, and a Washington State Department of Ecology (Ecology) Sand and Gravel General Permit (No. WAG 50-1120). This source has remained in continuous operation since its establishment in the late 1970s.

The proposed Central Conveyor is approximately 4 miles in length, beginning at the existing Shine Pit and extending to the west shore of Hood Canal at the Hood Canal Sand and Gravel Company, LLC, property located in Section 19, Township 28N, Range 1E, W.M. (Appendix B, Sheets 8-16).

The Central Conveyor uses two principal types of conventional conveyors. Twin Conveyors (each measuring 48 inches wide) will transport materials from the Shine Pit approximately 3.25 miles to a single 60-inch-wide conveyor. This Single Conveyor will transport sand and gravel from the Twin Conveyors to the Pier. The Central Conveyor, including the Pier, will be covered or enclosed over its entire length to minimize the potential for spillage. A forestry service road will be located along a majority of the conveyor to provide maintenance access. Stormwater management will be provided along the entire Central Conveyor.

Environmental conditions reports have been prepared for the proposed project. These reports include a *Marine Resources Survey Report* (Appendix C), a *Habitat Management Plan for Marine Habitat and Bald Eagles* (Appendix D), a *Wetlands Delineations and Biological Inventory* report (Krazan 2003), a *Preliminary Geotechnical Report* (Shannon and Wilson 2003), a *Preliminary Storm Drainage Report* (Team4 2003), and a *Potential Effects on Longshore Sediment Transport and Shoreline Processes Preliminary Report* (Anchor 2003).

The project elements of importance to this BE primarily include the Single Conveyor and the Pier. Engineering drawings (project plans and profiles) for those elements are provided in Appendix B.

Construction details of the Twin Conveyors (Appendix B, Sheets 9-16) and Single Conveyor (Appendix B, Sheets 2-9, C2.2, and C2.3) are discussed in the following sections.

2.2.1 Twin Conveyors

The 3.25-mile Twin Conveyors will be located within a 60-foot easement on Pope Resources' commercial forest lands. Each conveyor with support structure will be approximately 5 feet wide and 6 feet high, with a 2-foot clearance from the ground. The conveyor belt system will be an enclosed or covered system. The system consists of steel channel frames with vertical supports spaced approximately 12 feet apart. The vertical supports are made of steel, with steel pads resting on wood or concrete blocks. The belt portion of each of the Twin Conveyors will consist of a continuous section composed of high-strength flexible composite material 48 inches wide and powered by electric motors. The conveyor will transfer material from one section to another at transfer points as needed. The Twin Conveyors will terminate and transfer materials at the north end of the Single Conveyor.

The Twin Conveyors alignment was established to avoid impacts to environmentally sensitive areas. According to the technical studies prepared to date (i.e., wetlands and preliminary geotechnical reports cited above), the Twin Conveyors will not impact any existing wetlands or steep slopes.

Existing forestry service roads provide access to the Thorndyke Block, the 22,000-acre region of commercial forest production owned by Pope Resources. The existing forestry service roads located in the vicinity of the proposed Conveyor will be removed and replanted with trees. Approximately 206,100 square feet (sf) (4.7 acres) of existing forestry service road will be removed.

The new forestry service road, located adjacent to the proposed Conveyor, will provide access both to the Conveyor and to the Thorndyke Block. The new road will be an all-weather gravel road, 14 feet in width. Approximately 240,900 sf (5.5 acres) of new forestry service road will be constructed. Each of the five proposed transfer points will include a vehicle turn-around and a utilities shed, consisting of approximately 1,200 sf (0.03 acre) each of additional impervious area. Each of the 5-foot-wide Twin Conveyors will result in an additional 174,760 sf (4.0 acres) of new impervious area. In total, 421,660 sf (9.7 acres) of

new impervious area will be constructed within the Twin Conveyors corridor. Combined with the forestry service roads removed and replanted, there will be a net gain of approximately 5.0 acres of new impervious area.

2.2.2 Single Conveyor

The length of the Single Conveyor, including the Pier, will be approximately 0.70 mile. The Single Conveyor will be similar in construction and design to the Twin Conveyors, although it will consist of only one covered conveyor belt 60 inches wide for a total width of 7 feet. The Single Conveyor will be approximately 8 feet high and supported on steel support frames with supports spaced approximately 50 feet apart except where the conveyor free-spans a steep slope and wetland area. Here the support spacing will be increased to 100 feet to avoid the sensitive areas.

The new all-weather, 14-foot-wide forestry service road will provide access to the Conveyor. Approximately 43,655 sf (1.0 acre) of new forestry service road will be constructed. The conveyor will consist of an additional 11,750 sf (0.27 acre) of impervious area. In total, 55,405 sf (1.27 acres) of new impervious area will be constructed within the Single Conveyor corridor.

At approximately 600 feet from the shoreline, the Single Conveyor will angle down through a 400-foot-long cut in the hillside approximately 50 feet wide and 20 feet deep (Appendix B, Sheet C2.2). This cut will reduce the gradient the Conveyor travels. Near the bottom of the hillside, the enclosed Single Conveyor will free-span (still at an angle) a steep slope and a wetland adjacent to the shoreline. At the shoreline, the conveyor will again become level. A support consisting of four 18-inch-diameter steel piles will be placed near the bottom of the span, at approximately ordinary high water (OHW) (i.e., Station 228+00). This marks the beginning of the Pier.

2.2.3 Pier

The Pier will be located approximately 5 miles southwest of the Hood Canal Bridge, extending approximately 1,000 feet from the Hood Canal shoreline at OHW to roughly -50 feet mean lower low water (MLLW) (Appendix B, Sheet 3). The Pier consists of the Single Conveyor and a retractable loadout conveyor supported on pilings spaced at 100-foot intervals, support towers, and eight dolphins (six breasting and two mooring dolphins), with an elevated catwalk. The Pier is the only structure to be placed above the water's surface and will be as low profile as possible. The conveyor will be fully enclosed where it crosses the shoreline and overwater areas.

For the first 500 feet (i.e., Station 228+00 to Station 233+00; Appendix B, Sheets C2.2 and C2.3), the Single Conveyor will be supported on steel support frames (truss supports) that will be spaced approximately 100 feet apart. It is anticipated that each truss support will consist of four 18-inch-diameter steel piles (Appendix B, Sheet 5). The truss width (including the conveyor and walkway) will be 13 feet. Over water, the top of the Pier will be approximately 32 feet above MLLW (i.e., Station 228+00 to Station 233+00). The bottom (or invert elevation) of the Conveyor will be approximately 22 feet above MLLW.

Beginning at Station 233+00, the conveyor will slope upward for a distance of 140 feet to an open steel tower support approximately 80 feet above MLLW (Station 234+35; Appendix B, Sheet C2.3). A second tower support will be located approximately 240 feet from the first support structure. The second tower structure will support both the conveyor and a separate, enclosed loadout conveyor. The truss width between first and second tower supports will be 18 feet. Each of the two open steel towers will include sixteen 30-inch steel piles (Appendix B, Sheet 7).

At the second tower support, the Conveyor will transfer materials onto the loadout Conveyor that will discharge materials onto the vessels (Appendix B, Sheet C2.3). The 165-foot-long loadout conveyor will retract to conform to various vessel loading configurations. An enclosed control room with access stairways, storage area, restroom, and holding tank will be located within the second support structure. These facilities will not increase the area of overwater coverage.

The docking facilities at the end of the Pier will consist of six pile-supported breasting dolphins and two pile-supported mooring dolphins located in water depths of -49 to -64 feet MLLW (Appendix B, Sheet C2.3). Each dolphin will be supported on twelve 30-inch steel piles capped with a 20-foot by 20-foot, 7-foot-thick concrete pilecap (Appendix B, Sheet 4). The bottom of the pilecaps will be approximately 15 feet above MLLW. The pile-supported breasting and mooring dolphins will be connected by a 5-foot grated walkway.

Lighting of portions of the Single Conveyor and Pier crossing marine habitats will be kept to a minimum, while still conforming to all applicable safety-related requirements of the regulatory agencies (e.g., U.S. Coast Guard, Occupational Safety & Health Administration, Washington Industrial Safety and Health Act, etc.). Lighting of the water surface will be minimized with shielding. During nonoperation hours, lights will be turned off, except as needed for maritime safety requirements.

2.3 System Construction

2.3.1 Project Timing

All inwater construction work (e.g., pile driving) will be restricted to the approved work window to protect federally listed salmon and bull trout that may be present within the nearshore of Hood Canal in the vicinity of the Conveyor and the Pier. The work window for those salmonid species in this area of Hood Canal is expected to be July 16 to February 15. Since there is no documented forage fish spawning in the project area, adherence to forage fish spawning windows is not anticipated. Assuming that inwater construction activities are allowed to proceed uninterrupted during this period, construction of the Pier is expected to take about 2 months.

Both the USFWS (Berg, K., USFWS, personal communication, October 19, 2001; Appendix A) and the WDFW (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A) indicate that bald eagle nesting territories exist in the vicinity of the project, including one nesting site near the beach to the northeast of the conveyor (also see Appendix D). Based on the proximity of this site, and other bald eagle nesting sites, construction could possibly be restricted to a period outside of both bald eagle nesting and wintering periods, which, combined, extend from October 31 through August 15 (USFWS 1999). The Applicant may request extension of these allowable work windows, coupled with monitoring to ensure no adverse impacts to listed species.

2.3.2 Construction Methods

2.3.2.1 Upland

To provide maintenance access, a forestry service road will be constructed along a majority of the Conveyor. Construction of the forestry service road will require clearing of vegetation and, where necessary, some grading. Small amounts of earth excavation and/or fill material may be required along the project's Central Conveyor to reduce local topographic variation.

Stormwater management will be provided during construction along the entire Central Conveyor. Stormwater from all work areas will be distributed into surrounding forested areas for infiltration in accordance with Ecology's stormwater manual (Ecology 2001).

Prefabricated sections of the Conveyor will be brought to the site by truck for final assembly. A small, truck-mounted crane will lift sections of the Conveyor off flatbed trucks and lower them into place. If necessary, existing vegetation

will be trimmed or removed for the placement of supports. For elevated portions (e.g., road crossings, uneven terrain, or slopes) the Conveyor will be supported on steel piles (up to 18 inches in diameter) installed using drilling equipment.

The use of preassembled components will minimize the need for staging equipment on site. Furthermore, since the project area was recently clearcut, additional clearing of vegetation will be minimal. Whenever possible, replanted areas will be avoided.

Approximately 600 feet from the shoreline, a cut will be made in the hillside to allow the Conveyor to angle down at a reduced slant. The approximately 50-foot-wide, 20-foot-deep, and 400-foot-long cut will be made using excavation and grading machinery. Excavated material will be backhauled to an upland disposal area.

A support structure for the Conveyor will be placed near the top of the steep bluff (approximately Station 226+00; Sheet C2.2). This will be one of two possible designs: a steel pile bent (drilled) or a deeply founded spread footing. The specific type of support will be determined following final engineering and geotechnical evaluations. Either support type will be placed a sufficient distance from the top of the bluff to minimize the risk from possible bank erosion.

The large conveyor truss system will span the steep bluff and the wetland at the base of the slope. Construction alternatives for placing are discussed below.

2.3.2.2 Marine

Placement of piles and assembly of the Pier will be completed from construction barges. The largest barge will be 155 feet by 50 feet and draw approximately 6 feet of water when fully loaded.

All support and batter piles in the marine and shoreline areas will be installed using a vibratory method (site conditions permitting). Prefabricated overwater conveyor trusses will then be hoisted into position using barge-mounted cranes.

There are two alternatives for construction of the conveyor truss system from the top of the bluff to the Pier (Station 226+00 to approximately Station 228+00; Sheet C2.2). Both alternatives will require the placement of construction equipment along the upper beach, but the two alternatives vary in the amount of equipment needed and its duration on the beach.

Alternative 1—Constructing Conveyor Truss System with Cable-Way Hoist

Alternative 1 would minimize the duration of construction and the amount of equipment needed on the beach. This alternative has two scenarios for placing the truss system: lower from the top and pull up from the bottom. The sequence of work would include the following tasks:

1. Construct a permanent pier piling and overwater conveyor truss system.
2. Construct a permanent support structure at Station 226+00 simultaneously with Task 1.
3. Install a temporary uphill cable-way hoist structure after completion of Task 2.
4. Install a temporary downhill cable-way hoist structure.
5. Place the cable-way hoist device.
6. Complete the installation by placing a prefabricated 205-foot conveyor truss system with the cable-way.

This alternative would include construction of a falsework (temporary structure) at the top of the slope (near Station 226+00) and on the Conveyor pile bent at Station 228+00). The pile bents would support a temporary suspension cable and cable-way hoist/traveler system to support the Conveyor when it is lowered from the top of the bluff or pulled up from the bottom, as described below. Suspension cable towers, jibs, pulleys, and other components would be temporarily attached to and supported by the piles and pile bents at the top of the bluff.

Lowering from Top of Slope. The 205-foot conveyor truss would be delivered to the top of the slope in 40 to 80-foot-long, preassembled sections, (length limited by highway regulations and permit fees) and then assembled on the prepared conveyor alignment at the top of the slope. The assembled Conveyor would be supported on dollies and lowered down a ramp to the top of the bluff. The suspension cable-supported traveler would pick up the conveyor truss once the downhill end reaches the top of the bluff. This traveler would then roll down the suspension cable toward the pile bent at Station 228+00. The rate of downslope movement would be controlled by winches, cranes, or other equipment operating on the top of the slope, or by a barge-mounted crane with winch equipment that is tied to dock dolphins.

Pulling Up from the Bottom. The preassembled truss, a single 205-foot-long section, would be brought to the site on a barge-mounted crane and hoisted up

the slope on a suspension cable with a traveler similar to that described above. The 205-foot-long truss would be lifted to top-of-bent elevation with a crane or by travelers that are supported on the suspension cable system. The barge-mounted crane would control the travelers on the suspension cables (if this option were used) and perform hoisting.

Alternative 2—Constructing Conveyor Truss System with Crane on Beach

After completing steps 1 and 2 above, a barge with a crawler crane would be maneuvered alongside the newly placed piling supports at approximately station 229+00 at an estimated elevation of +6 feet MLLW. Once the tide has receded, the crawler crane (weighing approximately 165 tons) would be driven off the barge and onto timber “mats” (timber units 20 to 28 feet long by 4 to 6 feet wide by 1 foot thick) placed onto the beach (from the barge) to temporarily support the crane while placing pilings for support and lifting prefabricated conveyor trusses into final position. The mats would be placed in a “leapfrog” manner so the crawler crane is not in direct contact with the beach sediments. The crane would move between elevations approximately +6 and +12 feet MLLW (above the area of the upper *Zostera japonica* eelgrass zone). Estimated time for piling placement from Station 228+00 to 229+00 is 5 working days. Time for placing conveyor trusses into final position is estimated to be 2 days.

After work is complete, approximately 7 total working days, the crane would be moved back onto the barge. Physical disturbance to the beach is projected to be minimal; for example, ridging of sediments in areas where mats cannot be picked up completely vertically. Any disturbance such as ridging will be restored to its original state following completion of equipment use on the beach.

2.3.2.3 Best Management Practices

Upland Areas

Best management practices (BMPs) will be instituted around all areas of earthwork to minimize erosion and runoff from work areas, particularly near slopes. This includes implementation of stormwater controls in accordance with Ecology’s stormwater manual (Ecology 2001).

Marine

Best management practices will be implemented in the marine work areas to limit release of debris and to recover any such materials. BMPs will also minimize the risk of fuel spills and other potential sources of contamination. Refueling of equipment will be conducted off site whenever possible. On-site

refueling activities will adhere to strict safety guidelines. An approved spill response plan, including provisions for on-site spill containment equipment (including a boom), will be developed prior to any construction activities. To minimize the areas of disturbance, construction barges will be moved as little as possible while working in intertidal areas. Care also will be taken to minimize disturbance to eelgrass beds during construction (see *Habitat Management Plan*; Appendix D).

2.3.3 System Operation

2.3.3.1 Operating Schedule

Following construction, the Conveyor is expected to operate indefinitely. However, the operating lifespan of the project will ultimately depend on market conditions and available supplies of sand and gravel. Outside of scheduled intermittent shutdowns and any regulatory restrictions placed on conveyor or vessel operations, the Conveyor's operating schedule will be driven by the demand for the materials. This will determine the capacities of transport vessels (described below) and their frequency (e.g., number of vessels per week or month). The Pier will be used up to 300 days a year, which excludes 65 days annually for holidays, inclement weather, and periods of non-use. It is assumed ships would be loaded at the Pier between 48 and 72 days a year (an average of three per day; no more than six per day). At any given time, no more than one ship or two barges would be berthed at the Pier. The different vessel sizes for which the facility has been designed and their expected loading times are described below.

2.3.3.2 Vessel Descriptions

Vessels of varying sizes/displacements will be used to transport sand and gravel materials. Initially, only barges will call at the Pier. Typical barge capacity is 5,000 dead-weight U.S. short tons (dwt) (7,000 dwt with side fences), but barges may range in size from 2,500 dwt up to 20,000 dwt. Dimensions of the largest barges are 100 feet wide by 400 feet long, with a 25-foot draft. The dimensions of a typical barge are 60 feet wide by 240 feet long, with a 16-foot draft.

Ship capacities will range from 20,000 dwt to 65,000 dwt. Dimensions of the largest ships will be 110 feet wide by 745 feet long, with a 45-foot draft. It is anticipated that these ships (only U.S. flagged ships will be used) will become available in approximately 8 to 12 years after the Pier's construction and will be used subject to market demand.

The smallest-capacity barge (2,500 dwt) will take up to 1 hour to load, while the largest-capacity barge (20,000 dwt) will take up to 8 hours for loading. Loading times of the largest capacity ships (65,000 dwt) will take up to 24 hours.

Depending on the vessels' sizes, it is anticipated that one to six vessels will be loaded at the facility each day of operation.

During mooring operations, all vessels will be tugboat-assisted and will not maneuver under their own power. When mooring larger ships or multiple-barge tows, two tugboats may be used. The assist tugboats will not be stationed on site. The only vessel that will remain on site will be a small tender capable of operating a spill containment boom (also stored on site), along with other safety and maintenance equipment.

2.3.3.3 Annual Volumes Transported by Vessels

Initially, only barges will call at the Pier. In Year 1 of Pier operations, it is anticipated that the volume of sand and gravel transported by barge will be 2 million U.S. short tons (tons). By Year 10, the volume of sand and gravel transported by barge is expected to reach 4 million tons annually.

In the first year that U.S. flagged ships become available (Year 8 to 12 of Pier operations), it is anticipated that 600,000 tons of sand and gravel will be transported by ship. By Year 25, the volume of sand and gravel transported by ship is expected to reach 2.75 million tons annually.

By Year 25, it is anticipated that the combined volume of sand and gravel transported by ship and barge will reach 6.75 million tons annually (i.e., 4 million tons via barge and 2.75 million tons via ship), subject to market demand.

2.3.3.4 Best Management Practices

The Central Conveyor and Pier will be covered or enclosed to minimize the potential for spillage (see Central Conveyor and Pier Fact Sheet, Appendix F). During Conveyor operations, BMPs will be implemented in both the upland and marine operating areas. These BMPs are designed to minimize the risk of materials spills, including fuel spills and other potential sources of contamination. Refueling of equipment will be conducted off site whenever possible. On-site refueling activities will adhere to strict safety guidelines. An approved spill response plan including details regarding on-site spill containment equipment will be developed prior to Conveyor operations.

3.0 DESCRIPTION OF THE SPECIES AND HABITAT

3.1 *Species Information*

The nearshore area of northern Hood Canal, like most of the Puget Sound shoreline, provides important habitat for salmonids and other species. Although no studies have been identified that determine the specific river of origin of juvenile salmonids in the action area, it is expected that salmonid use of the action area is extensive. The project area is located within the northern portion of Hood Canal; thus, ESA-listed salmonids, including chinook salmon, summer-run chum salmon, and bull trout, as well as coho salmon (proposed for listing) from a number of river systems within the Hood Canal basin—particularly those to the south—may use the action area. The larger rivers within the Hood Canal basin with chinook salmon, summer-run chum salmon, and/or coho salmon include the Skokomish, Hamma Hamma, Duckabush, Dosewallips, and Quilcene river systems. Other smaller systems, such as Big Beef Creek, on the eastern shore, also support salmon runs. Because of its proximity to the action area, the Quilcene river system is considered to be a representative source of salmon that occur in the action area. The Big Quilcene River contains runs of fall chinook, coho, and both summer-run and fall-run chum salmon (Williams et al. 1975). The Hood Canal fall-run chum salmon is genetically distinct from the summer-run chum salmon ESU and is not currently listed or proposed for listing under the ESA. Surveys conducted in the Big Quilcene River indicate that there is not a distinct bull trout or Dolly Varden (*S. malma*) stock in this river (WDFW 1998a). These two species are often collectively referred to as “native char” due to their similarity in appearance. Hood Canal bull trout/Dolly Varden are currently separated into three distinct stocks, all located within the Skokomish River basin (WDFW 1998a). Thus, for purposes of this assessment, any bull trout that may occur in the action area are assumed to originate from the Skokomish River basin.

Hood Canal salmonid stock status information is obtained through the WDFW Salmonid Stock Inventory (SaSI; WDFW 2000), which is a cooperative product of the WDFW and the Tribal co-managers. The statewide inventory is a compilation of data on all wild stocks and a scientific determination of each stock’s status as *healthy*, *depressed*, *critical*, *unknown*, or *extinct*. The SaSI thus is a basis for prioritizing recovery efforts and for measuring the results of future recovery actions (WDFW 2000).

In addition to chinook, summer chum, and coho salmon, and bull trout, the bald eagle and marbled murrelet are ESA-listed threatened species that may also occur in the project vicinity (Berg, K., USFWS, personal communication,

October 19, 2001). The life histories and population status of these avian species are also discussed in this BE (Sections 3.1.5 and 3.1.6).

The Steller sea lion, humpback whale, and leatherback turtle have not been reported in, nor are they considered likely to be found in, the action area, but they are addressed in this BE in Sections 3.1.7 to 3.1.9 because of their status as threatened or endangered species.

3.1.1 Chinook Salmon

3.1.1.1 *Habitat Use*

Chinook salmon prefer to spawn and rear in the mainstem of rivers and larger streams (Williams et al. 1975, Healey 1991). In Hood Canal, naturally reproducing chinook exhibit primarily a summer/fall timing (WDFW and WWTIT 1994). In the Quilcene basin, the Big Quilcene River is the only system containing sufficient flows during the late summer–early fall spawning migration period to accommodate a sustained run of fall chinook. Occasionally a few chinook are observed spawning in the Little Quilcene River, although it is felt that these are strays from the run destined for the Big Quilcene. This is an introduced stock of chinook, and a large portion of adult returns is attributed to hatchery production (Williams et al. 1975).

The adult chinook spawning migration in the Big Quilcene River begins in early September and continues into mid-October. Most fish are destined for the federal fish hatchery at the mouth of Penny Creek (river mile [RM] 2.8). However, the lower 2 miles of the river provide excellent natural spawning habitat. Spawning commences by mid-September and terminates early in November. Following incubation and subsequent emergence, the majority of chinook fry rear in the system from 90 to 120 days before entering the estuary, with the major outmigration between April and June (Figure 1; Williams et al. 1975).

Chinook smolts may spend a prolonged period (several days to several weeks) during their spring outmigration feeding in saltmarshes and distributary channels as they transition gradually into more marine waters (Simenstad et al. 1982). Chinook fry and subyearlings in saltmarsh and other shallow habitat predominantly prey on emergent insects and epibenthic crustaceans such as gammarid amphipods, mysids, and cumaceans. As chinook mature and move to neritic habitat, they feed on small nekton (decapod larvae, larval and juvenile fish, and euphausiids) and neustonic drift insects (Simenstad et al. 1982; see also detailed life history review by Healey 1991).

3.1.1.2 Stock Status

According to the WDFW (WDFW and WWTIT 1994), hatchery chinook stocks have historically been mixed with wild chinook populations, resulting in hybridization. Because of this mixing, naturally spawning and hatchery-produced chinook from the different river systems in Hood Canal are managed as a single unit. The Hood Canal chinook are managed primarily to achieve hatchery escapement goals, and this results in a high harvest rate on naturally spawning populations that intermix with the hatchery returns. Spawning escapement of natural chinook to individual streams, including the Big Quilcene River, has not, in general, met the goals established by fisheries managers (WDFW and WWTIT 1994).

All Hood Canal chinook salmon are included as part of the Puget Sound chinook population that was listed as threatened under the federal ESA in 1999.

3.1.1.3 Preliminary Effects Determination

The preceding life history information indicates that chinook salmon are present in the action area and in the project area. Because certain project activities have the potential to adversely affect salmonids and their habitat, potential project effects on this species are analyzed in detail in Section 4.0.

3.1.2 Coho Salmon

3.1.2.1 Habitat Use

All accessible streams and tributaries draining the upper Hood Canal basin are used by coho salmon. Spawning occurs in almost every stream area where suitable spawning habitat and conditions permit. These include the mainstem of the Big Quilcene River up to the diversion dam barrier at RM 9.4 and in the mainstem Little Quilcene River up to the City of Port Townsend diversion dam at RM 7.1 (Williams et al. 1975).

Mature coho begin entering the larger streams and rivers in the basin in mid-September and the smaller streams after mid-October, with the peak of migration occurring in early November. Spawning extends over the period from late October until the end of December. The fry emerge from the gravel starting in early March and generally remain in the system for more than a year. The normal outmigration occurs in the second year of freshwater existence from late February to mid-April (Figure 1; Williams et al. 1975).

Because of their larger size when entering saltwater, coho are generally considered less dependent on estuarine and nearshore rearing than chinook or chum salmon (Simenstad et al. 1982). Coho tend to move through estuaries more rapidly, using deeper waters along the shorelines. Feeding is primarily on planktonic or small nektonic organisms, including decapod larvae, larval and juvenile fish, and euphausiids (Miller et al. 1976, Simenstad et al. 1982). Coho also eat drift insects and epibenthic gammarid amphipods, especially in turbid estuaries (see detailed life history review by Sandercock 1991).

3.1.2.2 Stock Status

The status of the Hood Canal-Quilcene/Dabob Bay's coho stock was considered depressed as of 1992 (WDFW and WWTIT 1994). Other Hood Canal coho stocks, primarily those located in the southern portion of Hood Canal, were classified as healthy.

3.1.2.3 Preliminary Effects Determination

The preceding life history information indicates that coho salmon are present in the action area and in the project area. Because certain project activities have the potential to adversely affect salmonids and their habitat, potential project effects on this species are analyzed in detail in Section 4.0.

3.1.3 Chum Salmon

3.1.3.1 Habitat Use

Chum salmon spend more of their life history in marine waters than other Pacific salmonids. Chum salmon, like pink salmon, usually spawn in coastal areas, and juveniles outmigrate to saltwater almost immediately after emerging from the gravel (Johnson et al. 1997). This ocean-type migratory behavior contrasts with the stream-type behavior of some other species in the genus *Oncorhynchus* (e.g., coho salmon and most types of chinook and sockeye salmon), which usually migrate to sea at a larger size, after months or years of freshwater rearing. It is believed that survival and growth in juvenile chum salmon depend less on freshwater conditions than on favorable estuarine and marine nearshore conditions (Johnson et al. 1997).

Two distinct runs of spawning chum salmon are found in the Quilcene basin in upper Hood Canal. The early run (summer chum) enters the Big and Little Quilcene rivers in September, while the late run (fall chum) found in these two systems, as well as smaller independent streams in the basin, moves upstream from October through November (Figure 1; Williams et al. 1975). The summer

chum spawn in October, while the fall chum spawn from mid-November through most of December. Following incubation and subsequent fry emergence, the juveniles migrate into the estuary from February through May (Figure 1).

Chum salmon juveniles, like other anadromous salmonids, use estuaries and nearshore areas to feed before beginning long-distance ocean migrations. However, chum and ocean-type chinook salmon usually have longer residence times in estuaries than do other anadromous salmonids. The period of estuarine residence appears to be the most critical phase in the life history of chum salmon appearing to play a major role in determining the size of the subsequent adult run back to freshwater (Johnson et al. 1997).

Simenstad et al. (1982) summarized the diets of juvenile salmonids in 16 estuaries. Simenstad concluded that small (≤ 50 - to 60-mm fork length) juvenile chum salmon feed primarily on such epibenthic crustaceans as harpacticoids copepods, gammarid amphipods, and isopods. Large juveniles (> 60 -mm fork length) in neritic habitats, on the other hand, feed on drift insects and on such plankton as calanoid copepods, larvaceans, and hyperiid amphipods.

3.1.3.2 Stock Status

The status of the Hood Canal summer chum stock was classified by the state as critical in 1992 (WDFW and WWTIT 1994). In 1999, Hood Canal summer chum were listed as threatened under the federal ESA.

3.1.3.3 Preliminary Effects Determination

The preceding life history information indicates that summer-run chum salmon are present in the action area and in the project area. Because certain project activities have the potential to adversely affect salmonids and their habitat, potential project effects on this species are analyzed in detail in Section 4.0.

3.1.4 Bull Trout (Native Char)

3.1.4.1 Habitat Use

Newly hatched anadromous bull trout emerge from the gravel in the spring (WDFW 1998b). They typically spend 2 years in fresh water before they migrate to salt water, the mainstem of rivers, or reservoirs, although there are populations of bull trout that do not exhibit this behavior; these trout spend their entire lives in the same stretch of headwater stream. Bull trout may not mature

until they are 7 to 8 years old, and rarely reach sizes greater than 14 inches in length (WDFW 1998b).

Bull trout typically use pristine headwater areas to spawn (WDFW 1998b). Although spawning timing varies among different populations, spawning generally begins in late August, peaks in September and October, and ends in November. Fish in a given stream spawn over a period of 2 weeks or less. Almost immediately after spawning, adults begin to work their way back to the mainstem rivers, lakes, or reservoirs to overwinter. Some of these fish stay in these areas while others move into salt water in the spring. Bull trout will spawn a second or even third time. Newly spawned fish, or kelts, feed aggressively to recover from the stress of spawning (WDFW 1998b).

Bull trout are opportunistic feeders, eating aquatic insects, shrimp, snails, leeches, fish eggs, and fish. Early beliefs that these fish are serious predators of salmon and steelhead are generally not supported today (WDFW 1998b).

Any bull trout/Dolly Varden that may occur in the action area likely originate from the Skokomish River system, which is believed to support the only native bull trout/Dolly Varden populations in Hood Canal (WDFW 1998a).

3.1.4.2 Stock Status

The Hood Canal bull trout/Dolly Varden are separated into three distinct stocks, based on geographical separation, and are all located within the Skokomish River basin. Of the three stocks, only the South Fork Skokomish stock is thought to contain anadromous forms (WDFW 1998a). As of 1998, the status of the South Fork Skokomish stock was unknown.

In 1999, the USFWS listed bull trout throughout their U.S. range as threatened under the ESA. In 2001, the USFWS announced that it is proposing to protect Dolly Varden char in the coastal Puget Sound region of Washington under the "similarity of appearance" provision of the ESA, because the Dolly Varden so closely resembles the bull trout. The proposal would extend some of the ESA's protections to Washington's coastal Puget Sound population of Dolly Varden as if it were a threatened species. Under the ESA, a species may be treated as if it were endangered or threatened when it so closely resembles a protected species that law enforcement personnel would have substantial difficulty in distinguishing between the two species. If the proposal is finalized, it will help eliminate situations where people mistakenly "take" bull trout when they believe they are "taking" Dolly Varden. Dolly Varden would only be treated as a listed species where its range overlaps with that of the coastal Puget Sound population of bull trout in Washington State. This would include Hood Canal.

3.1.4.2 Preliminary Effects Determination

The preceding life history information indicates that bull trout may be present in the action area and in the project area. Because certain project activities have the potential to adversely affect salmonids and their habitat, potential project effects on this species are analyzed in detail in Section 4.0.

3.1.5 Bald Eagle

3.1.5.1 Habitat Use

The Single Conveyor will pass approximately one-half mile south and west of a known bald eagle nesting site located near the shoreline, as identified in the WDFW PHS Database (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A). Eagles have been observed on and near the site by other consultants working on this project, and foraging in shallow waters along the site and on site beaches during low tides.

Much of the surrounding forestland (part of Pope Resources' Hood Canal Tree Farm) was logged in 1930, and wild fires spread through it in 1939. The forest reseeded naturally over the last 60 years, and second-growth timber now predominates. Logging of all areas in the 21,000-acre Thorndyke Resource Management Area is expected over time. Many portions of the site have been logged within the past 10 years and are either clear of vegetation or covered with forest brush and shrubs. Eagles may forage in these disturbed habitats, but level of use is expected to be less than in the marine shoreline areas. As noted in the *Habitat Management Plan for Marine Habitat and Bald Eagles* (Appendix D), known and potential perch trees were not cut during the most recent logging, and additional large trees, especially Douglas fir and red alder, remain along the shoreline. None of these trees are anticipated to be cut for the project.

In Puget Sound (Discovery Park) the bald eagles' diet has been studied by watching birds as they hunt and return with prey to an active nest site (Parametrix 1992-1996). Marine and freshwater fish were identified as the preferred prey of these eagles during five seasons of observation, composing over 84 percent of all captures and deliveries. Birds contributed a much smaller proportion (7.3 percent) of the eagles' diet. Fish species that were visually identified during the feeding of their young included salmonids, catfish, pollock, cod, rockfish, carp, dogfish, sculpin, perch, and hake. Eagle foraging is best described as opportunistic, as they will take advantage of whatever prey is easiest to obtain.

Bald eagles generally begin breeding activities in the late fall. Following courtship, egg laying, and incubation, eggs usually hatch in April and brooding occurs through June. Eaglets generally fledge in June or July. Adults don't often depart from the nesting area until August. The following fall they return to begin the nesting cycle. Time fluctuations in breeding activity can be attributed to weather changes affecting foraging or nesting success (Parametrix 1992-1996).

3.1.5.2 Population Status

After World War II, bald eagle populations declined significantly, largely as a result of the use of organochlorine pesticides and loss of nesting habitat (USFWS 1999). In 1963, only 417 nesting pairs of bald eagles were known to occur in the lower 48 states. In 1978, the bald eagle was listed as an endangered species in the continental United States, except in Washington, Oregon, Minnesota, and Wisconsin, where it was listed as threatened (USFWS 1986).

Due to recovery efforts, there are now an estimated 5,478 nesting pairs in the continental United States (USFWS 1999). As a result, biologists believe that the bald eagle may no longer require special protection under the ESA. In July 1999, the USFWS proposed to remove the bald eagle from the list of threatened and endangered species. A final decision on delisting is still pending.

3.1.5.3 Preliminary Effects Determination

The preceding life history information indicates that bald eagles may be present in the action area and in the project area. Because certain project activities have the potential to adversely affect bald eagles and their habitat, potential project effects on this species are analyzed in detail in Section 4.0.

3.1.6 Marbled Murrelet

3.1.6.1 Habitat Use

The marbled murrelet, a small seabird that nests in the coastal, old-growth forests of the Pacific Northwest, inhabits the Pacific Coast of North America from the Bering Sea to central California. In contrast to other seabirds, murrelets do not form dense colonies, and may fly 70 km or more inland to nest, generally in older coniferous forests. They are more commonly found inland during the summer breeding season, but make daily trips to the ocean to gather food, primarily fish and invertebrates, and have been detected in forests throughout the year. When not nesting, the birds live at sea, spending their days feeding and then moving several kilometers offshore at night (SEI 1999).

The breeding season of the marbled murrelet generally begins in April, with most egg laying occurring in late May and early June. Peak hatching occurs in July after a 27- to 30-day incubation. Chicks remain in the nest and are fed by both parents. By the end of August, chicks have fledged and dispersed from nesting areas (Marks and Bishop 1999). The marbled murrelet differs from other seabirds in that its primary nesting habitat is old-growth coniferous forest within 50 to 75 miles of the coast. The nest typically consists of a depression on a moss-covered branch where a single egg is laid. Marbled murrelets appear to exhibit high fidelity to their nesting areas, and have been observed in forest stands for up to 20 years (Marks and Bishop 1999). Marbled murrelets are not known to nest in other habitats such as alpine forests, bog forests, scrub vegetation, or scree slopes (Marks and Bishop 1999).

Marbled murrelets are presumably long-lived species but are characterized by low fecundity (one egg per nest) and low nesting and fledging success. Fledging success has been estimated at 45 percent. Nest predation on both eggs and chicks appears to be higher for marbled murrelets than for other alcids, and may be cause for concern. Principal predators are birds, primarily corvids (jays, ravens, and crows) (Marks and Bishop 1999).

At sea, foraging murrelets are usually found as widely spaced pairs. In some instances, murrelets form or join flocks that are often associated with river plumes and currents. These flocks may contain sizable portions of local populations (Ralph et al. 1995).

3.1.6.2 Population Status

The total North American population of marbled murrelets is estimated to be 360,000 individuals. Approximately 85 percent of this population breeds along the coast of Alaska. Estimates for Washington, Oregon, and California vary between 16,500 and 35,000 murrelets (Ralph et al. 1995). In British Columbia, the population was estimated at 45,000 birds in 1990 (Environment Canada 1999). In recent decades the murrelet population in Alaska and British Columbia has apparently suffered a marked decline, by as much as 50 percent. Between 1973 and 1989, the Prince William Sound, Alaska, murrelet population declined 67 percent. Trends in Washington, Oregon, and California are also down, but the extent of the decrease is unknown. Current data suggest an annual decline of at least 3 to 6 percent throughout the species' range (Ralph et al. 1995).

The most serious limiting factor for marbled murrelets is the loss of breeding habitat through the removal of old-growth forests and fragmentation of forests. Forest fragmentation may be making nests near forest edges vulnerable to

predation by other birds such as jays, crows, ravens, and great-horned owls (USFWS 1996). Entanglement in fishing nets is also a limiting factor in coastal areas because the areas of salmon fishing and the breeding areas of marbled murrelets overlap. The marbled murrelet is especially vulnerable to oil pollution; in both Alaska and British Columbia, it is considered the seabird most at risk from oil pollution. In 1989, an estimated 8,400 marbled murrelets were killed as a result of the *Exxon Valdez* oil spill (Marks and Bishop 1999).

3.1.6.3 Preliminary Effects Determination

The preceding life history information indicates that marbled murrelets may be present in the action area and in the project area. Because certain project activities have the potential to adversely affect marbled murrelets and their habitat, potential project effects on this species are analyzed in detail in Section 4.0.

3.1.7 Steller Sea Lion

3.1.7.1 Habitat Use

The Steller sea lion was listed as a threatened species under emergency rule by the National Marine Fisheries Service (NMFS, now NOAA Fisheries) in April 1990; final listing for the species became effective in December 1990. Steller sea lion habitat includes both marine and terrestrial areas that are used for a variety of purposes. Terrestrial areas (e.g., beaches) are used as rookeries for pupping and breeding. Rookeries usually occur on beaches with substrates that include sand, gravel, cobble, boulder, and bedrock (NMFS 1992). Sites used as rookeries may be used as haul-out areas during other times of the year. When Steller sea lions are not using rookery or haul-out areas, they occur in nearshore waters and out over the continental shelf. Some individuals may enter rivers in pursuit of prey (Jameson and Kenyon 1977).

Steller sea lions are opportunistic feeders and consume a variety of fish such as flatfish cod and rockfish, and invertebrates such as squid and octopus. Demersal and off-bottom schooling fishes dominate the diet of Steller sea lions (Jones 1981). Along the coasts of Oregon and California, Steller sea lions have eaten rockfish, hake, flatfish, cusk-eel, squid, and octopus (Fiscus and Baines 1966, Jones 1981, Treacy 1985). Rockfish and hake are considered to be consistently important prey items (NMFS 1992). Feeding on lamprey in estuaries and river mouths has also been documented at sites in Oregon and California (Jones 1981, Treacy 1985). Spalding (1964) and Otesiuk et al. (1990) have documented Steller sea lions feeding on salmon, but they are not considered to be a major prey item (Osborne 1988).

The breeding range of Steller sea lions extends from southern California to the Bering Sea (Osborne 1988). Breeding colonies consisting of small numbers of sea lions also exist on the outer coasts of Oregon and British Columbia. There are currently no known breeding colonies in Washington State (NMFS 1992), although three major haul-out areas exist on the Washington outer coast and one major haul-out area is located at the Columbia River south jetty (NMFS 1992). Jagged Island and Spit Rock are used as summer haul-outs, and Umatilla Reef is used during the winter (National Marine Mammal Laboratory, unpublished data). Other rocks, reefs, and beaches as well as floating docks, navigational aids, jetties, and breakwaters are also used as haul-out areas (NMFS 1992).

Responses to various types of human-induced disturbances have not been specifically studied. Close approach by humans, boats, or aircraft will cause hauled-out sea lions to go into the water. Disturbances that cause stampedes on rookeries may cause trampling and abandonment of pups (Lewis 1987). Areas subjected to repeated disturbance may be permanently abandoned (Kenyon 1962), and/or the repeated disturbance may negatively affect the condition or survival of pups through interruption of normal nursing cycles. Low levels of occasional disturbance may have little long-term effect (NMFS 1992).

3.1.7.2 Population Status

The worldwide Steller sea lion population is estimated at just under 200,000, with the majority occurring in Alaska. The range of the Steller sea lion extends around the North Pacific Ocean rim from northern Japan, the Kuril Islands, and Okhotsk Sea, through the Aleutian Islands and Bering Sea, along Alaska's southern coast, and south to California (Kenyon and Rice 1961, Loughlin et al. 1984).

3.1.7.3 Preliminary Effects Determination

Steller sea lions are not expected to be present in the action area within Hood Canal. Because of the innate escape responses of marine mammals and the pelagic habitats they use, the possibility of a direct take or injury that could result from project-related activities is extremely low. Thus, the conclusion of this biological evaluation is that the project **may affect, but is not likely to adversely affect**, Steller sea lions. No further discussion of the effects of the project on the species is included in this document.

3.1.8 Humpback Whale

3.1.8.1 *Habitat Use*

Humpback whales are commonly found in the North Pacific. Humpback whales inhabit coastal waters and are typically found within about 50 nautical miles from shore (Evans 1987, Calambokidis and Steiger 1995). The coastal waters that attract the whales represent areas of high productivity in plankton and forage fish that are important food sources for these animals (Evans 1987). They are dependent on these abundant food resources because of their size and metabolic needs for reproduction, nursing, and sustenance during times of the year when food resources are less abundant (i.e., while at wintering grounds) (Evans 1987).

Three groups have been identified based on summer and winter range distributions (Calambokidis et al. 1997a). The population was reduced to about 13 percent of the carrying capacity by commercial whaling (Braham 1991) and is now estimated to number between 6,000 and 8,000 animals (Calambokidis et al. 1997a). The three population groups spend the summer off the Aleutian Islands to southeast Alaska, the Washington/British Columbia coast, and California. The Alaska group migrates to winter grounds in Hawaii. The group off the Washington/British Columbia coast splits between three wintering areas in Hawaii, Mexico, and Japan. The California group migrates primarily to wintering grounds off Mexico to Costa Rica (Calambokidis et al. 1997a, 1998). The greatest numbers of animals winter off Hawaii (about 4,000 to 5,000), with Mexico second (1,600 to 4,200), and Japan representing the smallest wintering group (about 400). The summer grounds are used for feeding; the wintering grounds are used for breeding and calving (Evans 1987).

Humpback whales use coastal habitats because of their productivity. They are not expected to be routinely present in Puget Sound because of the lack of appropriate habitat and food availability for these large mammals. This expectation is based on limited data, because most studies of these animals are focused on the areas the whales frequent, not areas where they are rarely if ever seen. The Cascadia Research Institute conducts studies on marine mammals in Puget Sound and throughout the North Pacific Ocean. They have reported no humpback whales as incidental sightings in Puget Sound during recent marine mammal surveys (Calambokidis et al. 1994, 1997b; Calambokidis and Quan 1997; Calambokidis 1996). A humpback was seen in the Strait of Juan de Fuca in June of 1999 (Cascadia Research Institute, personal communication, 1999). This indicates that use of Puget Sound by humpback whales is rare and the species is not expected to occur within the action area.

3.1.8.2 Population Status

The humpback whale stock is listed as “depleted” under the Marine Mammal Protection Act. As a result, the Central North Pacific stock of humpback whale is classified as a strategic stock. The stock appears to have increased in abundance between the early 1980s and early 1990s; however, the status of this stock relative to its Optimum Sustainable Population size is unknown (NMFS 2000).

3.1.8.3 Preliminary Effects Determination

Humpback whales are extremely unlikely to occur in the action area and the possibility of a direct take or injury that could result from project-related activities is extremely low. Thus, the project **may affect, but is not likely to adversely affect**, humpback whales. No further discussion of the effects of the project on the species is included in this document.

3.1.9 Leatherback Turtle

3.1.9.1 Habitat Use

The leatherback turtle is a highly pelagic species, generally approaching shores only during the reproductive season. Small groups of individuals have been reported moving together in coastal waters, although these have been centered on concentrations of jellyfish on which they feed. Leatherbacks seldom form large aggregations (NMFS 1999a).

The leatherback turtle is well adapted to temperate climates because of its ability to thermo-regulate; thus it is one of the most widely distributed of all turtles. Their breeding grounds are located in the tropical and subtropical latitudes, although they are regularly seen in more temperate areas (Poland 1996). The eastern Pacific Ocean has the highest number of nesting sites, particularly on the western coast of Mexico (Poland 1996). There are no known nestings on Central Pacific islands, but nesting has been recorded on South Pacific islands. The nesting period for the eastern Pacific is from October to March (Poland 1996). Leatherback turtles nest only on high-energy, steep-shelving beaches immediately adjacent to deep water, and where there are no fringing reefs. Nests are sited on or just above the high water mark.

Very little is known about the life history of the leatherback turtle from emergence to reaching sexual maturity. The leatherback turtle feeds mainly on pelagic invertebrates, such as jellyfish and tunicates, crustaceans, and juvenile fish. Marine plants are often ingested accidentally. The feeding behavior of

juveniles is unknown, but it is thought that they are pelagic and follow warm currents and eddies offshore in search of food (Poland 1996).

3.1.9.2 Population Status

Populations have declined in Mexico, Costa Rica, Malaysia, India, Sri Lanka, Thailand, Trinidad, Tobago, and Papua, New Guinea. Leatherback numbers are in serious decline at all major nesting beaches throughout the Pacific. Nesting along the Pacific coast of Mexico declined at an average rate of 22 percent over the last 12 years, and the Malaysian population is 1 percent of the levels recorded in the 1950s. The collapse of nesting populations was precipitated by a tremendous over-harvest of eggs, direct harvest of adults, and incidental mortality from fishing (NMFS 1999a). Nesting populations of leatherback turtles are especially difficult to discern because the females frequently change beaches. However, current estimates are that 20,000 to 30,000 female leatherbacks exist worldwide (NMFS 1999a).

Leatherback turtles do not nest frequently enough in the United States to assess an accurate trend. The recovery plan for the turtles concluded that the nesting trends in the United States appear stable, but the population faces significant threats from incidental take in commercial fisheries and marine pollution (NMFS 1999a).

3.1.9.3 Preliminary Effects Determination

It is extremely unlikely that leatherback turtles ever occur in the action area and the possibility of a direct take or injury to leatherback turtles that could result from project-related activities is extremely low. Thus, the project **may affect, but is not likely to adversely affect**, leatherback turtles. No further discussion of the effects of the project on the species is included in this document.

3.2 Inventories and Surveys

Information on existing habitat conditions in the project area was largely obtained through field surveys conducted in conjunction with project planning and design. Field surveys included three intertidal beach surveys, an underwater video survey, a diver survey, and reconnaissance of two previously delineated wetlands. All field surveys were conducted between August 17, 2001, and July 12, 2002 (see *Marine Resources Survey Report*; Appendix C).

3.3 Critical Habitat

On March 11, 2002, NMFS (now NOAA Fisheries) rescinded the critical habitat designation for all West Coast salmon and steelhead populations in order to craft a new designation based on sound science and an analysis of economic impacts. Until such analyses are completed, no critical habitat designations for Puget Sound chinook salmon or Hood Canal summer-run chum salmon have been set.

The USFWS does not have sufficient information to conduct analyses required to determine critical habitat for bull trout (native char) in Puget Sound. As a result, the service has not yet proposed or designated critical habitat (Chan, J., USFWS, personal communication, March 22, 2000).

3.4 Existing Habitat Conditions in the Project Area

3.4.1 General

The upland portions of the Central Conveyor will pass through a commercial timber forest owned by Pope Resources except for the last approximately 350 feet adjacent to the shoreline. This waterfront property (a 14.7-acre parcel) is owned by the Hood Canal Sand and Gravel Company, LLC. Portions of the upland area were recently logged and replanted; other sections will be logged sometime in the future. The Hood Canal Sand and Gravel Company property will not be commercially logged. In addition to timber stands and clearcuts, the project area includes wetlands and wetland buffers. These are identified in the project drawings (Appendix B).

The existing marine intertidal habitat and associated species are described in detail in the *Marine Resources Survey Report* (Appendix C).

3.4.2 Noise

Existing noise levels in the proposed project vicinity were evaluated in December of 2002. The study results were not yet available at the time this BE was prepared; however, existing background noise levels are expected to be similar to other undeveloped shoreline areas along Hood Canal that are located well away from shoreline developments (e.g., cities/industrial waterfronts, marinas, etc.).

3.4.3 Water Quality and Stormwater

No direct measurements of water quality have been collected within the vicinity of the proposed T-ROC. Because this area has remained relatively undeveloped (e.g., no shoreline development or nearby industrial activity) and has no obvious sources of contaminants, marine water quality is expected to be excellent.

As a result of tidal fluctuations and strong nearshore currents, it is unlikely that water temperatures in the nearshore areas increase substantially in the summertime, with the exception of isolated tidepools. Likewise, dissolved oxygen levels are expected to remain relatively constant year round, at least in surface water layers.

3.4.4 Sediment Quality

No quantitative sediment quality data are available for marine sediments in the vicinity of the proposed project. Because no industrial activity has historically occurred in the vicinity of the Conveyor and Pier, marine sediments in this area are likely to contain only very low concentrations of the contaminants (e.g., metals and organics) that are associated with the industrial areas of Puget Sound. No sediment dredging is required for this project.

3.4.5 Access/Refugia

Juvenile salmonids and other species have unrestricted access to the intertidal, shallow subtidal, and deepwater habitats in the project area. From intertidal habitats, juvenile salmonids require low-tide refuge and/or access to wetted habitat as the tide drops to avoid stranding or increased risk of predation. The low-gradient beach in the project area would be expected to provide excellent feeding opportunities for juvenile salmonids and may provide refuge from some predators. At lower tidal elevations, juvenile salmonids would be expected to make use of the eelgrass beds that lie between approximately +4 feet MLLW and +1 foot MLLW (*Z. japonica*) and between approximately -1.5 feet MLLW and -20 feet MLLW (primarily *Z. marina*) (see *Marine Resources Survey Report*, Appendix C). Eelgrass (*Z. marina*) has been shown to be an important habitat type used by juvenile salmonids in their early marine life phase as they migrate through Puget Sound toward more marine rearing areas (Simenstad et al. 1982). In addition to providing feeding opportunities, the eelgrass beds provide refuge for small fish, including salmon, which can escape larger fish and avian predators by dodging among the blades.

3.4.6 Substrate

The upper beach is mostly sandy, with lenses of gravel visible at the beach face (Appendix C, Photo 2). A broad sand flat begins at about +6 feet MLLW and the sandy substrate continues outward into deep water well beyond the Pier.

3.4.7 Slope

Below the high-tide line, the beach face is moderately steep and continues down to a sand flat that begins at about +6 feet MLLW. The sand flat extends out to subtidal depths (approximately –10 feet MLLW), where the slope increases considerably (Appendix B, Sheet C2.3).

Flatter slopes are considered to provide higher-quality habitat for juvenile salmonids than steeper slopes because of the typical interdependence of slope and substrate (e.g., steeper slopes usually have coarser materials and flatter slopes typically have more fines). Shallower slopes and finer materials tend to drain less quickly on falling tides and thus do not dry out as rapidly and can support more benthic life. Flatter slopes also provide small fish with shallow-water escape corridors from larger fish predators. However, flatter slopes also allow more efficient feeding by other predators (e.g., great blue heron).

3.4.8 Shoreline

The beach and backshore along the Central Conveyor is bordered on the northwest by a steep bluff that rises to about 100 feet above mean sea level (Sheet C2.2 Appendix B, and Appendix C, Photo 1). A slope failure in the 1990s deposited a substantial quantity of sand and silt on the backshore, significantly altering a wetland formed by seepwater from sediment layers within the bluff. Along the high-tide drift line are scattered plants of saltbrush (*Atriplex patula*), jaumea (*Jaumea carnosa*), seaside plantain (*Plantago maritime*), meadow barley (*Hordeum brachyantherum*), pacific silverweed (*Potentilla anserena*), and silver burweed (*Ambrosia chamissonis*) (Appendix C, Photo 2).

3.4.9 Flow/Current Patterns

Current patterns in the vicinity of the Conveyor and Pier result from tidal flows in Hood Canal. Given the relatively exposed shoreline and the geomorphology of northern Hood Canal, it is anticipated that localized currents near the project area are moderate in strength. Both on the upper beach and on the sand flat, low patches of unstable sand give evidence of a net drift from southwest to the northeast. This is confirmed by the results of two separate drift cell studies

conducted by the Washington Department of Natural Resources ShoreZone Inventory (WDNR 2000) and Ecology (Johannessen 1992).

3.4.10 Biota

3.4.10.1 Prey—Epibenthic

Epibenthic zooplankton—primarily crustaceans—and terrestrial insects are important prey for juvenile salmonids in estuaries (Simenstad et al. 1988, Healey 1991). No quantitative studies examining benthic and epibenthic biota have been conducted within the action area.

Several of the habitat indicators on the site are important in determining the productivity and composition of the epibenthic community. The coarse sand and gravel of the upper beach is generally unproductive, supporting a sparse epibiota of species common in Puget Sound. The flatter, broad, middle-intertidal beach is composed mostly of coarse to medium sand and supports a more productive epibiota, as well as infauna such as polychaetes, bivalves, and crustaceans. Infauna is not considered a major source of prey for any age group of chinook or chum salmon. Chinook and chum do prey on certain burrowing and tube-dwelling amphipods, but these animals (e.g., *Corophium* sp.) are not typically considered part of the infauna; rather, they are considered to be epifaunal because they often leave their burrows to move about in the water column, where they may be captured by juvenile salmonids.

3.4.10.2 Prey—Pelagic Zooplankton

Production of calanoids and other potential pelagic prey of salmonids are largely dependent on water-column processes in Puget Sound. Pelagic zooplankton productivity is dependent on the presence of adequate light and nutrients to stimulate phytoplankton, and is not influenced greatly by conditions along shorelines or in deeper waters in the vicinity of the proposed Pier.

3.4.10.3 Prey—Forage Fish

Larval, juvenile, and adult Pacific herring (*Clupea pallasii*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus*) are important forage fish for juvenile, subadult, and adult salmonids (Healey 1991). Alteration of spawning habitat for these species may directly affect the abundance of forage for a range of age groups of juvenile salmonids.

The substrate along and below the high-tide line of the project area appeared potentially suitable for spawning by surf smelt and/or sand lance. According to

WDFW PHS Database, the nearest documented sand lance spawning occurs approximately one-third to one-half mile southwest of the proposed Central Conveyor (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A). The PHS Database does not contain any records of surf smelt nearer than at least 1 mile to the northeast and 1 mile to the southwest of the Conveyor.

3.4.10.4 Prey—Insects

Juvenile chinook salmon, in their early marine residency, are known to supplement their diet of marine crustaceans and larval fish with terrestrial insects (Healey 1991, Cordell et al. 1999). Presence of riparian vegetation along estuarine and marine shorelines is believed to be an important source of insects that may become salmonid prey (Brennan and Culverwell 2001).

3.4.10.5 Aquatic Vegetation

Eelgrass beds (*Zostera* spp.) are recognized as habitats of statewide significance due to their high production rates of prey for salmonids and other fishes, for the structural diversity they provide, and as a site for herring spawning (e.g., Simenstad et al. 1988). Eelgrass grows in shallow subtidal marine waters in substrates ranging from sandy silt to gravelly sand. Macroalgae also are recognized as a contributor to habitat complexity and primary productivity. In contrast to eelgrass, macroalgae readily colonize all appropriate rocky, cobble, or artificial substrates. The project area lacks cobble or rocky habitats and hence has no kelp beds and few macroalgae.

Where the lower edge of the beach face transitions to the sandflat, water emerges at low tide to create shallow pools of standing water and eventually form a channel that meanders across the flat. At the time beach surveys were conducted in August and September of 2001, and in July 2002, patches of the annual green algae *Ulva* spp., *Enteromorpha intestinalis*, and *E. linza* were observed in these fresh or brackish seeps.

From about +4 feet MLLW to +1 foot MLLW the sandflat supports scattered and discrete patches of *Z. japonica*. *Z. japonica* is an introduced species that is known to occur throughout northern Puget Sound, although its distribution has not been well documented (Thom and Hallum 1990). Because it is an annual, it is expected to be highly variable in space and time. This is especially true on beaches such as this one, where the advancing sand waves bury individual patches while new patches form in the wake of each sand wave. The summer 2001 beach surveys documented very high shoot density (approximately 1,100 turions per square meter [m²]) and fertile fronds were present where patches

occurred in shallow standing water ponds. In a brief, late-winter 2002 site visit, the larger blades present in late summer 2001 were largely replaced by much narrower and shorter blades. This would be expected, as eelgrass would normally be at the peak of its annual growth (i.e., blade size and shoot density) during the summer months. However, the beach survey conducted in July 2002 showed the *Z. japonica* blades to be noticeably narrower than in summer 2001. In addition, patches of *Z. japonica* appeared to be more scattered and less dense compared to the previous summer. It was also apparent that the upper beach and backshore in the vicinity of the Pier had changed significantly from summer 2001 as a result of high tides and intense wave action over the winter. A sand/cobble berm that in 2001 existed near the top of the slope had shifted waterward by up to several meters (see photos, Appendix C).

Continuing waterward, the beach surface is somewhat firmer on the outer portion of the sandflat. Beginning at about -1.5 feet MLLW and extending down into the subtidal zone (approximately -16 feet MLLW) is a band of patches of native eelgrass (*Z. marina*). However, some *Z. japonica* was present within the upper elevations of this band. Eelgrass is generally dense in the patches within this band, and the patches become larger and more continuous to the northeast of the Pier. The eelgrass densities within this band appeared to be unchanged between August/September 2001 and July 2002, although no shoot densities were measured during the latter survey. The diver survey in August 2001 indicated that most patches are smaller than 20 feet in diameter, with densities ranging from 20 to 428 shoots per m² (mean: 189 shoots per m²) in quadrats containing eelgrass (i.e., within the patches shown on Sheet C2.3, Appendix B).

Within the 75-foot strip (from 25 feet south to 50 feet northeast of the Pier), the zone of maximum potential shading, *Z. marina* is very sparse. Of the 32 observation points within this zone, only three contained any eelgrass at all. Overall density was 1.75 shoots per m², about 1 percent of the density in eelgrass patches southwest and northeast of the Pier.

3.4.10.6 Ecological Diversity

Ecological diversity is an abstract concept relating to the variety of habitats and assemblages present in a given area. A greater ecological diversity is often considered to reflect a more stable, productive, and/or healthy ecosystem, although its tie to habitat quality for salmon and other species is theoretical, not empirical.

The action area supports diverse habitats as well as a wide variety of fish, invertebrates, birds, and mammals. However, within the project area, habitat is

not particularly diverse (mostly sandy); diversity is provided mostly by changes in elevation.

4.0 EFFECTS OF THE ACTION

The effects of construction and operation of the proposed conveyor and Pier on listed and candidate salmonids and their habitat are described in this section in the context of a series of “pathways” and “indicators.” Pathways represent groups of environmental attributes important to anadromous fish and their habitats. These pathways are further broken down into indicators, which are specific components of habitat quality that are relevant to the project area. The concept of pathways and indicators was developed by NMFS (now NOAA Fisheries) as a way to summarize important environmental parameters and associated levels of condition for ESA determinations of effect in fresh water at the watershed scale (NMFS 1999b). The concept is used in this BE to frame discussions of how the T-ROC will contribute to improvement, maintenance, or degradation of each of the indicators of habitat quality. A list of pathways and indicators considered in this biological evaluation, and the net effect of the proposed project on each, is provided in Table 1.

Presented below is a discussion of short-term and long-term direct and indirect effects of project activities (Section 2.2) in the project area, as well as the net effects of those activities. Net effect is considered to be the overall effect on the species and habitat in the long term. For example, a short-term adverse condition (e.g., loss of infauna during dredging or debris removal) may be necessary to achieve a long-term improvement in benthic habitat and quality; in such a case, the *net* effect is positive and would contribute toward improvement in the infauna indicator. Moreover, if short-term adverse conditions occur when few or no listed species are present, and if those conditions are no longer present when listed species return to the area, then those conditions do not constitute adverse modification of the indicator of habitat quality. Only those pathways and their associated indicators that are likely to be affected by the project are discussed in detail below.

4.1 Disturbance and Noise

In- and overwater construction of the Pier is expected to take approximately 2 months. Construction activities waterward of the OHW line will be conducted during periods when few juvenile salmonids are expected to be present in the work area (between July 16 and February 15). In addition, certain construction activities may be restricted to periods outside of the bald eagle wintering season

(October 31 through March 31) (USFWS 1999) and nesting period (January 1 through August 15) (USFWS 1999).

4.1.1 Short-Term Effects

4.1.1.1 Direct Effects

Marine Environment—Short-term disturbance of salmonids and foraging bald eagles and marbled murrelets may result from pile driving and work vessel activity during construction of the Pier. Inwater noise levels associated with pile installation and other aspects of the proposed action will be temporarily elevated above existing background noise levels.

Feist et al. (1996) investigated the impacts of driving concrete piles on juvenile pink and chum salmon behavior and distribution in Everett Harbor, Washington. The authors reported that changes may occur in general behavior and school size, and that fish appeared to be driven toward the acoustically isolated side of the site during pile driving. However, the number of fish schools did not change significantly with or without pile driving, and schools were often observed about the pile-driving rigs themselves. No effects on feeding were reported. The study concluded that any effects of pile-driving noise on juvenile salmonid fitness would be very difficult to measure quantitatively.

More recent experience in Puget Sound and elsewhere, however, has documented more severe effects from use of an impact hammer to drive large-diameter, hollow steel piles such as those that will be required for this project. Impact driving of 24-inch steel piles in late 2002 at a ferry terminal in Puget Sound resulted in deaths of a number of pile perch (*Embiotocidae*); similar or larger piles, driven by impact hammer at the Port of Seattle, resulted in kills of Pacific herring (P. Erstad, WDFW, personal communications). However, impact driving of 24-inch piles at the Mukilteo Ferry dock in early 2003 did not result in documented fish kills; a bubble curtain was deployed at Mukilteo and shown to significantly reduce measured water-borne sound pressures (Houghton, J., Pentec, personal observation).

For the proposed project, all support and batter piles in the marine and shoreline areas will be installed using a vibratory method (site conditions permitting), producing much lower inwater noise levels than installation using an impact hammer. Furthermore, the inwater construction activities will occur outside of periods when significant numbers of juvenile salmonids are expected to be present. Thus, no significant noise-related disturbances to salmonids are expected from these construction activities.

The Washington State Department of Transportation (WSDOT) conducted monitoring studies to determine the potential impacts on wintering eagles associated with pile-driving activities at Orcas and Shaw islands in San Juan County, Washington, from December 15, 1986, through March 15, 1987 (Bottorff et al. 1987). Each monitoring area was associated with a Washington State ferry terminal. Thus, background noise sources included ferry whistles, boat motors, chain saws, aircraft, front-end loaders, cranes, generators, diesel trucks, hammers, and other general noise sources associated with construction areas. Noise readings were taken at the construction sites and at various intermediate points out to about 6,000 feet from the construction sites.

Driving wood piles did not visibly disturb the eagles observed during the course of the study. A steel pile, which produces some of the loudest noises during pile-driving activities, may have disturbed a bald eagle pair at a distance of 4,000 feet. However, this same pair of eagles was in the same location during the driving of two steel piles earlier in the day and exhibited no visible disturbance reaction. The eagles returned to their preferred perch and no further adverse reactions were observed, even after over 100 wood piles were driven (Bottorff et al. 1987).

Again, the previously cited study included the use of an impact hammer to install piles. Because the proposed project will use a vibratory method, the increased ambient noise levels generated during construction activities will be lower, and therefore less likely to temporarily disturb bald eagles in the vicinity of the project area.

Short-term disturbance of foraging marbled murrelets may result from noises generated during pile driving and other construction activities. Unlike bald eagles, the behavioral responses of marbled murrelets to such construction noises have not been documented (e.g., Bottorff et al. 1987). It is assumed, however, that the birds would temporarily avoid the work area during construction periods, particularly during pile-driving activities, which may generate the highest noise levels.

Upland Areas—Construction activities related to the upland portion of the Conveyor (e.g., installation of support piles, grading/excavation, and placement of Conveyor sections) may also deter bald eagles from perching in trees along the Conveyor. However, any disturbances caused by construction-generated noise would only be temporary and short term.

4.1.1.2 Indirect Effects

No short-term indirect effects due to construction disturbances are anticipated.

4.1.2 Long-Term Effects

4.1.2.1 Direct Effects

Following construction, the Conveyor will operate indefinitely. Outside of scheduled intermittent shutdowns and any regulatory restrictions placed on Conveyor or vessel operations, the normal operating schedule for the Conveyor will be driven by the demand for the materials. This will determine the capacities of transport vessels used and their frequency (e.g., number of vessels per week or month). Depending on the vessels' sizes, it is anticipated that one to six vessels will be loaded each day.

Noise levels during the project operation will be elevated above the existing background levels in the project area. Routine noise-generating activities will include vessel operations and loading, operation of the Conveyor, and maintenance activities.

It is unlikely that the noises generated during normal operations will adversely affect salmonids in the project area, as most of these activities will occur above water and are expected to generate lower noise volumes than construction activities. Noise from marine traffic will be unlikely to adversely affect juvenile salmonids normally associated with the shallow nearshore habitat, because the Pier and associated vessel traffic will be approximately 1,000 feet offshore in water generally greater than 40 feet deep. Also, due to its modern design (e.g., sealed bearings), combined with regular monitoring and maintenance, the Conveyor itself is expected to generate relatively little noise.

Like the impacts associated with construction activities, normal operations of the vessels and conveyor may affect foraging and roosting behavior of bald eagles and marbled murrelets. However, bald eagles and marbled murrelets occur in and around more developed areas in Puget Sound where they have presumably acclimated to those urban and industrial sounds. Any disturbances here would likely be localized, and limited to the immediate project area. Marbled murrelets are likely to forage in areas farther offshore than bald eagles, and the vessel traffic to and from the Pier could cause the seabirds to temporarily avoid the paths of the vessels. When approached by boats, marbled murrelets, like most seabirds, will either swim or fly away from the path of the boat, or dive under water. When marbled murrelet pairs are separated in such a manner, they quickly find each other again (Ritchie, B., WDFW, personal communication, March 8, 2002). The impact on overall foraging behavior will be little to none since the amount of traffic during even the heaviest use will remain relatively small (up to six vessels, plus tugboats per day).

4.1.2.2 Indirect Effects

No long-term indirect effects from project activities are anticipated.

4.1.3 Net Effects

Pile driving and other activities during construction of the Pier would result in brief periods of increased noise, possibly causing salmonids and other fish species to avoid certain areas in the vicinity of the Conveyor. This possible impact to juvenile salmonids would only be temporary, would not persist beyond the construction period, and would not result in significant or measurable take. The increased noise from construction activity may temporarily deter or discourage foraging by bald eagles and marbled murrelets in the immediate work area. Routine operation of the Conveyor would generate less noise than construction activities and be less likely to disturb bald eagles and marbled murrelets in the area.

Therefore, the net effect of construction and the Conveyor operation would be a minor increase in noise levels in the project area (Table 1).

4.2 Water Quality

4.2.1 Short-Term Effects

4.2.1.1 Direct Effects

Upland Areas—The Central Conveyor will not cross any lakes, but it will cross several small seasonal streams and natural drainage courses. However, the south end of the Central Conveyor will cross a wetland located at the base of the slope along the Hood Canal shoreline (Wetland “B”; Appendix B, Sheets 8 and C2.2). Because the Conveyor will be fully covered or enclosed, its entire length, there is little risk of spillage of materials directly into the wetland or into these streambeds.

BMPs designed to minimize erosion, particularly near slopes, will be put in place around all areas of earthwork, including construction of forestry service roads and excavation of the cut on the hillside above the shoreline. These BMPs include implementation of the stormwater controls previously described.

Marine Environment—Because of the relatively silt-free nature of sediments in the intertidal and shallow subtidal areas, relatively little material will be suspended in the water column during pile driving and other construction activities. However, turbidity may be increased above background levels within

the immediate vicinity of construction activities and could exceed turbidity criteria for state water quality standards (WAC 173-2101A). Because of local currents and tidal action, these water quality exceedances are expected to be temporary and highly localized. The local currents will disperse suspended sediments from pile-driving operations at a moderate to rapid rate depending on tidal stage.

Minor increases in turbidity could result from propeller wash from tugboats conveying vessels to and from the Pier and from possible small spills of sand and gravel into Hood Canal while loading the vessels. Turbidity increases resulting from these actions would be transient, highly localized, and not expected to yield acute or chronic exceedances of state turbidity criteria.

To reduce the potential of sand and gravel spills, fences will be placed around the perimeter of any flat-deck transport vessels loaded at the site. The potential for spillage from overwater sections of the Conveyor will be minimized because the Conveyor will be enclosed.

Fuel spillage during construction activities and operation of the Conveyor is possible. However, as fueling of vessels will not occur on site, the quantity released from such an event will be limited to that contained within the vessel. Potential impacts to water quality from small spills or leaks are possible, but are unlikely to have a long-term impact.

Other BMPs will be implemented in the marine areas to minimize the risk of fuel spills and other potential sources of contamination. An approved spill response plan including provisions for on-site containment equipment (including a boom) will be developed prior to any construction activities. Spill prevention and spill response procedures will be maintained throughout conveyor operation. Vessels calling at the Pier may release gray water within the confines of Hood Canal. However, quantities released will be limited with releases intermittent in time and varied in location. Plumes of gray water are expected to disperse quickly in the substantial currents present in this portion of the canal, and no short-term acute or chronic effects on biota are likely.

4.2.1.2 Indirect Effects

No significant short-term indirect effects to freshwater or marine water quality are anticipated from project activities.

4.2.2 Long-Term Effects

4.2.2.1 Direct Effects

Upland Areas—The Central Conveyor and associated forestry service roads do not represent a significant impervious area within the drainage basins and will be separated from surface water courses by considerable distances of undisturbed land that will allow ready infiltration of stormwater. Therefore, no increased runoff volumes from this project are expected to impact any local streams or marine areas.

Marine Environment—No long-term direct effects to water quality in the marine environment are anticipated as a result of project activities. From the top of the marine bluff to the end of the Pier, the Central Conveyor will be enclosed by a roof and siding. The floor will consist of either a solid floor or a pan under the return belt of the Conveyor with an adjacent grated walkway. Therefore, the risk of spillage of materials into marine waters will be minimized.

4.2.2.2 Indirect Effects

No long-term indirect effects to freshwater or marine water quality are anticipated as a result of the Central Conveyor and the Pier.

4.2.3 Net Effects

Short-term effects resulting from increased turbidity are expected during pile driving and other inshore construction activities, but these effects (due to sediment resuspension) are expected to be temporary and highly localized. Project activities are not expected to result in any long-term adverse changes in chemical concentrations, turbidity, temperature, or dissolved oxygen. The net effects of construction and operation of the proposed project will be to maintain water quality in the marine waters surrounding the project site and in the upland drainages (Table 1).

4.3 Stormwater

4.3.1 Short-Term Effects

No short-term direct or indirect effects to stormwater quality or quantity are anticipated from construction activities or from operation of the Central Conveyor in the project area. BMPs designed to minimize erosion, particularly near slopes, will be put in place around all areas of earthwork, including construction of forestry service roads and excavation of the cut on the hillside

above the shoreline. These BMPs include implementation of the stormwater controls previously described.

4.3.2 Long-Term Effects

No long-term direct or indirect effects to stormwater quality or quantity are anticipated from construction activities or from operation of the Central Conveyor in the project area. The Central Conveyor and associated forestry service roads do not represent a significant impervious area within the drainage basins and will be separated from surface water courses by considerable distances of undisturbed land that will allow ready infiltration of stormwater. Therefore, no increased runoff volumes from this project are expected to impact any local streams or marine areas.

4.4 Sediment Quality

4.4.1 Short-Term Effects

No short-term direct or indirect effects to sediment quality are anticipated from pile driving and other construction activities, or from operation of the Central Conveyor in the project area.

4.4.2 Long-Term Effects

No long-term direct or indirect effects to sediment quality are anticipated from pile driving and other construction activities, or from operation of the Central Conveyor in the project area.

4.5 Habitat

4.5.1 Short-Term Effects

4.5.1.1 Direct Effects

Upland Areas—Construction of the Conveyor and forestry service road in upland areas will avoid bald eagle perch trees and minimize the extent of vegetation that will be cut.

Marine Environment—Short-term disturbance of fish fauna in the nearshore marine habitat will result from pile driving and other construction activities. These temporary disturbances, including increased noise levels and turbidity, are addressed in the previous sections. Grounding of work barges during construction of the overwater portions of the Conveyor will disrupt surface

sediments and possibly eelgrass beds (*Z. japonica*). This may result in a short-term compression of beach sediments that could alter the nature of benthic biota that succeed in these localized areas. As noted, the typical size of a construction barge is 155 feet by 50 feet (7,750 sf). Depending on construction alternative selected, a barge of this approximate size will be required to ground during low tide to offload the large crane required for installation of the pile bents and conveyor truss sections nearshore. This grounding is expected to occur above the elevation of the band of patchy *Z. japonica* (i.e., above +4 feet MLLW) in an area with little macro-infauna.

The preferred method of construction across the beach will be to drive piles during high tide to avoid grounding of barges. Nonetheless, barges will likely be required to drop spuds to hold position while working in a given area. There is a probability that some of these spuds will drop on patches of *Z. japonica*. Also, one or more of the pilings required to support the Conveyor across the beach may be driven in an area that supports *Z. japonica* at the time of construction. Because of the dynamic nature of patches of this species on this beach, the extent of these disruptions cannot be predicted. The *Habitat Management Plan for Marine Habitat and Bald Eagles* (Appendix D) contains provisions for up-front replacement of eelgrass that may be lost during project construction.

4.5.1.2 Indirect Effects

No short-term indirect adverse effects to upland habitat or the marine habitat are anticipated.

4.5.2 Long-Term Effects

4.5.2.1 Direct Effects

Upland Areas—Project operation will have no long-term effects on listed species or their habitat in upland areas.

Marine Environment—Project construction will result in destruction of isolated local areas of marine benthic habitat and species in the footprint of each pile (up to 30 inches in diameter). The pilings will occupy approximately 734 sf of marine benthic habitat at depths between about +6 feet and -64 feet MLLW (Appendix D; Table D-1). The great majority of this area (about 613 sf) would be below depths of -30 feet MLLW. To offset this loss, a substantially greater area of hard surface will be provided for attachment of epibenthic plants and animals that will greatly exceed the lost benthic primary and secondary productivity. A total of over 11,000 sf of epibenthic surface area will be created at depths between +6 feet and -10 feet MLLW (Appendix D; Table D-1). Plants and

animals colonizing this surface area will contribute to the primary and secondary productivity of the water column passing the site. The offshore pilings, portions of which are permanently submerged, would likely attract pile-oriented fish such as shiner and pile perch (Embiotocidae). The shells of barnacles and mussels sloughed from the pilings would support a suite of organisms that is different from that now present in the predominantly sandy substrate of the project site.

The overwater portion of the Conveyor will be fully enclosed out to the Pier. However, some sand and gravel could be spilled at the discharge point. If any spillage occurred over the beach due to an unanticipated catastrophic system failure, it will simply add sand and gravel to a sand-and-gravel beach. Any effects will be minimal, localized, and quickly dispersed by wave action. In deeper water (e.g., deeper than -30 feet MLLW), any small amount of sand and gravel that may spill at the transfer point could alter the nature of the benthic fauna and epibiota in localized areas to favor an assemblage adapted to a coarser substratum. Rates of accumulation will not be great enough to adversely affect larger infauna, such as geoducks (e.g., Westley et al. 1975).

The Pier will bisect patches of *Z. japonica* within a zone from about +4 feet MLLW to +1 foot MLLW (Appendix B, Sheet C2.3). Any piles driven through the patches will likely destroy or displace eelgrass immediately under pile footprints. Depending on the presence of *Z. japonica* at the time of construction (*Z. japonica* is seasonal and likely shifts in this area due to currents and wave action), the potential direct impact to eelgrass from pile driving is less than 6 sf (assuming that 12, 18-inch-diameter piles will be installed across the eelgrass zone and that the zone is 25 percent covered with eelgrass). However, the potential direct impact to eelgrass could increase to slightly more than 21 sf if all of these piles were placed in existing eelgrass patches.

The presence of the conveyor will cast shadows on portions of the adjacent beach and subtidal bottom areas; however, overall impacts (direct and indirect) to eelgrass beds are expected to be very limited. During the major growth periods of spring and summer, shadows from the Central Conveyor and Pier (including vessels) are not expected to reach the large patch of *Z. marina* north and east of the Pier (Appendix B, Sheet C2.3) except in the early morning. However, due to the conveyor alignment and its proximity to patches of *Z. japonica*, some shading of *Z. japonica* is likely to occur. The amount of shading and the amount of eelgrass potentially affected cannot be predicted with accuracy.

Due to the height of the conveyor, its shadow will move constantly throughout each day, falling on any given area that may contain eelgrass patches for a maximum of an hour or two each day. *Z. japonica* occurs in isolated patches

within a 250-foot-wide zone over which the shadow will move. It is conservatively predicted that light availability may fall below thresholds necessary for optimal eelgrass production for periods of 1 to 2 hours per day in a zone of about 30 feet in width (three times the approximate effective diagonal dimension of the enclosed section of the Conveyor, given the south half of the structure will consist of a grated walkway) over the *Z. japonica* band. This is an area of about 7,500 sf where some reduction in eelgrass growth may occur. This estimate is conservative because production of eelgrass at higher intertidal elevations is limited by desiccation, not by light levels. Thus, it is probable that there will be no reduction in *Z. japonica* productivity as a result of shadows cast by the Central Conveyor.

Shading from the two open support platforms and from mooring dolphins will not reach areas of eelgrass (*Z. marina*) during the great majority of the day. The shadow from the northern mooring dolphin and from the outer support tower will reach adjacent eelgrass beds briefly during early morning, when the sun is very low in the eastern sky. Because of the low sun angle, light refraction off the water surface will be great under these circumstances, and the amount of photosynthetically active radiation reaching the bottom (and eelgrass) will likely be below the threshold for photosynthesis with or without the project structures. Thus, the effect on eelgrass is expected to be minimal.

To ensure that there will be no temporal reduction in eelgrass productivity and compensate for any loss of eelgrass habitat function that may occur, the project Applicant has proposed preconstruction eelgrass enhancement. This enhancement will be in the form of eelgrass transplanting to expand the area of eelgrass in the project area by approximately 2,500 sf (1,250 sf for each species). The eelgrass transplant will be conducted in the first spring following issuance of project permits. The Applicant has also proposed a detailed eelgrass monitoring program (see *Habitat Management Plan for Marine Habitat and Bald Eagles*, Appendix D) that will quantify the baseline eelgrass distribution and density on both sides of the Central Conveyor before construction begins. Operational monitoring will be conducted in the first summer following construction and during Years 3 and 5 of project operation to determine if any reduction in eelgrass densities has occurred as a result of the project and to assess the extent of any spillage of materials that has occurred. This monitoring will define any losses of eelgrass attributable to the project. The preconstruction eelgrass transplant area also will be monitored. This enhancement area will be expanded, if needed, to offset documented losses during Conveyor use that exceed the preconstruction transplant. If needed, the additional eelgrass transplanting will occur at a 2.0:1 ratio to offset those losses.

4.5.2.2 Indirect Effects

No long-term indirect adverse effects are expected to result from project activities.

4.5.3 Net Effects

Installation of piles for the Pier will result in the destruction of isolated local areas of marine benthic habitat in the footprint of each pile. The piling will offset the loss of benthic habitat by creating new physical habitat upon which invertebrate and algal colonization will occur, and which will likely attract pile-oriented fish such as shiner and pile perch.

Installation of the Central Conveyor will result in partial shading of a portion of the *Z. japonica* eelgrass bed, which could result in reduced eelgrass productivity. Because eelgrass in the mid- to upper portion of its range is not naturally light limited and because project structures are narrow and elevated well above the water, the probability of measurable reductions in eelgrass growth from project structures is considered to be very low. If eelgrass productivity were reduced, it could be reflected as a reduced eelgrass blade area available to support epiphytic zooplankton, an important food source for juvenile chinook salmon.

The *Habitat Management Plan for Marine Habitat and Bald Eagles* (Appendix D) describes a preconstruction eelgrass transplant area that is expected to more than offset any short- or long-term reduction in area or productivity of eelgrass at the project site. Therefore, the long-term net effect of construction and operation of the Central Conveyor and Pier will be to maintain and possibly increase existing marine habitat function beneficial to listed and candidate fish species (Table 1).

4.6 Biota

4.6.1 Short-Term Effects

4.6.1.1 Direct Effects

Upland Areas—Construction of the Conveyor through the upland areas will require some removal of vegetation along the Central Conveyor. The Conveyor route is well away from most local streams, although it will cross some Type 5 streams in Wetland C. BMPs will be used to control site erosion. Therefore, construction activities may affect, but are not likely to adversely affect, aquatic biota. Location of pilings and construction techniques have been chosen to

avoid any impacts to the disturbed riparian wetland that occurs along the toe of the bluff (Appendix B, Sheet C2.2).

Marine Environment—Project construction will result in the destruction of nonmobile benthos in the footprint of each 18- or 30-inch-diameter pile. Short-term disturbance of fish fauna and avian species could result from pile driving and work barge activities during construction of the Pier (see Section 4.1.1.1). Barge movements over shallow intertidal areas could disturb or destroy portions of the shallower eelgrass (*Z. japonica*) beds on the low-gradient sandy bench. Inwater construction activities will be timed to avoid periods when large numbers of juvenile salmon are expected to be present. It is anticipated this work window will be July 16 to February 15.

During project operation, additional short-term disturbance of fish fauna could result from tugboat-assisted movement of transport vessels to and from the Pier. These disturbances will be largely off shore in waters greater than 40 feet deep, which are not expected to be significantly used by smaller juvenile chinook or chum salmon that could be vulnerable to disturbance.

Vessel movements to and from the Pier could temporarily disrupt the feeding or resting activities of any marbled murrelets in the path of oncoming vessels. The typical response of these birds to such a disturbance is to dive underwater until the vessel passes or to fly a short distance away. In either case, any disruption of feeding effectiveness is expected to last only a few minutes at most.

To reduce the potential for introductions of nonindigenous species, vessels calling at the Pier will be subject to the U.S. Coast Guard's ballast water management program, rules set forth by Washington Administrative Code (WAC) 220-777-090 and 095, and Chapter 77.120 Revised Code of Washington (RCW). Among other restrictions, these rules require vessels involved in coastal trade to report and conduct ballast water exchange at least 50 miles offshore before they are allowed to discharge ballast into waters of the state.

4.6.1.2 Indirect Effects

No short-term adverse indirect effects are anticipated as a result of project activities.

4.6.2 Long-Term Effects

4.6.2.1 Direct Effects

Upland Areas—Project operation will have no long-term effects on listed species or their habitat in upland areas.

Marine Environment—Project construction will result in the destruction of isolated local areas of marine benthic species in the footprint of each pile. The presence of the Pier will have little effect on migrations of juvenile salmonids along the shoreline. Because these facilities will be perpendicular to the shoreline, relatively high above the water and relatively narrow, and because the largest structures will be well off shore, this potential effect should be negligible.

Presence of the Pier is not expected to provide habitat that would attract potential predators on juvenile salmonids to shoreline areas through which potentially vulnerable smaller fish pass. Major project structures with the potential to attract pile perch or rockfish would be located in deep water (e.g., >30 feet deep) and well off shore.

Operation of the Conveyor after dark will require lighting. Lighting on the Conveyor will be oriented up or at an angle of incidence allowing for light to fall on the mechanical system by indirect reflection. Under normal conditions, the design of the lighting will provide a nighttime condition of nondirect glare on the water.

There has been some research on the effects of artificial lighting on juvenile salmonid migration and behavior, but whether or not this results in potential harm (e.g., increased predation) is unknown. Prinslow et al. (1980) and Salo et al. (1977) studied the effects of artificial lighting along the edges of a pier apron on Hood Canal. Young salmon, as well as other fish, were attracted to the lighted areas at the edge of the aprons. In this situation, the lights were hung from the apron edges and directed at the water's surface. Light levels as low as 0.2 foot-candles (ft-c) at the water surface attracted young chum salmon from an area of 5 to 10 m during nighttime periods. These light levels also attracted young herring and sand lance. Light levels of 19 to 37 ft-c attracted substantial numbers of chum salmon and other fish. These attractions of young fish were to areas adjacent to the piers rather than under the aprons.

Ratte and Salo (1985) studied the effects of artificial lighting under a Port of Tacoma pier apron. Generally, they obtained higher catches in traps with the lights off than with the lights on. These results suggest that young salmon tended to avoid the artificially lighted area under the pier to some degree.

Despite much speculation concerning increased predation under piers and as a result of increased light levels, studies have been inconclusive (Simenstad et al. 1999, Nightingale and Simenstad 2001).

The Conveyor will shade portions of the adjacent beach and subtidal bottom areas, including the relatively wide band containing patches of *Z. japonica* between approximately +4 feet and +1 foot MLLW. It is conservatively predicted that some reduction in eelgrass productivity could occur in an area totaling 7,500 sf (about 0.17 acre).

The Applicant's *Habitat Management Plan for Marine Habitat and Bald Eagles* (Appendix D) describes the measures that will be taken to ensure that no long-term loss of eelgrass productivity results from the project and to provide compensatory mitigation for any temporal losses that may occur. The plan proposes a preconstruction eelgrass transplant that will offset any potential short-term reduction in the area or productivity of eelgrass at the project site.

4.6.2.2 Indirect Effects

No long-term adverse indirect effects to biota in upland areas or the marine area are anticipated.

4.6.3 Net Effects

No direct mortality of salmonids or other fish species is expected to result from any aspect of the project. Installation of piles for the Pier will result in the destruction of isolated local areas of nonmobile marine benthos in the footprint of each pile. The piling will partially offset the loss of benthic habitat by creating a hard substratum habitat upon which invertebrate and algal colonization will occur and which, in subtidal areas, will likely attract pile-oriented fish such as shiner and pile perch.

The alignment of the Conveyor will result in shading of a portion of the *Z. japonica* bed, which could result in reduced eelgrass productivity, although this effect is considered unlikely to be significant or measurable. If it occurred, reduced eelgrass productivity could reduce the eelgrass blade area available to support epiphytic zooplankton. The proposed mitigation plan will offset any short-term reduction in area or productivity of eelgrass at the project site. Therefore, the long-term net effect of construction and operation of the Central Conveyor and Pier will be to maintain existing marine biota (Table 1).

4.7 Net Effects of Action

The net effect of the proposed actions in the project area will be to maintain the majority of the indicators for each of the six pathways relative to their current conditions (Table 1). Short-term localized water quality degradation during construction will not impact habitat for juvenile salmonids because of the short-term nature of the effects on water quality and because of seasonal work restrictions; thus, current water quality conditions will be maintained in the long term.

However, the proposed actions will result in long-term degradation of marine habitat through placement of overwater structures, including permanent loss of benthic habitat in the footprint of each pile. Potential loss of eelgrass habitat will be avoided through advanced eelgrass transplants and postconstruction monitoring (see *Habitat Management Plan*). In addition, the proposed actions will result in a minor increase in noise levels in the project area.

4.8 Interdependent, Interrelated, and Cumulative Effects

Interdependent effects are defined as actions with no independent utility apart from the proposed action. Interrelated effects include those that are a part of a larger action and depend on the larger action for justification.

The transport of sand and gravel from the Shine Pit will continue with or without this project. An environmental impact statement will address the potential impacts of transporting a similar quantity of materials by truck. Regardless of the method of delivery, only a permitted source of materials will be used.

If the proposed conveyor were constructed, up to six vessels each day (plus tugboats) will use the Pier; depending upon specific demand for materials. The proposed action is not expected to affect other commercial marine traffic operating in the vicinity. In addition, no significant impacts to recreational vessel traffic in the project vicinity are anticipated. Thus, the proposed action will not significantly increase the risk of oil spills or other environmental hazards associated with collisions between marine vessels.

In the event that sand and gravel were spilled from a loaded vessel during transport from the project area, the sand and gravel will pose negligible risk to marine biota, particularly in the nearshore environment. Vessels will normally travel in established shipping lanes located in deep water, where any sand and gravel spillage would likely dissipate.

An anticipated use of sands and gravels from the site is in restoration or renourishment of beaches around Puget Sound. The Applicant has pledged to make a large volume of such material available for restoration actions without cost. The proposed marine loading facility is essential to allowing efficient delivery of these materials to large-volume restoration sites.

Cumulative effects are those effects of future state or private activities, not involving activities of other federal agencies, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02 Definitions). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. No significant future state or private activities have been identified in this area.

5.0 TAKE ANALYSIS

Section 3 of the ESA defines “take” as “to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect or attempt to engage in any such conduct.” The USFWS further defines “harm” as “significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavior patterns such as breeding, feeding, or sheltering,” and “harass” as “actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering.”

The net effect of the proposed project will be to maintain majority of the indicators for each of the six pathways in their current conditions (Table 1). Short-term localized water quality degradation during construction is not likely to impact habitat for juvenile salmonids. However, the proposed actions will result in the loss of limited benthic infaunal habitat (e.g., within the footprint of each pile; offset by the substantial gain in epibenthic habitat provided by the piles) and a minor increase in noise levels over existing background levels. While long-term degradation of these two indicators will occur, these impacts are not likely to result in incidental take of listed or proposed salmonids or bald eagles, or their habitat.

6.0 CONSERVATION MEASURES

The Thorndyke Resource Operations Complex Central Conveyor and Pier is proposed as an alternative that will avoid or minimize the overall impacts of transporting similar quantities of sand and gravel by trucks.

In addition to anticipated project construction windows, the proposed Central Conveyor and Pier have been designed to avoid or minimize impacts to ESA-listed species and candidate species and their critical habitat.

Timing Windows—A primary factor reducing the risk of impact to juvenile salmonids is the restriction of inwater construction to periods when few juveniles are present in the work area. Construction of the Pier will be limited to the approved work window for this area (expected to be July 16 to February 15).

Based on the proximity of the Central Conveyor and Pier to bald eagle nesting sites, certain construction activities could also be restricted to a period outside of the bald eagle nesting period of January 1 through August 15 and/or the wintering period (October 31 through March 31) (USFWS 1999). Thus, depending upon the work windows applied by the regulatory agencies, some, if not all, construction activities could be limited to a work window of August 16 through October 3. The Applicant may request extension of these allowable work windows, coupled with monitoring to ensure no adverse impacts to listed species.

Best Management Practices—BMPs will be implemented to control stormwater, fuel spills, release of debris, and introduction of nonindigenous species.

Design Features—Alignment and location of the Pier were carefully chosen to avoid impacts to riparian marsh areas and to native eelgrass *Z. marina*; however, it was unavoidable that the near-continuous band of non-native *Z. japonica* must be crossed. The conveyor support frame and Pier will be constructed largely of open steel girders to minimize shading effects on this species. Orientation, height above water, and narrowness of the structure also will minimize the potential for shading effects, which are considered to be unlikely.

However, these timing windows and design features cannot fully eliminate the potential for adverse impacts to these species or their habitats. To address these potential unavoidable impacts (e.g., possible reduced productivity in eelgrass habitat that must be crossed by the Conveyor), a *Habitat Management Plan for Marine Habitat and Bald Eagles* (Appendix D) has been developed. This plan addresses the potential marine impacts and the potential effects on bald eagles from construction and operation of the proposed Central Conveyor and Pier. The plan provides for advanced mitigation in the form of establishment of an area of eelgrass habitat in the action area that is equal to the predicted area that may experience reduced eelgrass productivity. The plan also proposes a monitoring program to document any reduced productivity and ensure that any adverse impacts to important marine resources, especially those comprising habitat for threatened salmonids, will be appropriately compensated.

7.0 DETERMINATION OF EFFECT

NOAA Fisheries/USFWS guidelines for the preparation of biological assessments state that a conclusion of “may affect, but is not likely to adversely affect” is the “...appropriate conclusion when the effects on the species or critical habitat are expected to be beneficial, discountable, or insignificant. Beneficial effects have contemporaneous positive effects without any adverse effects....” Insignificant effects, in the NOAA Fisheries/USFWS definition, “...relate to the size of the impacts and should never reach the size where take occurs...[One would not expect to]...be able to meaningfully measure, detect, or evaluate insignificant effects.” Based on the analyses in this biological evaluation, the expected nature and level of the impacts of the proposed project follow.

7.1 *Salmonids*

Although the conclusion of this BE regarding salmonids is focused on chinook salmon and Hood Canal summer-run chum salmon, it is applicable to coho and bull trout as well. However, because of their lesser dependence on nearshore habitat and their briefer estuarine residency, these species will be less affected by both the negative and positive aspects of each project component. This BE leads to the following conclusions regarding the potential effects of the project on chinook salmon, Hood Canal summer-run chum salmon, coho salmon, and bull trout:

The proposed action **may affect, but is not likely to adversely affect**, juvenile chinook salmon, Hood Canal summer-run chum salmon, or bull trout. Similarly, the proposed action will **not jeopardize** coho salmon, a species proposed for listing. If coho are listed, the proposed action **may affect, but is not likely to adversely affect**, coho salmon. Although NOAA Fisheries has temporarily rescinded the critical habitat designation for Puget Sound chinook salmon and Hood Canal summer-run chum salmon, new critical habitat designations for these species and other West Coast salmon and steelhead populations will be made following completion of scientific and economic impacts analyses. Using these previous critical habitat designations, the proposed action will result in **no adverse modification or destruction of designated chinook critical habitat or Hood Canal summer-run chum salmon critical habitat**. It is anticipated the same conclusion will be reached once new critical habitat is designated for these species. Similarly, if coho salmon habitat is designated, it is anticipated the proposed action will result in **no adverse modification or destruction of designated coho salmon critical habitat**.

7.2 **Birds**

Project construction and operation will result in minor, if any, changes in the behavior of bald eagles or marbled murrelets, as they may move away from project activities and associated vessel movement. The project will not affect bald eagle or marbled murrelet habitat quality or prey base. Thus, the proposed action **may affect, but is not likely to adversely affect**, bald eagles or their habitat. Likewise, the proposed action **may affect, but is not likely to adversely affect**, marbled murrelets or their habitat.

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TABLE

Table 1 – Checklist for Documenting Environmental Effects of the Proposed Project on Relevant Indicators

Pathway	Indicators	Effects of Action		
		Improve ¹	Maintain ²	Degrade ³
Construction Disturbances	Noise			X
	Entrainment		X	
	Stranding		X	
Water Quality	Turbidity		X	
	Chemical contamination/nutrients		X	
	Temperature		X	
	Dissolved oxygen		X	
	Stormwater	Stormwater quality/quantity		X
Sediment	Sedimentation sources/rates		X	
	Sediment quality		X	
Habitat Conditions	Fish access/refugia		X	
	Depth		X	
	Substrate		X	
	Slope		X	
	Shoreline		X	
	Riparian conditions		X	
	Flow and hydrology/current patterns/ saltwater–freshwater mixing patterns		X	
	Overwater structures			X
	Disturbance		X	
	Biota	Prey—epibenthic and pelagic zooplankton		X
Infauna			X	
Prey—forage fish			X	
Aquatic vegetation			X	
Nonindigenous species			X	
Ecological diversity			X	

00007\047\thorndyke\betable1.doc

¹ Action will contribute to long-term improvement, over existing conditions, of the indicator.

² Action will maintain existing conditions.

³ Action will contribute to long-term degradation, over existing conditions, of the indicator.

FIGURE

Figure 1 - Timing of Salmon Freshwater Life Phases in Hood Canal*

Species	Freshwater Life Phase	Month												
		J	F	M	A	M	J	J	A	S	O	N	D	
Summer-Fall Chinook	Upstream migration										■	■	■	
	Spawning										■	■	■	■
	Intragravel develop.	■	■								■	■	■	■
	Juvenile rearing	■	■	■	■	■	■	■						
	Juv. outmigration				■	■	■	■						
Coho	Upstream migration										■	■	■	■
	Spawning											■	■	■
	Intragravel develop.	■	■	■	■	■					■	■	■	■
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	■
	Juv. outmigration			■	■	■								
Chum	Upstream migration										■	■	■	■
	Spawning											■	■	■
	Intragravel develop.	■	■	■	■	■					■	■	■	■
	Juvenile rearing		■	■	■	■	■							
	Juv. outmigration		■	■	■	■	■							

*Quilcene basin

**APPENDIX A
AGENCY CORRESPONDENCE**



State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

Date: FEB 12 2003

Dear Habitats and Species Requester:

Enclosed are the habitats and species products you requested from the Washington Department of Fish and Wildlife (WDFW). This package may also contain documentation to help you understand and use these products.

These products only include information that WDFW maintains in a computer database. They are not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife, nor are they designed to provide you with guidance on interpreting this information and determining how to proceed in consideration of fish and wildlife. These products only document the location of important fish and wildlife resources to the best of our knowledge. It is important to note that habitats or species may occur on the ground in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site-specific surveys are frequently necessary to rule out the presence of priority habitats or species.

Your project may require further field inspection or you may need to contact our field biologists or others in WDFW to assist you in interpreting and applying this information. Generally, for assistance on a specific project, you should contact the WDFW Habitat Program Manager for your county and ask for the area habitat biologist for your project area. Refer to the enclosed directory for those contacts.

Please note that sections potentially impacted by spotted owl management concerns are displayed on the 1:24,000 scale standard map products. If specific details on spotted owl site centers are required they must be requested separately.

These products are designed for users external to the forest practice permit process and as such, does not reflect all the information pertinent to forest practice review. The Forest Practice Rules adopted August 22, 1997 by the Forest Practice Board and administered by the Washington Department of Natural Resources require forest practice applications to be screened against marbled murrelet detection areas and detection sections. Marbled murrelet detection locations are included in the standard priority habitats and species products, but the detection areas and detection sections are not included. If your project is affected by Forest Practice Regulations, you should specially request murrelet detection areas.

WDFW updates this information as additional data become available. Because fish and wildlife species are mobile and because habitats and species information changes, project reviews for fish and wildlife should not rest solely on mapped information. Instead, they should also consider new information gathered from current field investigations. Remember, habitats and species information can only show that a species or habitat type is present, they cannot show that a species or habitat type is not present. These products should not be used for future projects. Please obtain updates rather than use outdated information.

Because of the high volume of requests for information that WDFW receives, we need to charge for these products to recover some of our costs. Enclosed is an invoice itemizing the costs for your request and instructions for submitting payment.

Please note that sensitive information (e.g., threatened and/or endangered species) may be included in this request. These species are vulnerable to disturbances and harassment. In order to protect the viability of these species we request that you not disseminate the information as to their whereabouts. Please refer to these species presence in general terms. For example: "A Peregrine Falcon is located within two miles of the project area".

If your request required a Sensitive Fish and Wildlife Information Release Agreement and you or your organization has one on file, please refer to that document for conditions regarding release of this information.

For more information on WDFW you may visit our web site at <http://www.wa.gov/wdfw> or visit the Priority Habitats and Species site at <http://www.wa.gov/wdfw/hab/phspage.htm>.

For information on the state's endangered, threatened, and sensitive plants as well as high quality wetland and terrestrial ecosystems, please contact the Washington Department of Natural Resources, Natural Heritage Program at PO Box 47014, Olympia Washington 98504-7014, by phone (360) 902-1667 or visit the web site at <http://www.wa.gov/dnr/htdocs/fr/nhp/wanhp.html>.

If you have any questions or problems with the information you received please call me at (360) 902-2543 or fax (360) 902-2946.

Sincerely,



Lori Guggenmos, GIS Programmer
Priority Habitats and Species

Enclosures



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
**SURF SMELT, SANDLANCE, ROCKSOLE
 AND HERRING INFORMATION
 IN THE VICINITY OF T27R01E SECTION 17**

Map Scale - 1 : 24000
 Coordinate System - State Plane South Zone 5626 (NAD27)
 Production Date - February 11, 2003
 Cartography by WDFW Habitat Program GIS

PLEASE NOTE

The spawning information for surf smelt are offset from the shoreline for display purposes only. The typical depths for herring spawning are +3 feet to -20 feet (MLLW).

DISCLAIMER

This map only includes information that Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necessary to rule out the presence of priority resources.

This information is highly variable regarding source, some of it is based on field surveys while others are based on "best professional judgement" of the biologist involved. This information has been generalized for the release to the general public. To insure appropriate use or for more specific information, users are encouraged to consult with WDFW biologists.

MAIN DATA SOURCES

Marine Resource Data: WDFW Fish Program, Marine Resources Division.
 Township/Section data: Wa. Dept. of Natural Resources.
 7.5-minute quadrangle images: US Geological Survey.

MAP LEGEND

MARINE RESOURCE DATA

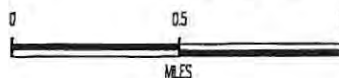
OTHER SYMBOLOGY

- Surf Smelt Spawning Area
- Sandlance Spawning Area
- Rocksole Spawning Area
- Herring Spawning Area
- Herring Holding Area

- Township Lines
- Section Lines



AREA LOCATION



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE - HABITATS AND SPECIES REPORT
 IN THE VICINITY OF T27R01E SECTION 17
 Report Date: February 11, 2003

PHS POLYGON FORM LIST - CROSS REFERENCE REPORT
 IN THE VICINITY OF T27R01E SECTION 17

PHSPOLY#	FORM NUMBER/ PHS CODE*USE CODE
2	900000 *-
3	904252 HALE*B-
4	901089 AISP*B-
5	904451 WET*-
6	904252 HALE*B-
7	904252 HALE*B-
8	901089-904252 AISP*B-HALE*B-
9	901089-902409-904252 AISP*B-WAFO*RLC-HALE*B-
10	901089-902409-904252-904451 AISP*B-WAFO*RLC-HALE*B-WET*-
11	902409-904252 WAFO*RLC-HALE*B-
12	902409-904252-904451 WAFO*RLC-HALE*B-WET*-
13	902409-904252-904762 WAFO*RLC-HALE*B-LAGOON*-
14	902409-904252-904451 WAFO*RLC-HALE*B-WET*-

PHS POLYGON - SPECIES AND HABITAT LIST

PHS FORM#	PRIORITY	PHS CODE	COMMON NAME	USE CODE	USE DESCRIPTION
900,000					
901,089	YES	AISP	WOOD DUCK	B	BREEDING OCCURRENCE
902,409	YES	WAFO	WATERFOWL CONCENTRATIONS	RLC	REGULAR LARGE CONCENTRATION
904,252	YES	HALE	BALD EAGLE	B	BREEDING OCCURRENCE
904,451	YES	WET	WETLANDS		
904,762	YES	LAGOON	LAGOONS		

Form number 900000 indicates presence of PHS is unknown or the area was not mapped. Form numbers 909998, 909997, or 909996 indicate compilation errors.

YES under the "PRIORITY" column indicates that the species or habitat is considered a priority and is on the Priority Habitats and Species List and/or the Species of Concern List.

WILDLIFE HERITAGE POINT - SPECIES LIST AND REPORT
 IN THE VICINITY OF T27R01E SECTION 17

QUADPT	PRIORITY	SPPCODE	COMMON NAME	USE CODE	USE DESCRIPTION
4712276026	NO	PAHA	OSPREY	B	BREEDING OCCURRENCE
4712276029	YES	HALE	BALD EAGLE	B	BREEDING OCCURRENCE
4712276030	YES	HALE	BALD EAGLE	B	BREEDING OCCURRENCE
4712276032	YES	HALE	BALD EAGLE	B	BREEDING OCCURRENCE
4712276041	YES	HALE	BALD EAGLE	B	BREEDING OCCURRENCE

YES under the "PRIORITY" column indicates that the species or habitat is considered a priority and is on the Priority Habitats and Species List and/or the Species of Concern List.

quadpt: 4712276026 sppcode: PAHA use: B name: OSPREY
 year: 1990 class: SA accuracy: C state status: SM fed status:
 township - range - section: T27N R01W S24 NE occur#: 597 seqno: 1
 general description:
 OSPREY NEST ON TOP OF BRANCHY CAP TOPPED SNAG, EAST SIDE OF CREEK.

quadpt: 4712276029 sppcode: HALE use: B name: BALD EAGLE
 year: 1993 class: SA accuracy: C state status: ST fed status: FT
 township - range - section: T27N R01E S04 SWOFSW occur#: 704 seqno: 4
 general description:
 BALD EAGLE NEST, SW NEST, 5 FT FROM TOP IN TRIPLE TOP TREE.

quadpt: 4712276030 sppcode: HALE use: B name: BALD EAGLE
 year: 1993 class: SA accuracy: C state status: ST fed status: FT

township - range - section: T27N R01E S04 SWOPSW occur#: 704 seqno: 3
general description:
BALD EAGLE NEST, SE NEST DOWN 15-25 FT.

quadpt: 4712276032 sppcode: HALE use: B name: BALD EAGLE
year: 1995 class: SA accuracy: C state status: ST fed status: FT
township - range - section: T27N R01E S20 occur#: 382 seqno: 2
general description:
BALD EAGLE NEST, LOCATED IN LEANING, EXPOSED, BROKEN TOP TREE, 10FT DOWN FROM
TOP, NW OF TAN A-FRAME HOUSE.

quadpt: 4712276041 sppcode: HALE use: B name: BALD EAGLE
year: 1999 class: SA accuracy: C state status: ST fed status: FT
township - range - section: T27N R01W S24 NEOFSE occur#: 507 seqno: 5
general description:
NEST IS NORTH OF THORNDYKE BAY ON THE EAST SIDE OF THORNDYKE CREEK. PREVIOUSLY A
N OSPREY NEST. LIVE SPRUCE WITH A DEAD FLAT WHORL TOP. NEST ON THE TOP OF THE TR
EE. NO OTHER TREES PRESENT BETWEEN THE CREEK AND THE NEST TREE.

Note:

If known occurrences of spotted owls and marbled murrelets exist they will
be displayed on the accompanying map, however, detailed information for
them are not included in this report.

form: 901,089 species/habitat: AISP species use: B season: SU accuracy: 1
sitename: THORNDYKE TREE FARM
general description:
WOOD DUCK NESTING AREAS

source: RAGON, MIKE WDW ENFORCEMENT
date: 88 code: PROF
synopsis:

OBSERVED NESTING PAIRS ON THESE BODIES OF WATER OVER THE PAST 20 YEARS FROM 1968

form: 902,409 species/habitat: WAFO species use: RLC season: WS F accuracy: 1
sitename: HOOD CANAL
general description:
WINTERING WATERFOWL AREA

source: MID-WINTER DIVING DUCK SURVEYS
date: 01 91 code: WTRAN
synopsis:

OBSERVED MALLARDS, WIDGEONS, AND PINTAILS, BRANT.

source: PT GAMBLE TRIBE TFW BIO REPORTED HUNDREDS OF DABBLERS PLUS MIGRATING
date: 03 88 code: PROF
synopsis:

BRANT AT THORNDYKE BAY.

form: 904,252 species/habitat: HALE species use: B season: SU accuracy: 0
sitename:
general description:
EAGLE TERRITORY

source: HOFMANN, LYNDY WDW
date: code:
synopsis:

BREEDING SURVEYS-GROUND SURVEYS-MANAGEMENT PLAN.

form: 904,451 species/habitat: WET species use: season: accuracy: 1
sitename: REGION 6 SALTWATER WETLANDS
general description:
COASTAL SALT MARSHES SALT MEADOWS AND BRACKISH MARSHES

source: WASHINGTON STATE COASTAL ZONE ATLAS D.O.E., 1979
date: 04 78 code: CZA
synopsis:
D.O.E. SPONSORED MAPPING OF COASTAL FEATURES

form: 904,762 species/habitat: LAGOON species use: season: accuracy: 1
sitename:
general description:
OPEN LAGOON. COASTAL ZONE ATLAS CODE 562-PARTIALLY ENCLOSED LAGOON ARE COMMON, BEING FORMED WHEN FRESHWATER INFLOW HAS MAINTAINED A STREAM CHANNEL THROUGH BARS FORMED BY ALONGSHORE DEPOSITION.

source: COASTAL ZONE ATLAS OF WASHINGTON. STATE OF WASHINGTON DEPT OF ECOLOGY.
date: code: CZA
synopsis:

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
 PRIORITY ANADROMOUS AND RESIDENT FISH PRESENCE REPORT FROM THE STREAMNET DATABASE
 IN THE VICINITY OF T27R01E SECTION 17
 Report Date: February 11, 2003

PRIORITY ANADROMOUS FISH PRESENCE

CODE	COMMON NAME	STREAM NAME	STREAM LLID	RECORD DATE	SOURCE
CHUM	Chum Salmon	Thorndike Creek	1227407478100	08-09-97	R. Egan, WDFW, M. Ereth, Skokomish Fisheri
COHO	Coho Salmon	Thorndike Creek	1227407478100	08-04-97	C. Baranski, WDFW
SRCT	Searun Cutthroat	Thorndike Creek	1227407478100	01-01-90	WDFW Staff
STWI	Winter Steelhead	Thorndike Creek	1227407478100	08-04-97	T. Johnson, WDFW

PRIORITY RESIDENT FISH PRESENCE

CODE	COMMON NAME	STREAM NAME	STREAM LLID	RECORD DATE	SOURCE
CCT	Resident Cutthroat	Stream name(s) not in database	1227406478267	07-15-97	WDFW Staff
CCT	Resident Cutthroat	Thorndike Creek	1227407478100	07-15-97	WDFW Staff

The fish information in this report only includes information that Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. This information only documents the location of important fish resources to the best of our knowledge. It is not a complete inventory of the fish species in the state. Fish are identified as priority by WDFW if they meet one of three criterion as listed in the Priority Habitats and Species List. The list is available by contacting WDFW Priority Habitats and Species section at (360)902-2543 or it is available on our web site at <http://www.wa.gov/wdfw/hab/phspage.htm>. To insure appropriate use of this information users are encouraged to consult with WDFW biologists.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Western Washington Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503
Phone: (360) 753-9440 Fax: (360) 534-9331

7-47

OCT 24 2001

Dear Species List Requester:

We are providing the information you requested to assist your determination of possible impacts of a proposed project to species of Federal concern. Attachment A includes the listed threatened and endangered species, species proposed for listing, candidate species, and/or species of concern that may be within the area of your proposed project.

Any Federal agency, currently or in the future, that provides funding, permitting, licensing, or other authorization for this project must assure that its responsibilities section 7(a)(2) of the Endangered Species Act of 1973, as amended (Act), are met. Attachment B outlines the responsibilities of Federal agencies for consulting or conferencing with us (U.S. Fish and Wildlife Service).

If both listed and proposed species occur in the vicinity of a project that meets the requirements of a major Federal action (i.e., "major construction activity"), impacts to both listed and proposed species must be considered in a biological assessment (BA) (section 7(c); see Attachment B). Although the Federal agency is not required, under section 7(c), to address impacts to proposed species if listed species are not known to occur in the project area, it may be in the Federal agency's best interest to address impacts to proposed species. The listing process may be completed within a year, and information gathered on a proposed species could be used to address consultation needs should the species be listed. However, if the proposed action is likely to jeopardize the continued existence of a proposed species, or result in the destruction or adverse modification of proposed critical habitat, a formal conference with us is required by the Act (section 7(a)(4)). The results of the BA will determine if conferencing is required.

The Federal agency is responsible for making a determination of the effects of the project on listed species and/or critical habitat. For a Federal agency determination that a listed species or critical habitat is likely to be affected (adversely or beneficially) by the project, you should request section 7 consultation through this office. For a "not likely to adversely affect" determination, you should request our concurrence through the informal consultation process. For a "no effect" determination, we would appreciate receiving a copy for our information.

Candidate species and species of concern are those species whose conservation status is of concern to us, but for which additional information is needed. Candidate species are included as an advance notice to Federal agencies of species that may be proposed and listed in the future. Conservation measures for candidate species and species of concern are voluntary but recommended. Protection provided to these species now may preclude possible listing in the future.

For other federally listed species that may occur in the vicinity of your project, contact the National Marine Fisheries Service at (360) 753-9530 to request a list of species under their jurisdiction. For wetland permit requirements, contact the Seattle District of the U.S. Army Corps of Engineers for Federal permit requirements and the Washington State Department of Ecology for State permit requirements.

Thank you for your assistance in protecting listed threatened and endangered species and other species of Federal concern. If you have additional questions, please contact Yvonne Dettlaff (360) 753-9582.

Sincerely,

A handwritten signature in black ink, appearing to read "Ken S. Berg". The signature is written in a cursive style with a large initial "K". Below the signature, the initials "KSB" are written in a smaller, simpler font.

Ken S. Berg, Manager
Western Washington Office

Enclosure(s)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CRITICAL
HABITAT, CANDIDATE SPECIES, AND SPECIES OF CONCERN THAT MAY OCCUR
WITHIN THE VICINITY OF THE PROPOSED
CONFIDENTIAL CLIENT PROJECT
IN JEFFERSON COUNTY, WASHINGTON**

(T27N R1E S7-9,16-20)

FWS REF: 1-3-01-SP-2299

LISTED

There are four bald eagle (*Haliaeetus leucocephalus*) nesting territories located in the vicinity of the project at T27N R1E S8,20; T27N R1W S24-25. Nesting activities occur from January 1 through August 15.

Wintering bald eagles may occur in the vicinity of the project. Wintering activities occur from October 31 through March 31.

Bull trout (*Salvelinus confluentus*) may occur in the vicinity of the project.

Foraging marbled murrelets (*Brachyramphus marmoratus*) may occur in the ocean waters adjacent to your project.

Major concerns that should be addressed in your biological assessment of the project impacts to listed species include:

1. Level of use of the project area by listed species,
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project, and
3. Impacts from project construction (i.e., habitat loss, increased noise levels, increased human activity) that may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None

CANDIDATE

None

CRITICAL HABITAT

None

SPECIES OF CONCERN

The following species of concern have been documented in the county where the project is located. These species or their habitat could be located on or near the project site. Species in **bold** were specific occurrences located on the database within a 1 mile radius of the project site.

California wolverine (*Gulo gulo luteus*)
Cascades frog (*Rana cascadae*)
Destruction Island shrew (*Sorex trowbridgii destructioni*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Olive-sided flycatcher (*Contopus cooperi*)
Olympic torrent salamander (*Rhyacotriton olympicus*)
Pacific lamprey (*Lampetra tridentata*)
Pacific fisher (*Martes pennanti pacifica*)
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Tailed frog (*Ascaphus truei*)
Van Dyke's salamander (*Plethodon vandykei*)
Western toad (*Bufo boreas*)

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - Consultation/Conference

- Requires:
1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;
 2. Consultation with the U.S. Fish and Wildlife Service (FWS) when a Federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after it has determined if its action may affect (adversely or beneficially) a listed species; and
 3. Conference with the FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat.

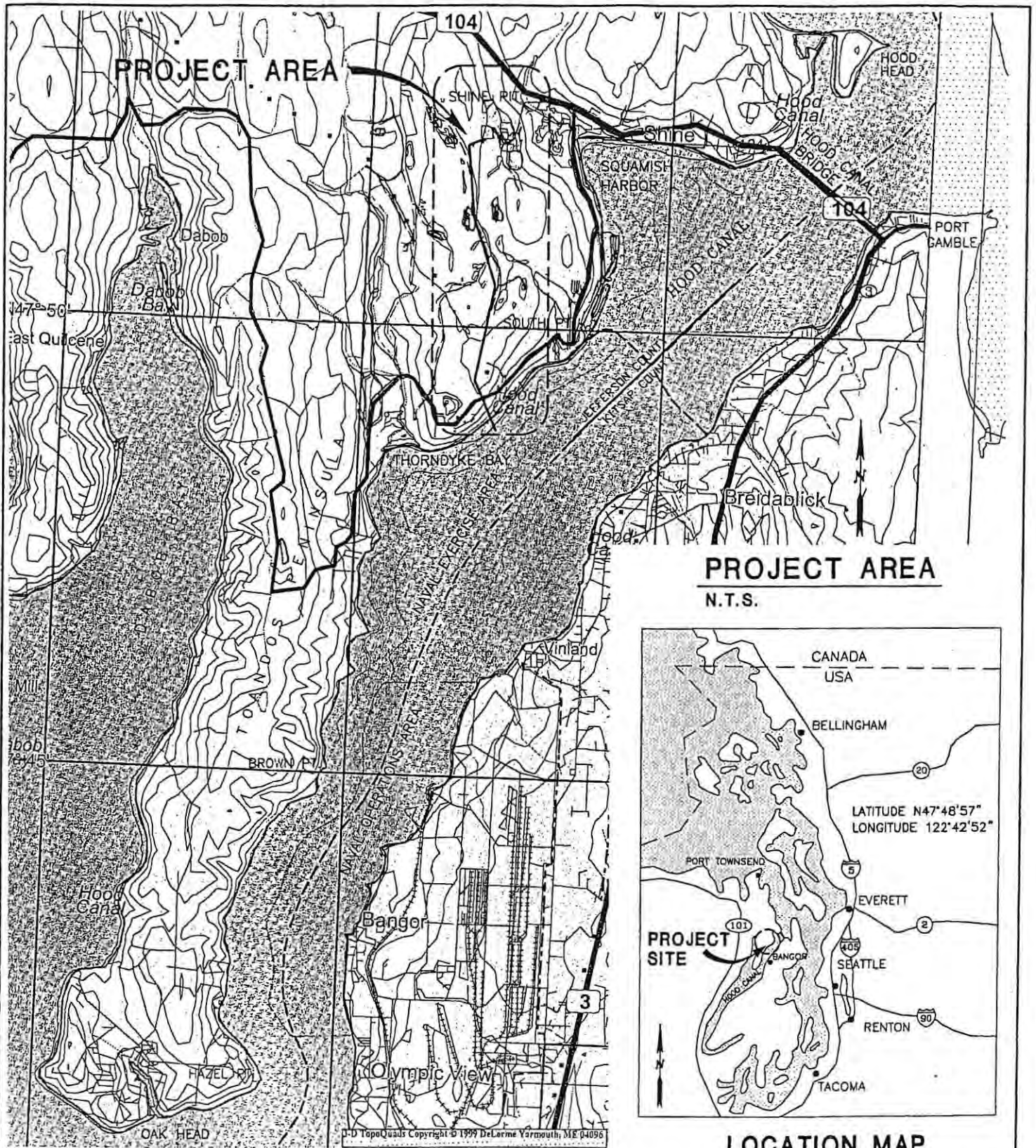
SECTION 7(c) - Biological Assessment for Construction Projects *

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species that is/are likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with the Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

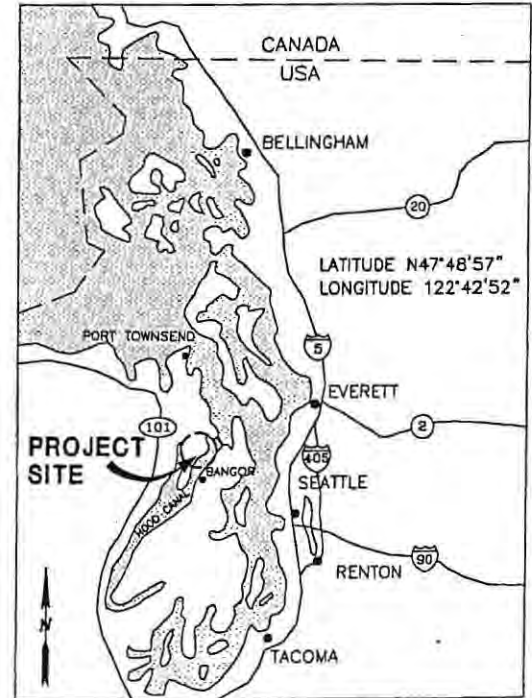
To complete the BA, your agency or its designee should (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Service, state conservation department, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion, the report should be forwarded to our Endangered Species Division, 510 Desmond Drive SE, Suite 102, Lacey, WA 98503-1273.

* "Construction project" means any major Federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes Federal action such as permits, grants, licenses, or other forms of Federal authorization or approval which may result in construction.

**APPENDIX B
PROJECT PLANS AND PROFILES**



PROJECT AREA
N.T.S.



LOCATION MAP

10/16/2002 R:\24\01\012\ConceptDesign\CCE-PEP\4112-VICINITY.dwg

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1993

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

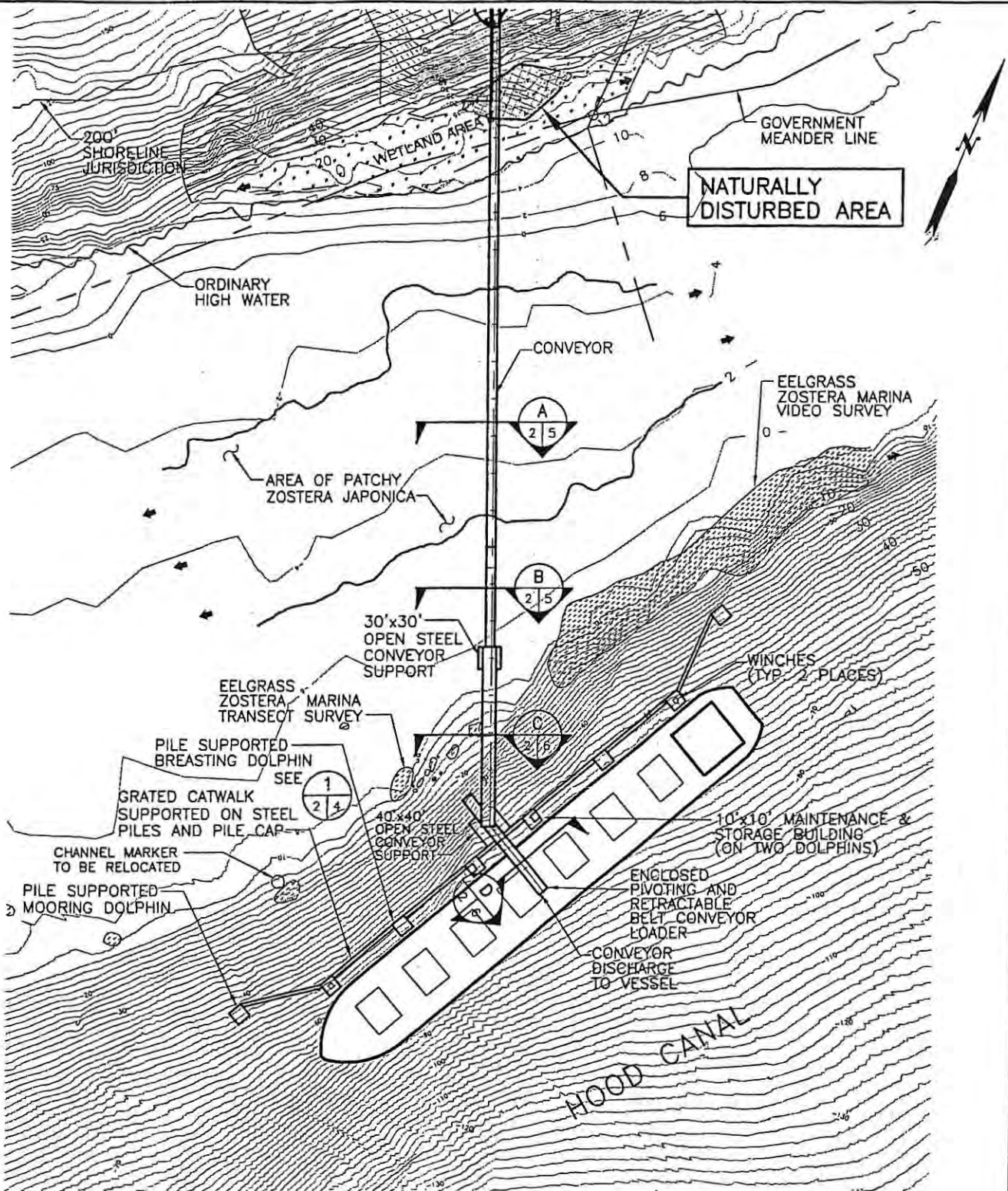
REGIONAL LOCATION MAP

T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

Reid Middleton 728 134th Street SW • Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS
SHEET 1 OF 16 DATE: 2-11-03



PLAN
SCALE: 1" = 200'

11/08/2002 10:55 am F:\24\01\012\ConceptDesign\COE-PERMIT\4112-S2A-COE.dwg

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: MLLW
HORIZONTAL DATUM: NAD 1983/1991
ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

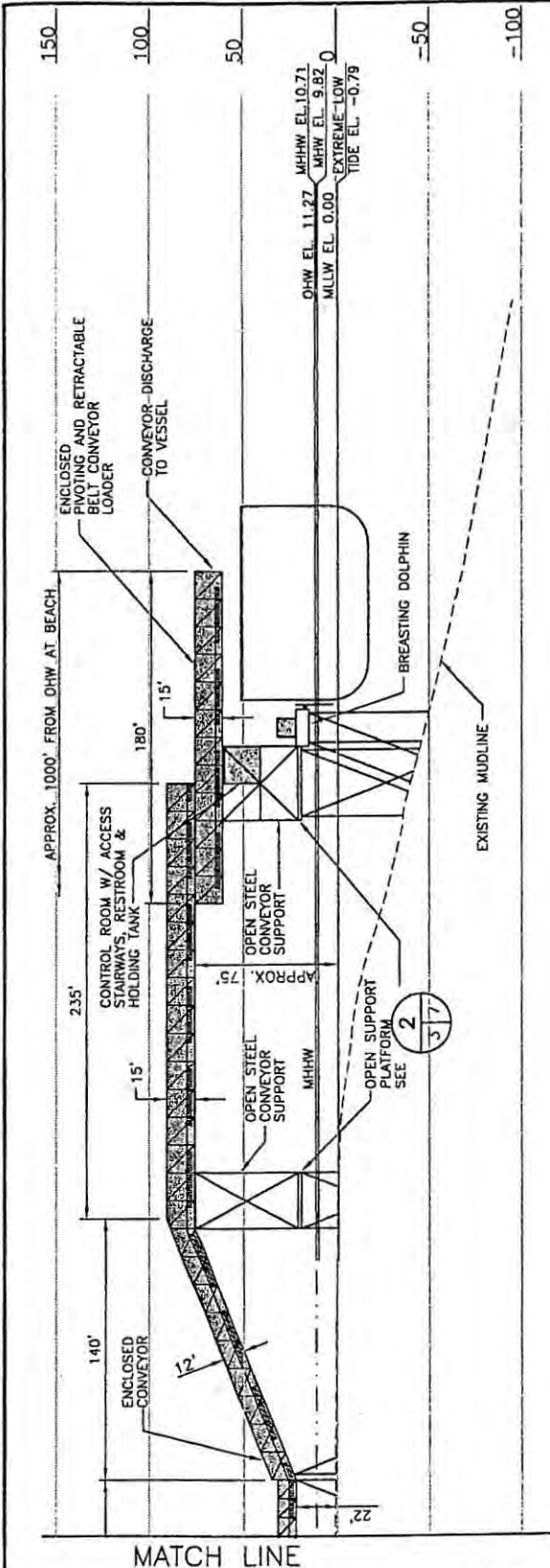
SINGLE CONVEYOR AND PIER SITE PLAN

T-ROC CENTRAL CONVEYOR AND PIER

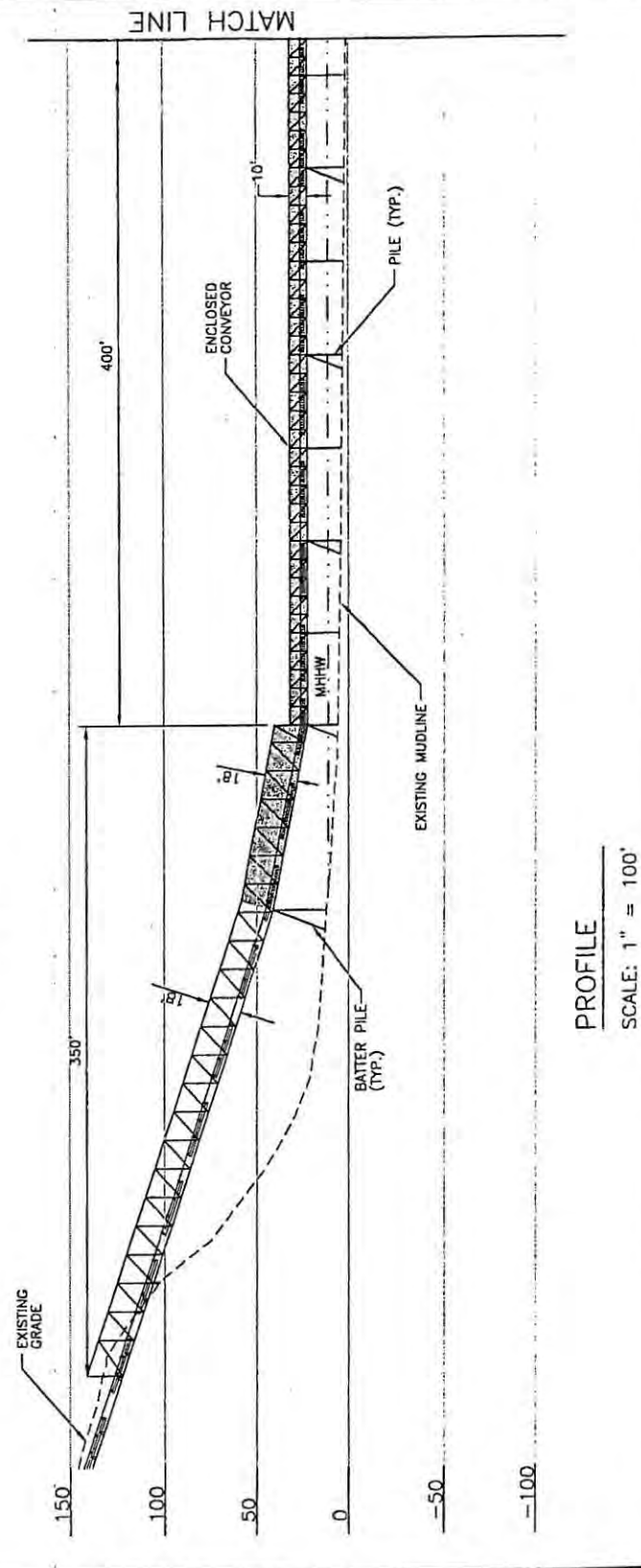
ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

Reid Middleton 728 134th Street SW · Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS
SHEET 2 OF 16 DATE: 2-11-03



PROFILE
SCALE: 1" = 100'



PROFILE
SCALE: 1" = 100'

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: MLLW
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

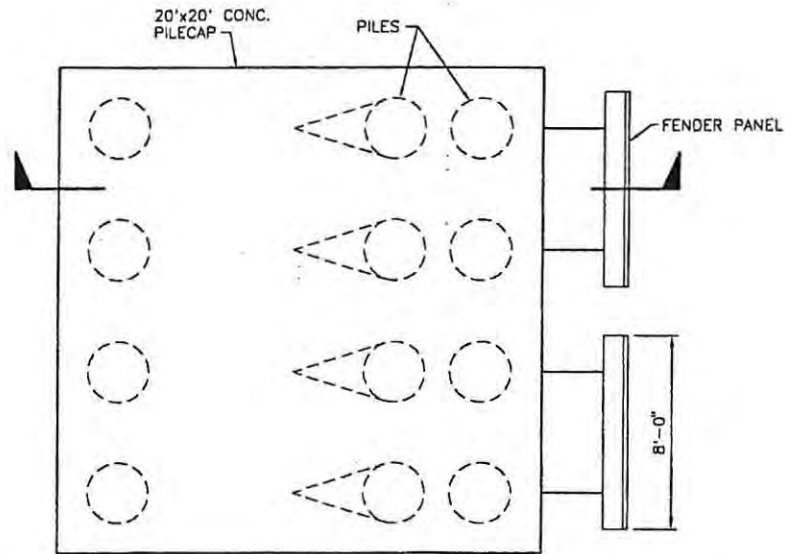
SINGLE CONVEYOR PROFILE

T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

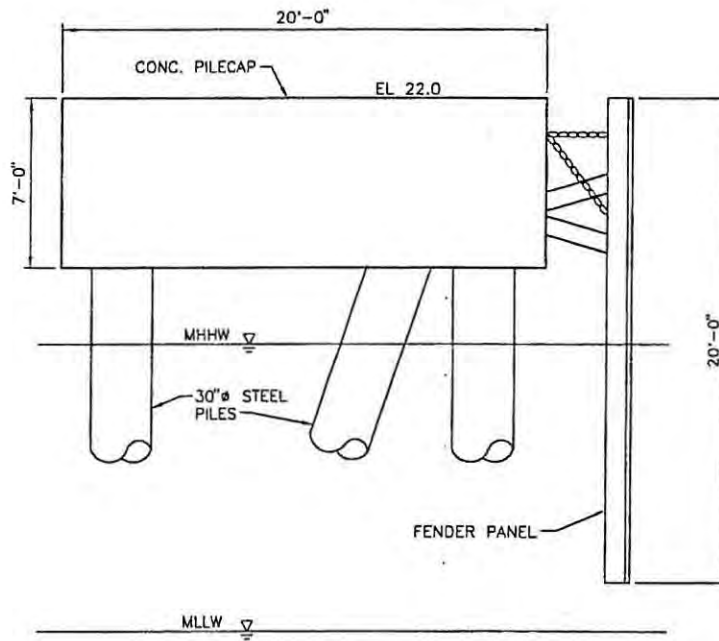
Reid Middleton 728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS
SHEET 3 OF 16 DATE: 2-11-03



NOTE:
MOORING DOLPHIN SIMILAR BUT WITHOUT
FENDER PANELS.

PLAN



SECTION

1 BREASTING DOLPHIN
2 4 SCALE: 1/8" = 1'-0"

10/22/2002 2:44 pm C:\24\01\012\ConceptDesign\COE-PERMIT\4112-S4-9COE.dwg

PURPOSE: CONSTRUCT CONVEYOR AND
PIER FOR MARINE TRANSPORT OF SAND
AND AGGREGATE MATERIALS

VERTICAL DATUM: MLLW
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

SINGLE CONVEYOR DETAIL

T-ROC CENTRAL CONVEYOR
AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

Reid Middleton

728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E

IN: HOOD CANAL

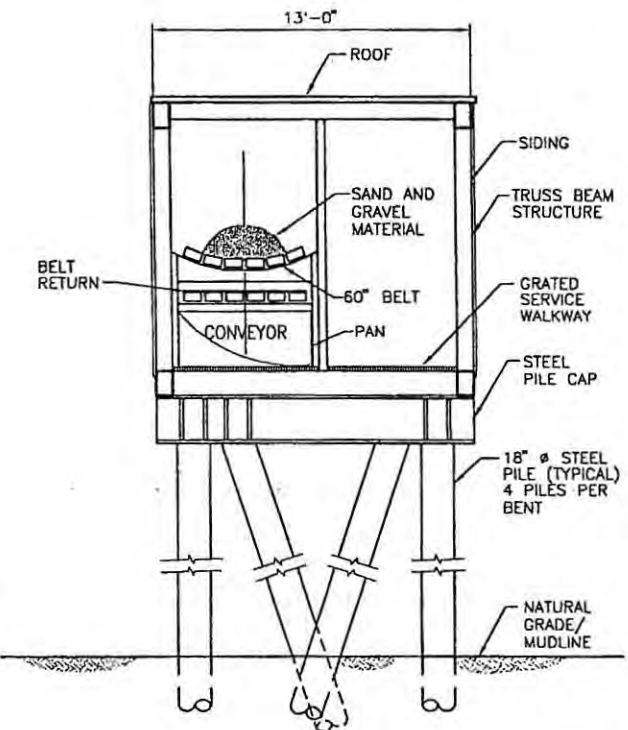
AT: THORNDYKE

COUNTY OF: JEFFERSON

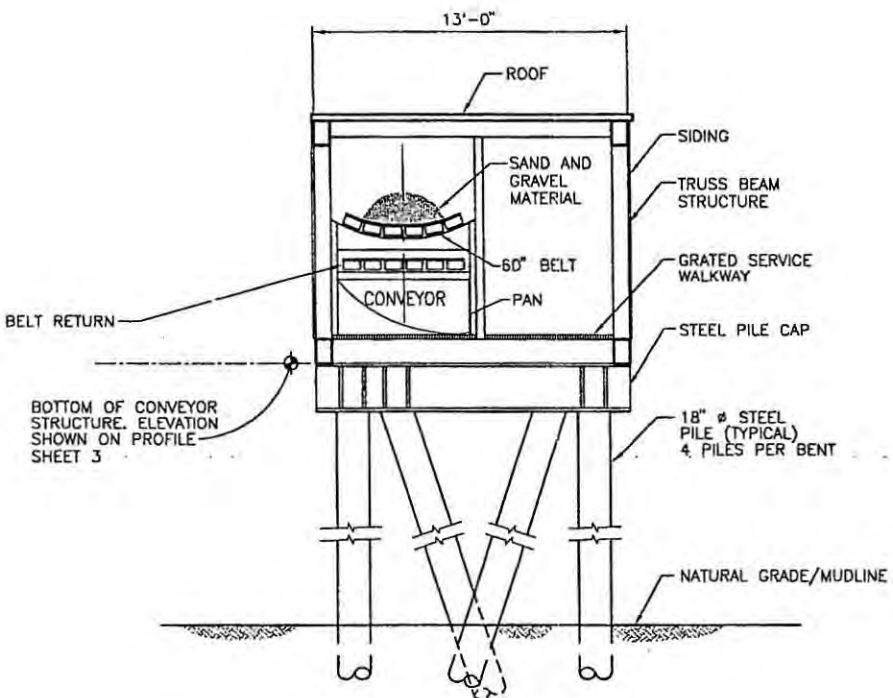
APPLICATION BY: FRED HILL MATERIALS

SHEET 4 OF 16

DATE: 2-11-03



B CONVEYOR SECTION
SCALE: 1/8" = 1'-0"



A CONVEYOR SECTION
SCALE: 1/8" = 1'-0"

10/22/2002 2:44 pm I:\24\01\012\ConceptDesign\COE-PERMIT\4112-54-9COE.dwg
PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: MLLW
HORIZONTAL DATUM: NAD 1983/1991
ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

SINGLE CONVEYOR SECTIONS

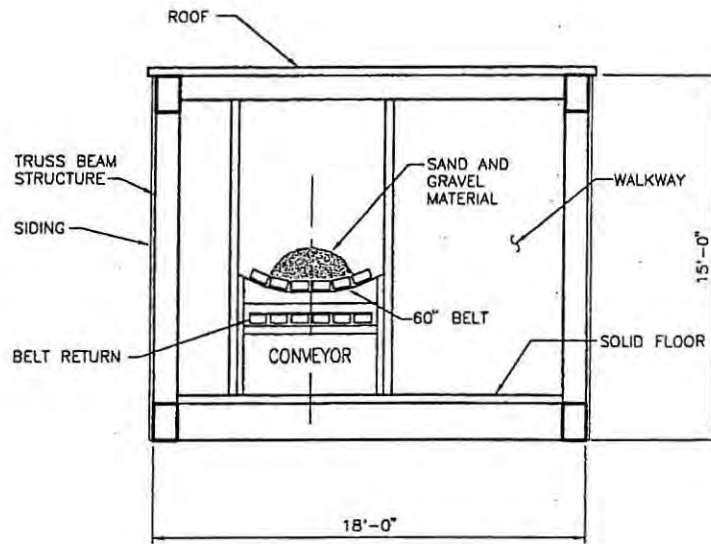
T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBORO, WA 98370

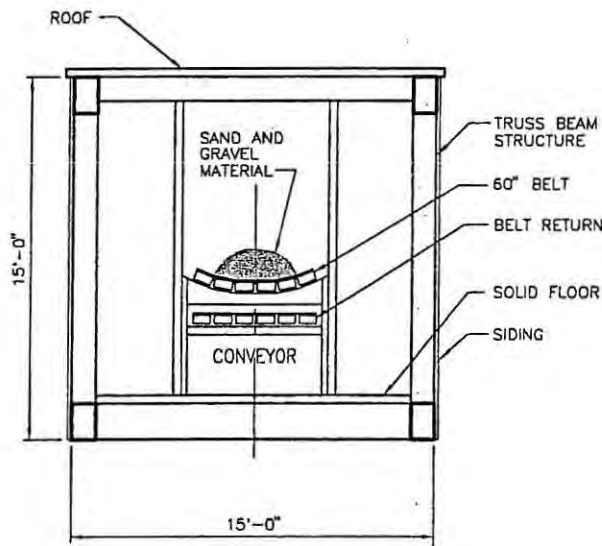


728 13th Street SW - Suite 200
Everett, Washington 98204
Ph. 425 741-3800

SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORN DYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS
SHEET 5 OF 16
DATE: 2-11-03



C CONVEYOR SECTION
 SCALE: 1/8" = 1'-0"



D CONVEYOR LOADER SECTION
 SCALE: 1/8" = 1'-0"

10/22/2002 2:44 pm I:\24\01\012\ConceptDesign\COE-PERMIT\4112-S4-9COE.dwg

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: MLLW
 HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
 (SEE ATTACHED LIST)

SINGLE CONVEYOR SECTIONS

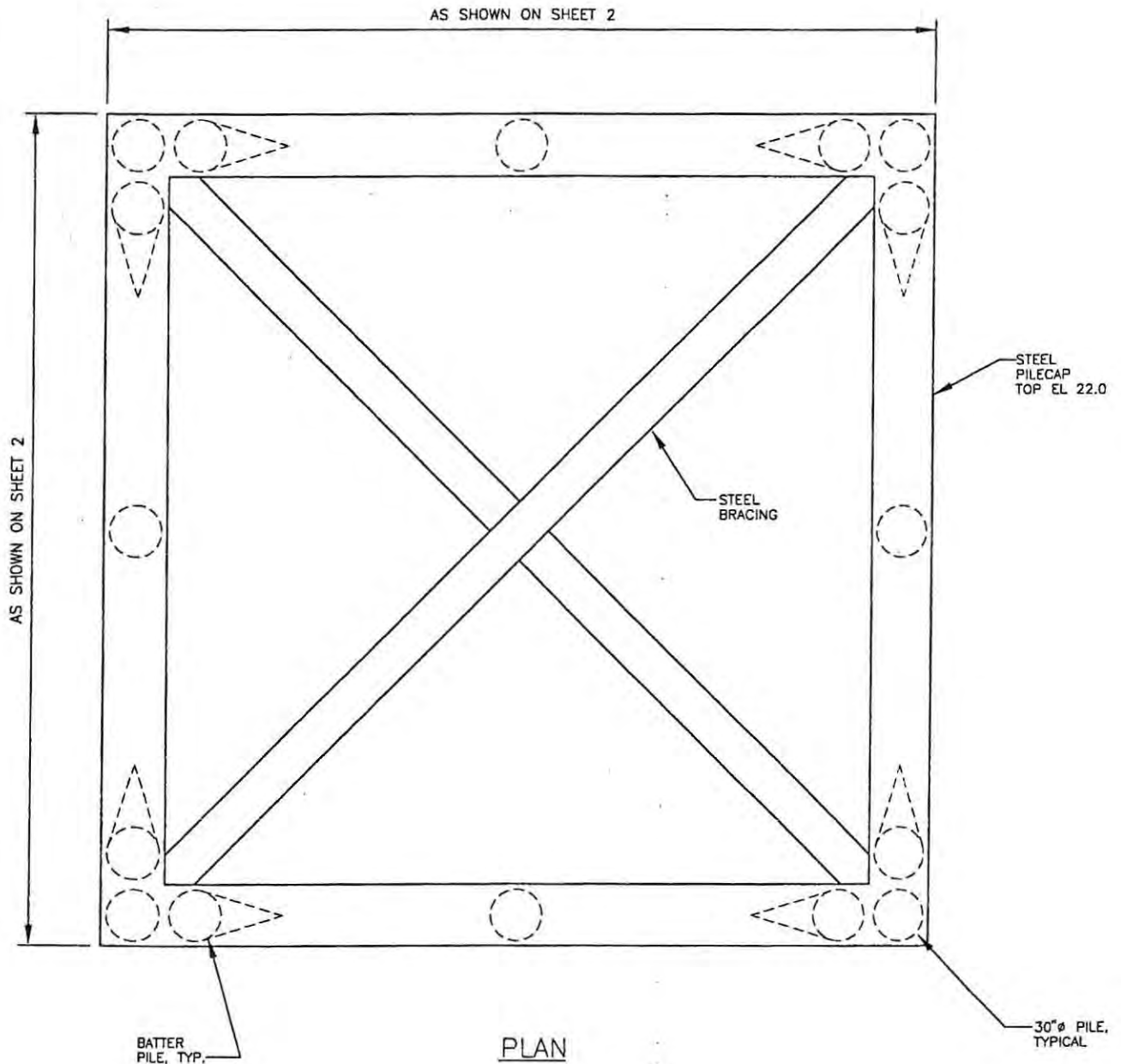
T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
 P.O. BOX 6
 POULSBO, WA 98370

Reid Middleton

728 134th Street SW - Suite 200
 Everett, Washington 98204
 Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
 IN: HOOD CANAL
 AT: THORNDYKE
 COUNTY OF: JEFFERSON
 APPLICATION BY: FRED HILL MATERIALS
 SHEET 6 OF 16 DATE: 2-11-03



PLAN

2 OPEN SUPPORT PLATFORM
 3 7 SCALE: 1/8" = 1'-0"

10/22/2002 2:44 pm K:\24\01\012\ConceptDesign\COE-PERMIT\4112-S4-9COE.dwg

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS
 VERTICAL DATUM: MLLW
 HORIZONTAL DATUM: NAD 1983/1991
 ADJACENT PROPERTY OWNERS:
 (SEE ATTACHED LIST)

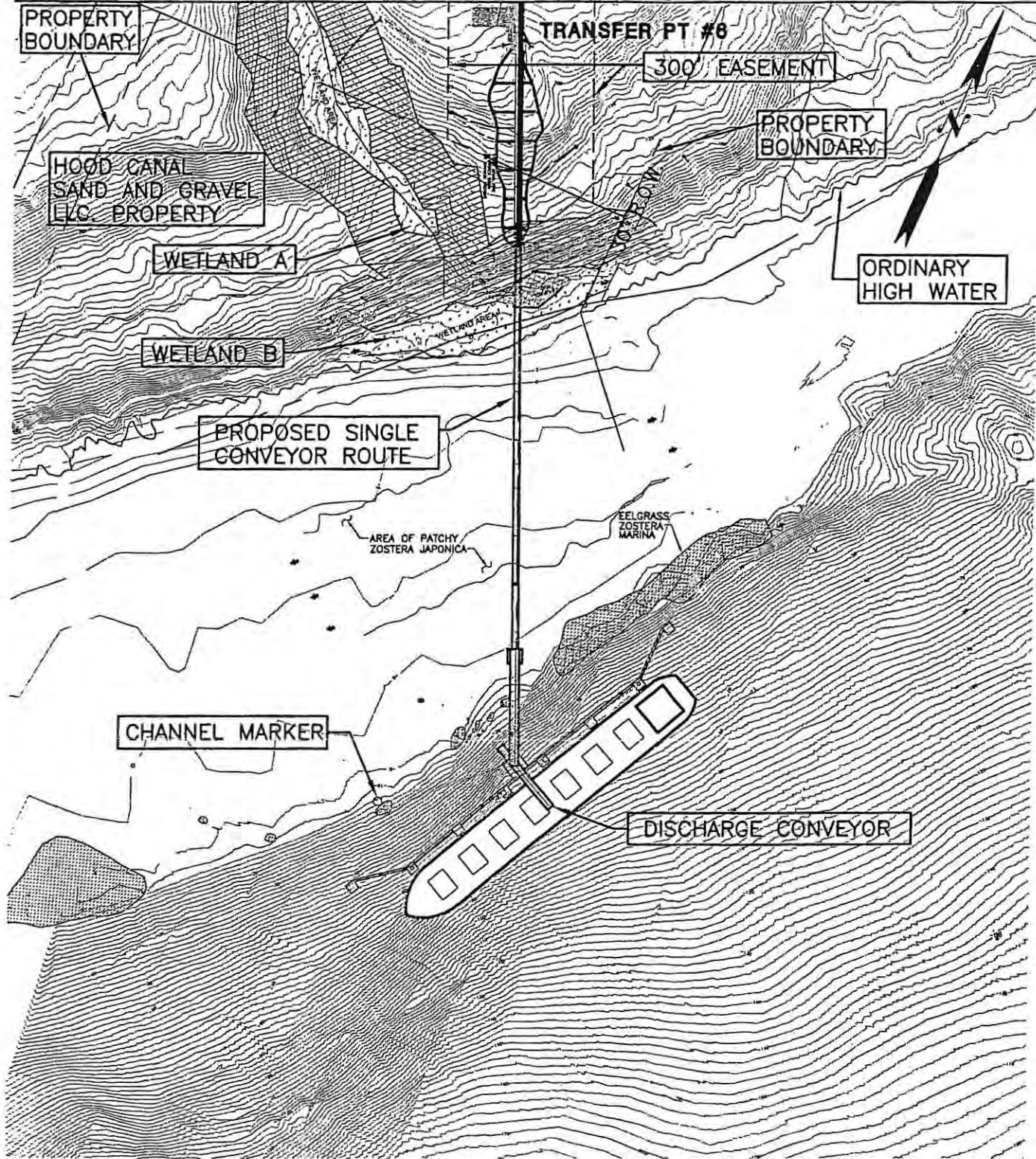
SINGLE CONVEYOR
 DETAIL
 T-ROC CENTRAL CONVEYOR
 AND PIER

ADDRESS: FRED HILL MATERIALS
 P.O. BOX 6
 POULSBO, WA 98370

Reid Middleton

728 134th Street SW - Suite 200
 Everett, Washington 98204
 Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
 IN: HOOD CANAL
 AT: THORNDYKE
 COUNTY OF: JEFFERSON
 APPLICATION BY: FRED HILL MATERIALS
 SHEET 7 OF 16 DATE: 2-11-03



I:\COEpermit\COE2-28-02\4112-S89-COE.dwg

SCALE: 1"=300'

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

ReidMiddleton

728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E

IN: HOOD CANAL

AT: THORNDYKE

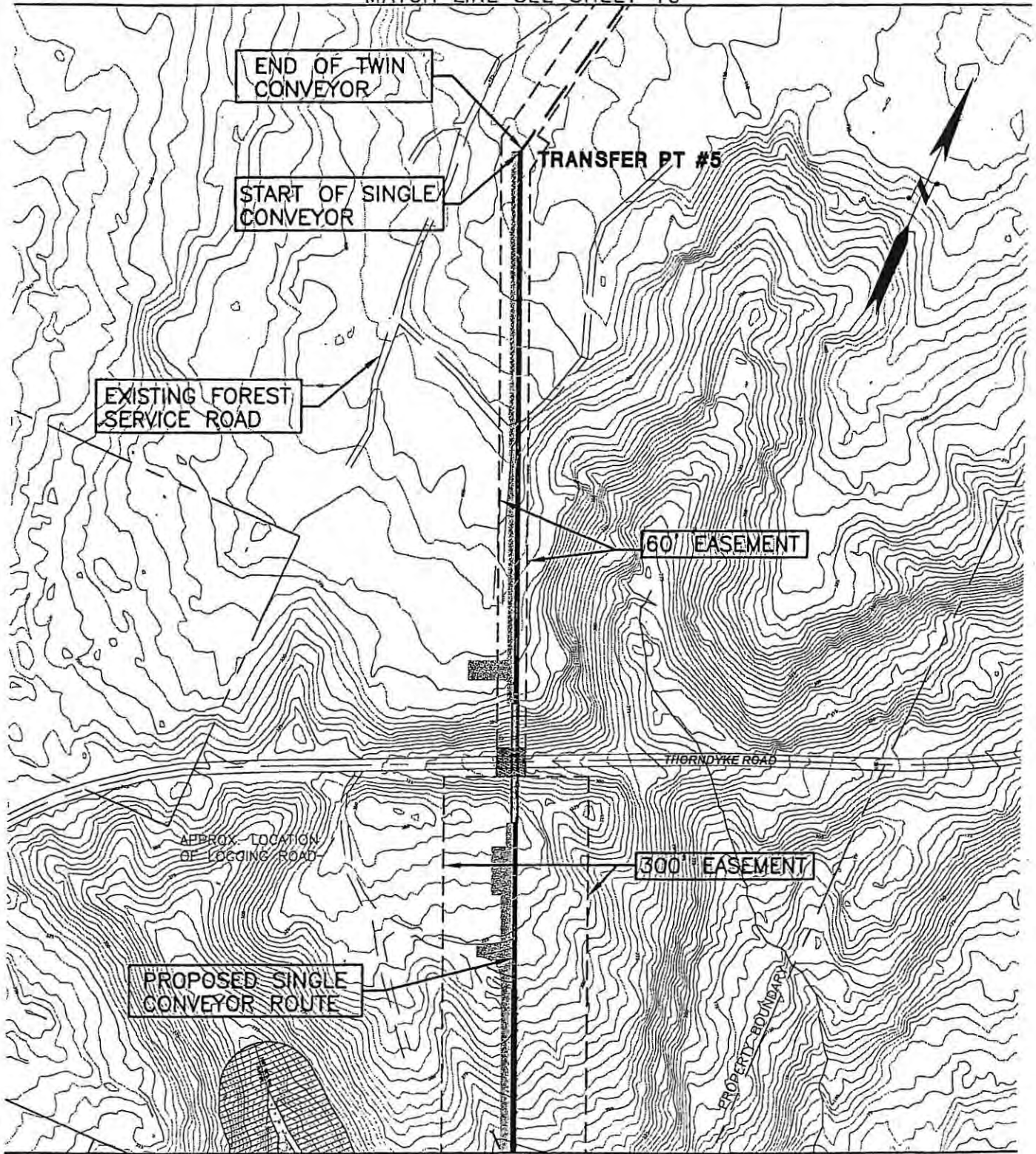
COUNTY OF: JEFFERSON

APPLICATION BY: FRED HILL MATERIALS

SHEET 8 OF 16

DATE: 2-11-03

MATCH LINE SEE SHEET 10



MATCH LINE SEE SHEET 8

SCALE: 1"=300'

I:\COEpermit\COE2-28-02\4112-S89-COE.dwg

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE T-ROC CENTRAL CONVEYOR AND PIER

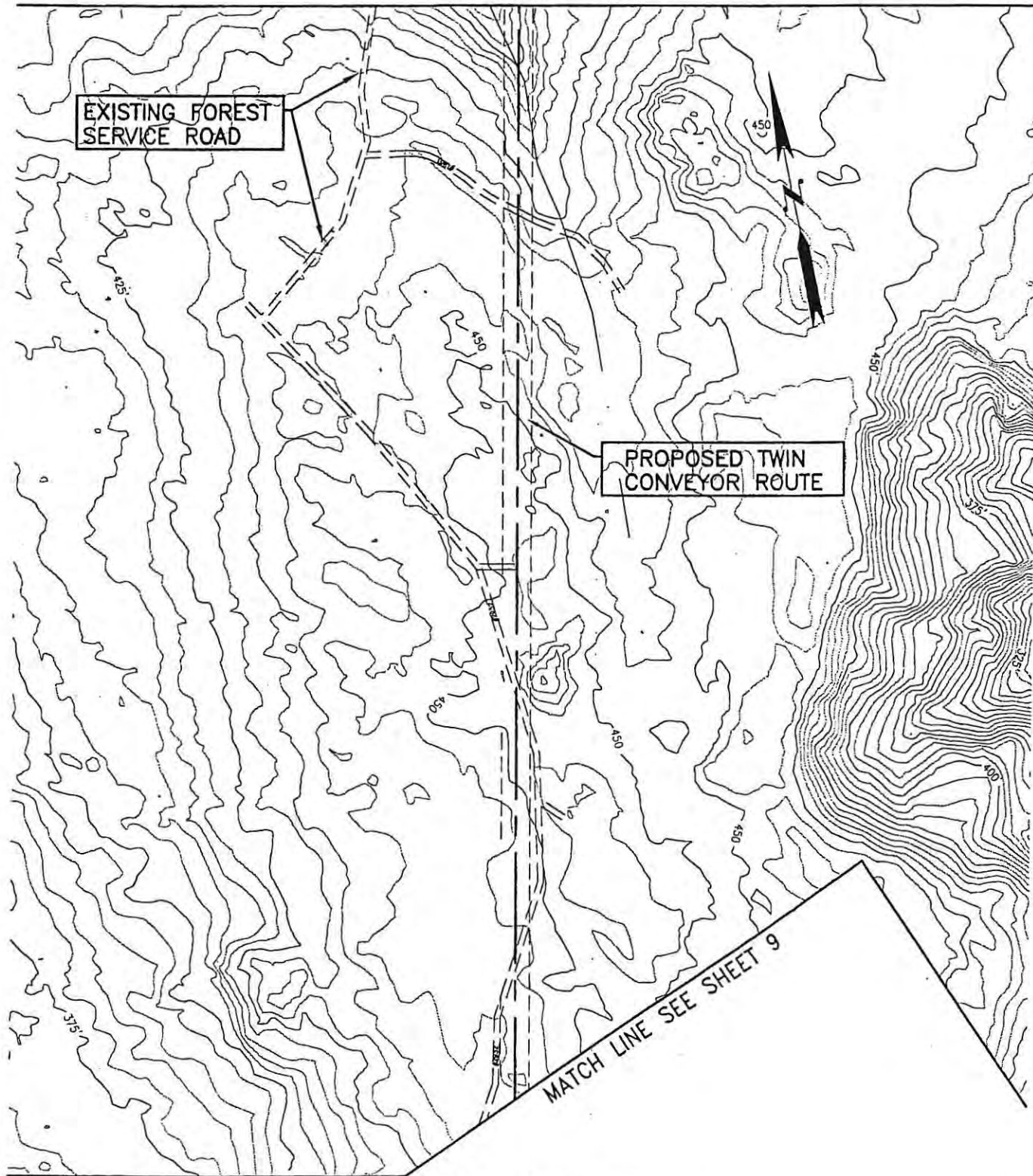
ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

ReidMiddleton

728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS
SHEET 9 OF 16 DATE: 2-11-03

MATCH LINE SEE SHEET 11



MATCH LINE SEE SHEET 9

SCALE: 1"=300'

I:\24\01\012\ConceptDesign\COE-PERMIT\4112-S10-16COE.DWG

02/11/2003 3:47 pm

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE

T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

Reid Middleton

728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

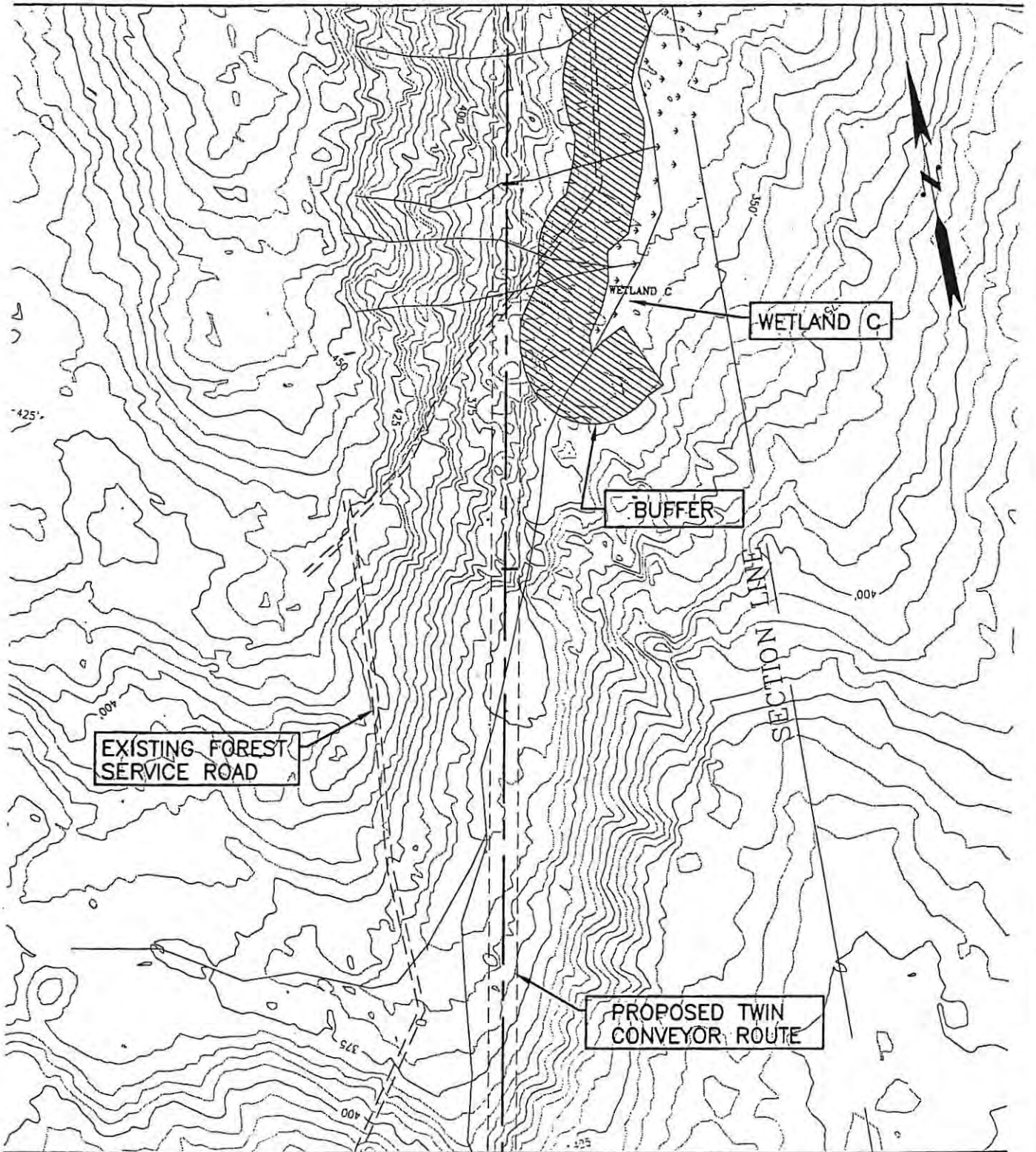
SEC. 19 T 27N. RGE. 1E

IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS

SHEET 10 OF 16

DATE: 2-11-03

MATCH LINE SEE SHEET 12



MATCH LINE SEE SHEET 10
SCALE: 1"=300'

I:\24\01\012\ConceptDesign\COE-PERMIT\4112-S10-16COE.DWG

02/11/2003 3:47 pm

PURPOSE: CONSTRUCT CONVEYOR AND
PIER FOR MARINE TRANSPORT OF SAND
AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 99370

ReidMiddleton

728 134th Street SW · Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E

IN: HOOD CANAL

AT: THORNDYKE

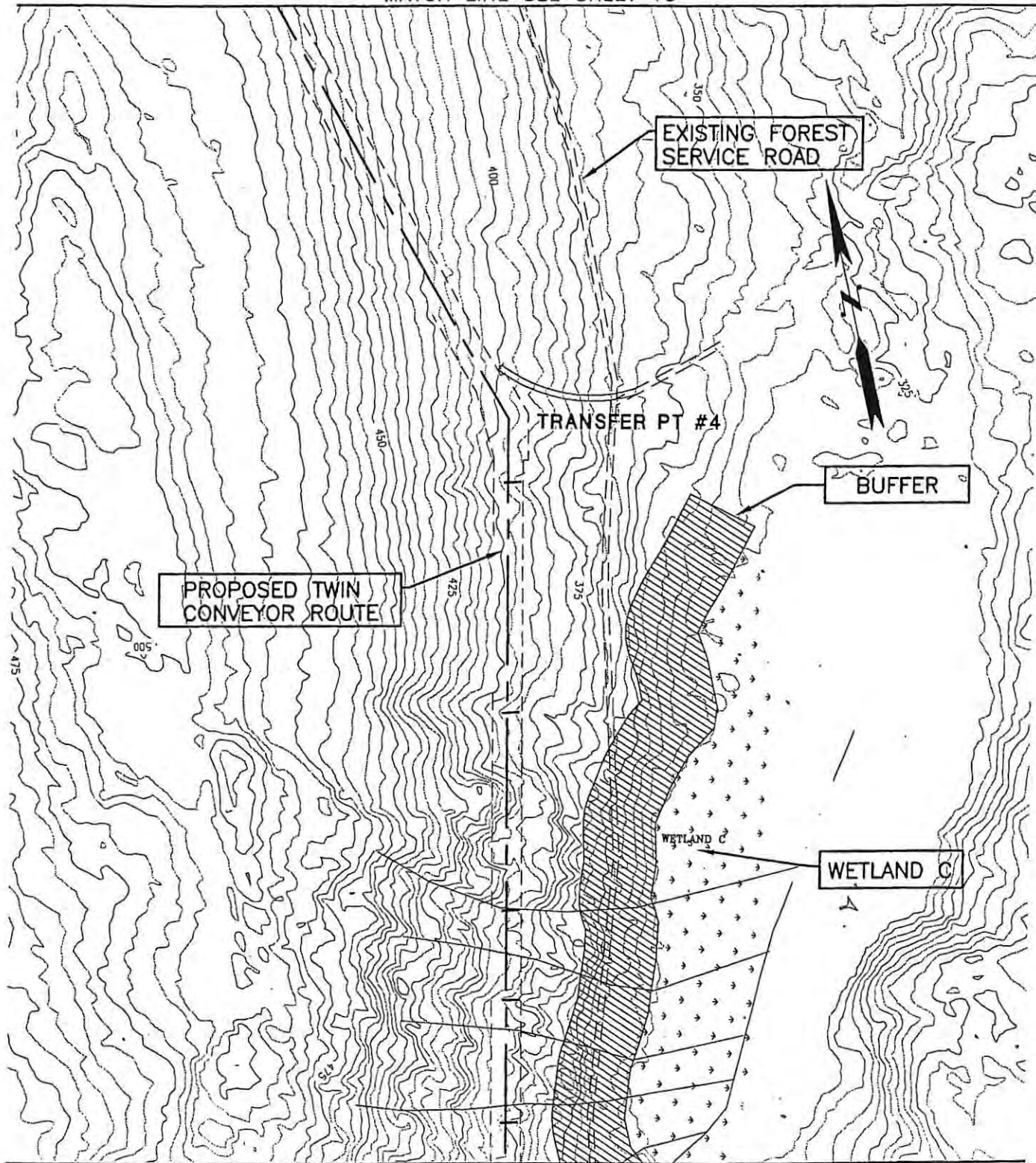
COUNTY OF: JEFFERSON

APPLICATION BY: FRED HILL MATERIALS

SHEET 11 OF 16

DATE: 2-11-03

MATCH LINE SEE SHEET 13



MATCH LINE SEE SHEET 11

SCALE: 1"=300'

I:\24\01\012\ConceptDesign\COE-PERMIT\4112-S10-16COE.DWG

02/11/2003 3:47 pm

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE

T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

ReidMiddleton

728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E

IN: HOOD CANAL

AT: THORNDYKE

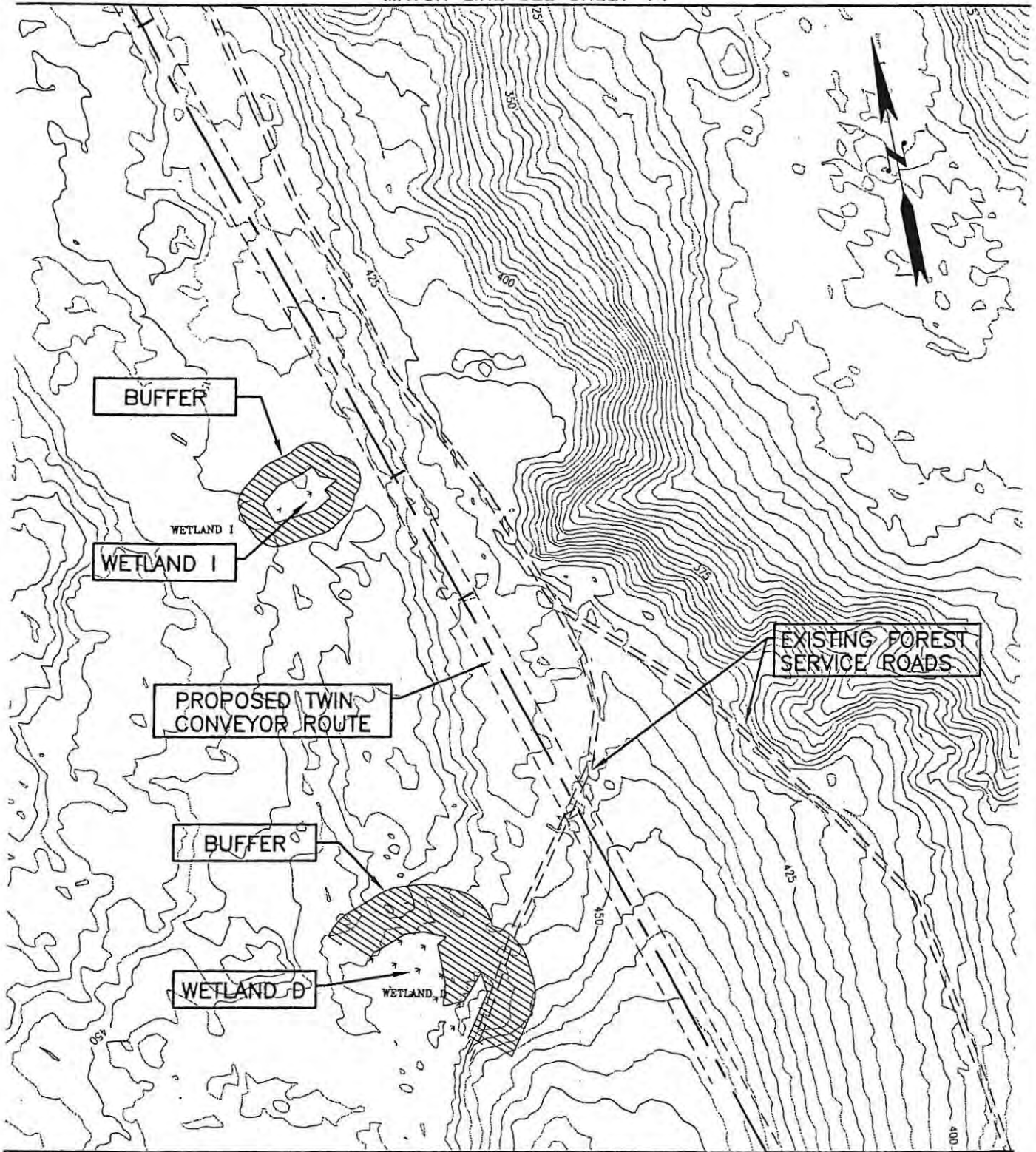
COUNTY OF: JEFFERSON

APPLICATION BY: FRED HILL MATERIALS

SHEET 12 OF 16

DATE: 2-11-03

MATCH LINE SEE SHEET 14



MATCH LINE SEE SHEET 12
SCALE: 1"=300'

I:\24\01\012\ConceptDesign\COE-PERMIT\4112-S10-16COE.DWG

02/11/2003 3:47 pm

PURPOSE: CONSTRUCT CONVEYOR AND
PIER FOR MARINE TRANSPORT OF SAND
AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

ReidMiddleton

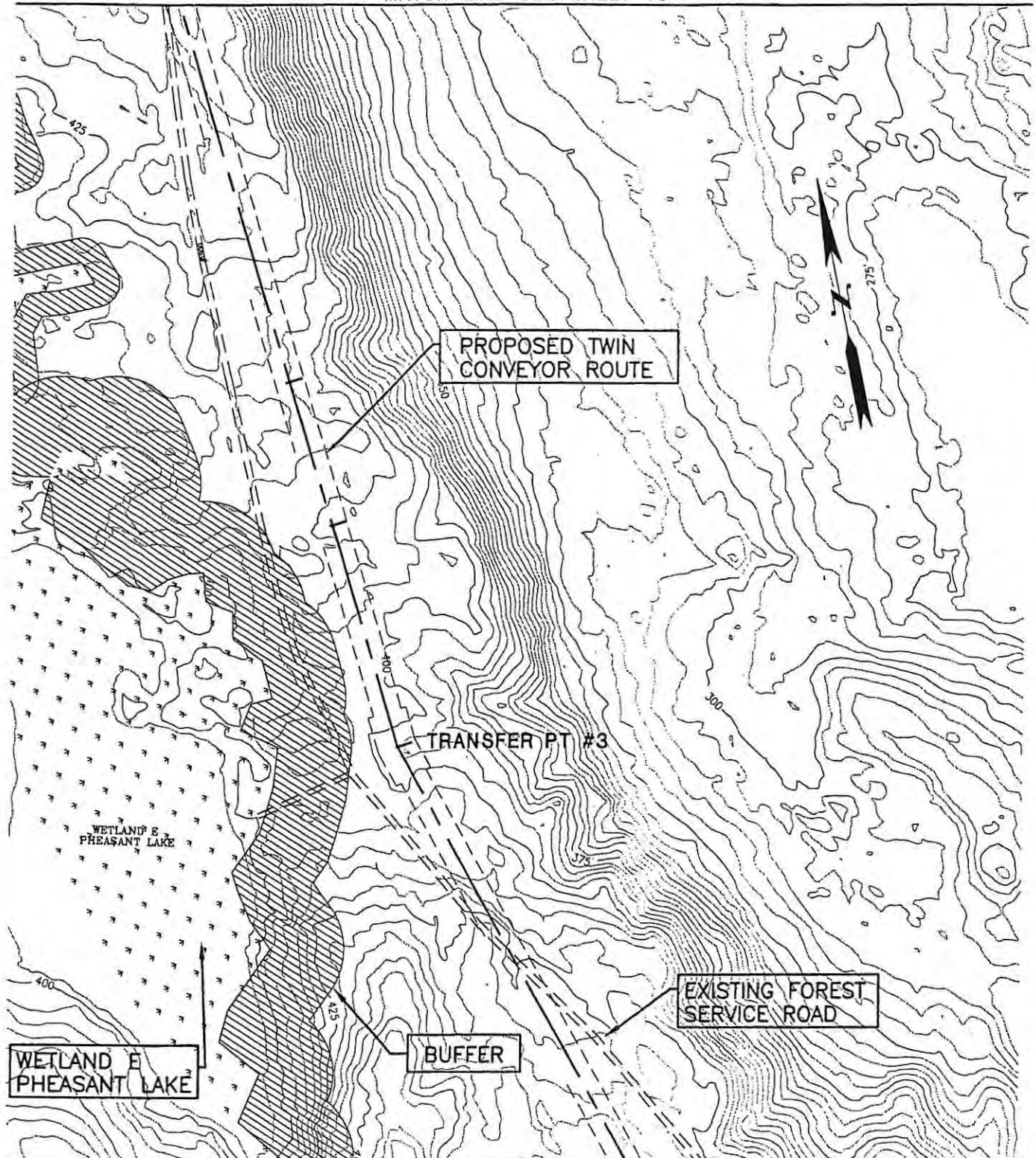
728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS

SHEET 13 OF 16

DATE: 2-11-03

MATCH LINE SEE SHEET 15



MATCH LINE SEE SHEET 13

SCALE: 1"=300'

I:\24\01\012\ConceptDesign\COE-PERMIT\4112-S10-16COE.DWG

02/11/2003 3:47 pm

PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE T-ROC CENTRAL CONVEYOR AND PIER

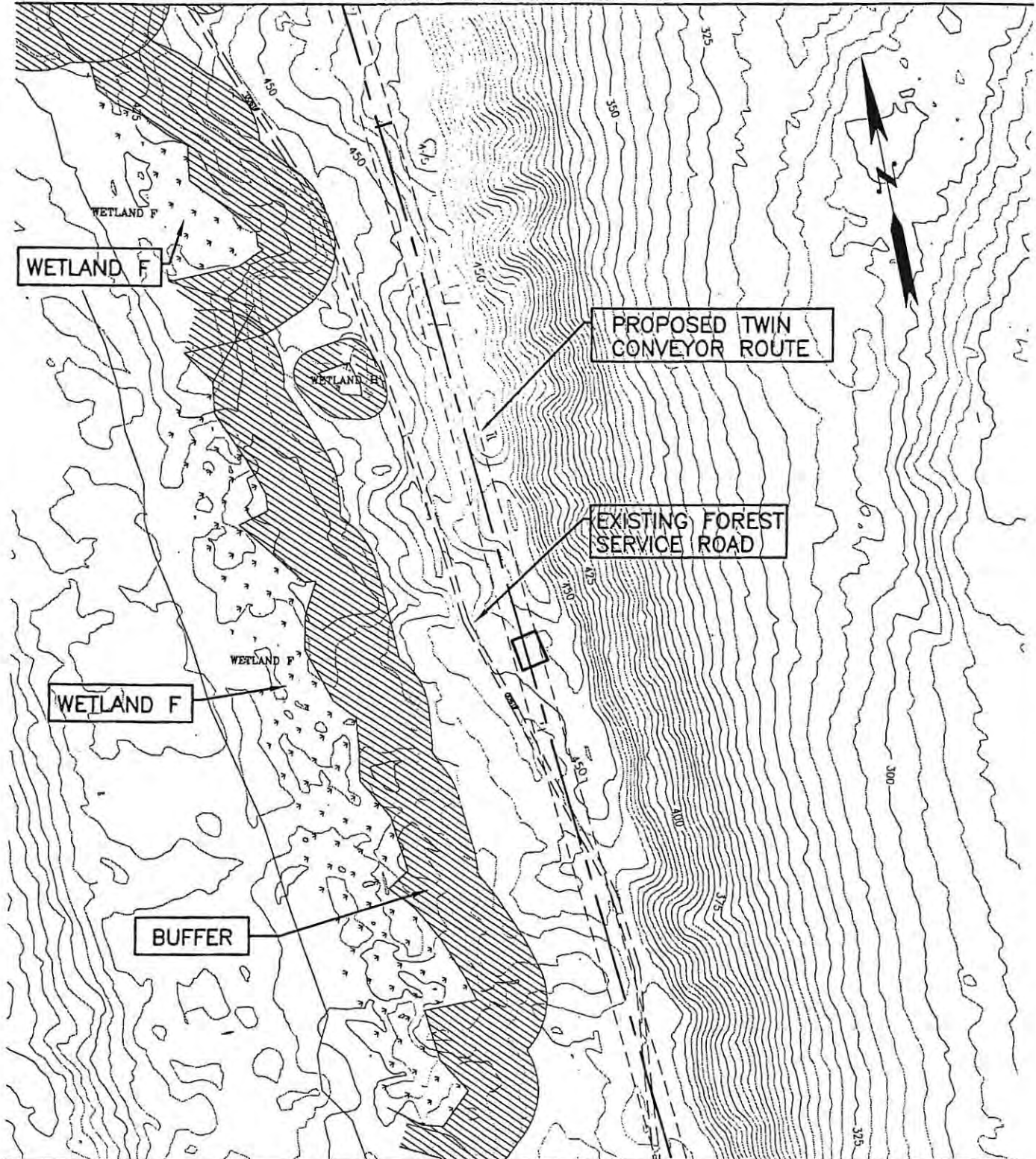
ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

ReidMiddleton

728 134th Street SW · Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS
SHEET 14 OF 16 DATE: 2-11-03

MATCH LINE SEE SHEET 16



MATCH LINE SEE SHEET 14
SCALE: 1"=300'

I:\24\01\012\ConceptDesign\COE-PERMIT\4112-S10-16COE.DWG

02/11/2003 3:47 pm

PURPOSE: CONSTRUCT CONVEYOR AND
PIER FOR MARINE TRANSPORT OF SAND
AND AGGREGATE MATERIALS

VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991

ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE T-ROC CENTRAL CONVEYOR AND PIER

ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POLLESEC. WA 98370

ReidMiddleton

728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425 741-3800

SEC. 19 T 27N. RGE. 1E

IN: HOOD CANAL

AT: THORNDYKE

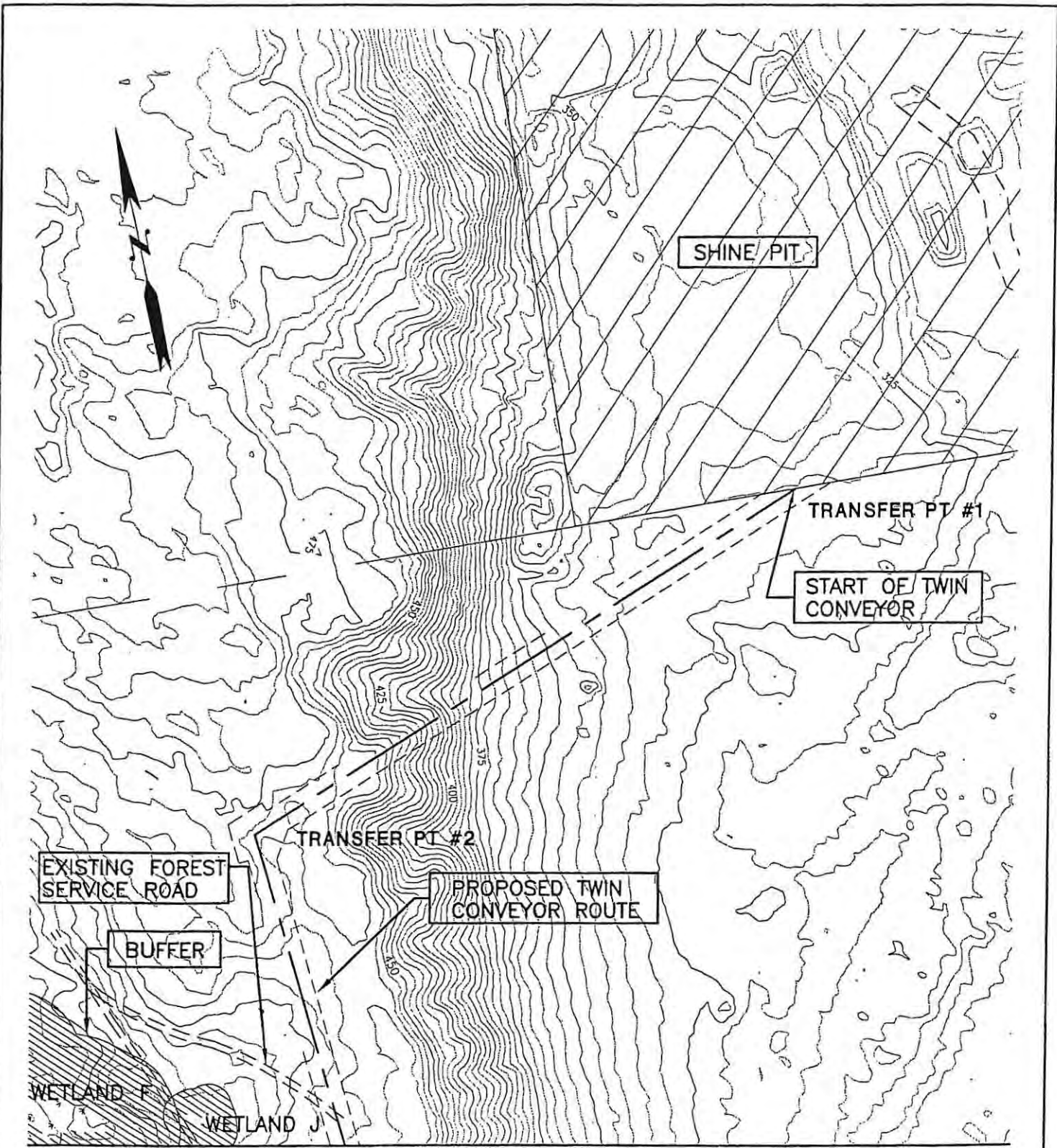
COUNTY OF: JEFFERSON

APPLICATION BY: FRED HILL MATERIALS

SHEET 15 OF 16

DATE: 2-11-03

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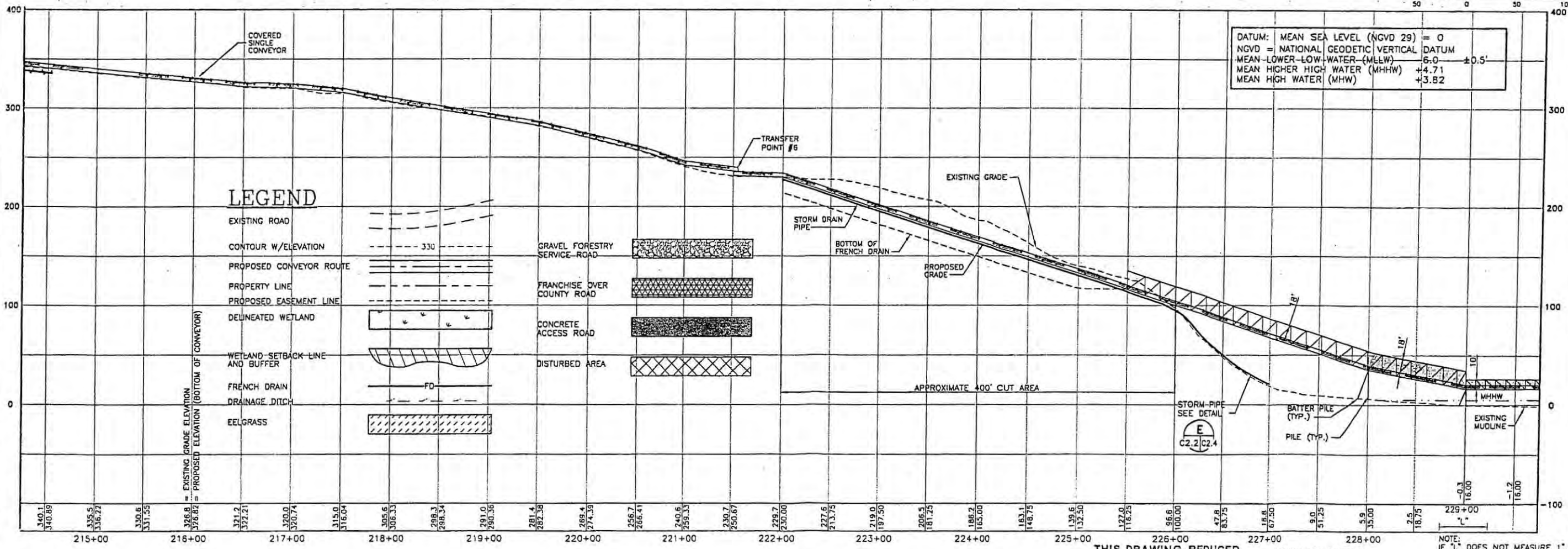
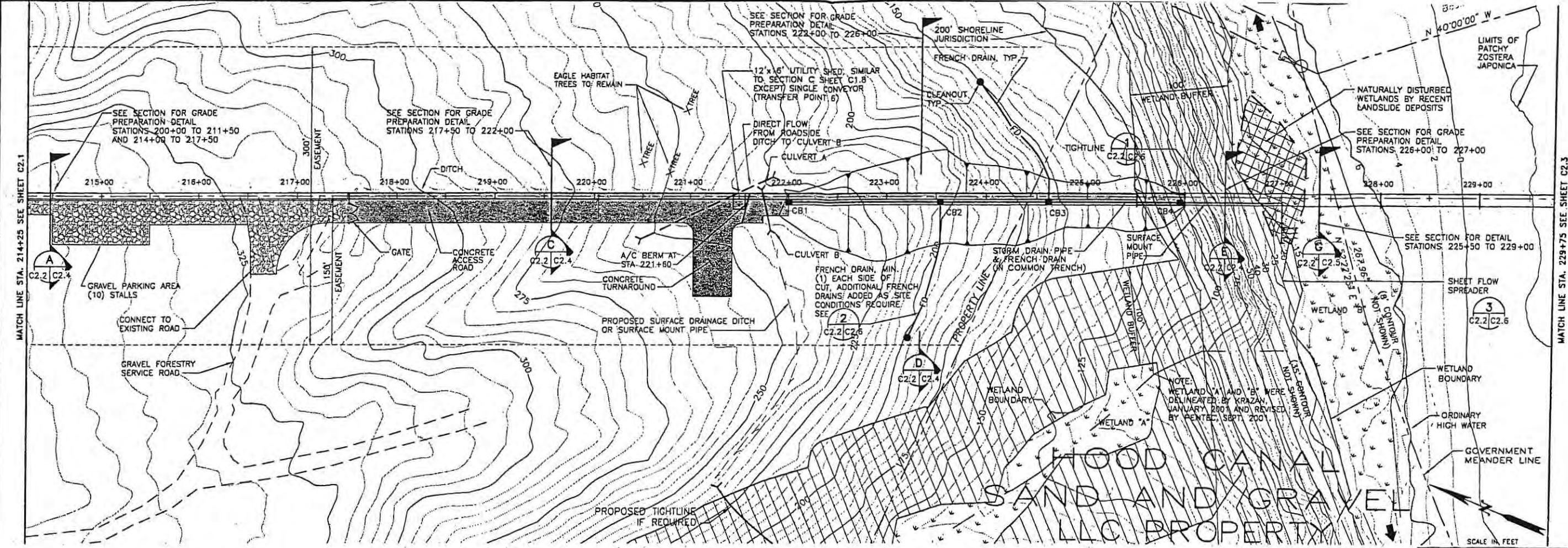


MATCH LINE SEE SHEET 15
SCALE: 1"=300'

\\ConceptDesign\COE-PERMIT\4112-S10-16COE.dwg
PURPOSE: CONSTRUCT CONVEYOR AND PIER FOR MARINE TRANSPORT OF SAND AND AGGREGATE MATERIALS
VERTICAL DATUM: NVDG 1929
HORIZONTAL DATUM: NAD 1983/1991
ADJACENT PROPERTY OWNERS:
(SEE ATTACHED LIST)

PROPOSED CONVEYOR ROUTE
T-ROC CENTRAL CONVEYOR AND PIER
ADDRESS: FRED HILL MATERIALS
P.O. BOX 6
POULSBO, WA 98370

ReidMiddleton 728 134th Street SW · Suite 200
Everett, Washington 98204
Ph: 425 741-3800
SEC. 19 T 27N. RGE. 1E
IN: HOOD CANAL
AT: THORNDYKE
COUNTY OF: JEFFERSON
APPLICATION BY: FRED HILL MATERIALS
SHEET 16 OF 16 DATE: 2-11-03



DATUM: MEAN SEA LEVEL (NGVD 29) = 0
 NGVD = NATIONAL GEODETIC VERTICAL DATUM
 MEAN LOWER LOW WATER (MLLW) = 6.0 ± 0.5'
 MEAN HIGHER HIGH WATER (MHHW) = +4.71
 MEAN HIGH WATER (MHW) = +3.82

LEGEND

- EXISTING ROAD
- CONTOUR W/ELEVATION
- PROPOSED CONVEYOR ROUTE
- PROPERTY LINE
- PROPOSED EASEMENT LINE
- DELINEATED WETLAND
- WETLAND SETBACK LINE AND BUFFER
- FRENCH DRAIN
- DRAINAGE DITCH
- EELGRASS
- GRAVEL FORESTRY SERVICE ROAD
- FRANCHISE OVER COUNTY ROAD
- CONCRETE ACCESS ROAD
- DISTURBED AREA

THIS DRAWING REDUCED TO LESS THAN HALF SIZE
 SCHEMATIC

REID MIDDLETON
 FRED HILL MATERIALS
 P.O. BOX 6
 POULSBO, WA 98370
 360-779-4431

CLIENTS:
 FRED HILL MATERIALS
 P.O. BOX 6
 POULSBO, WA 98370
 360-779-4431

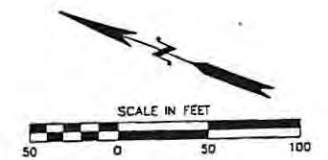
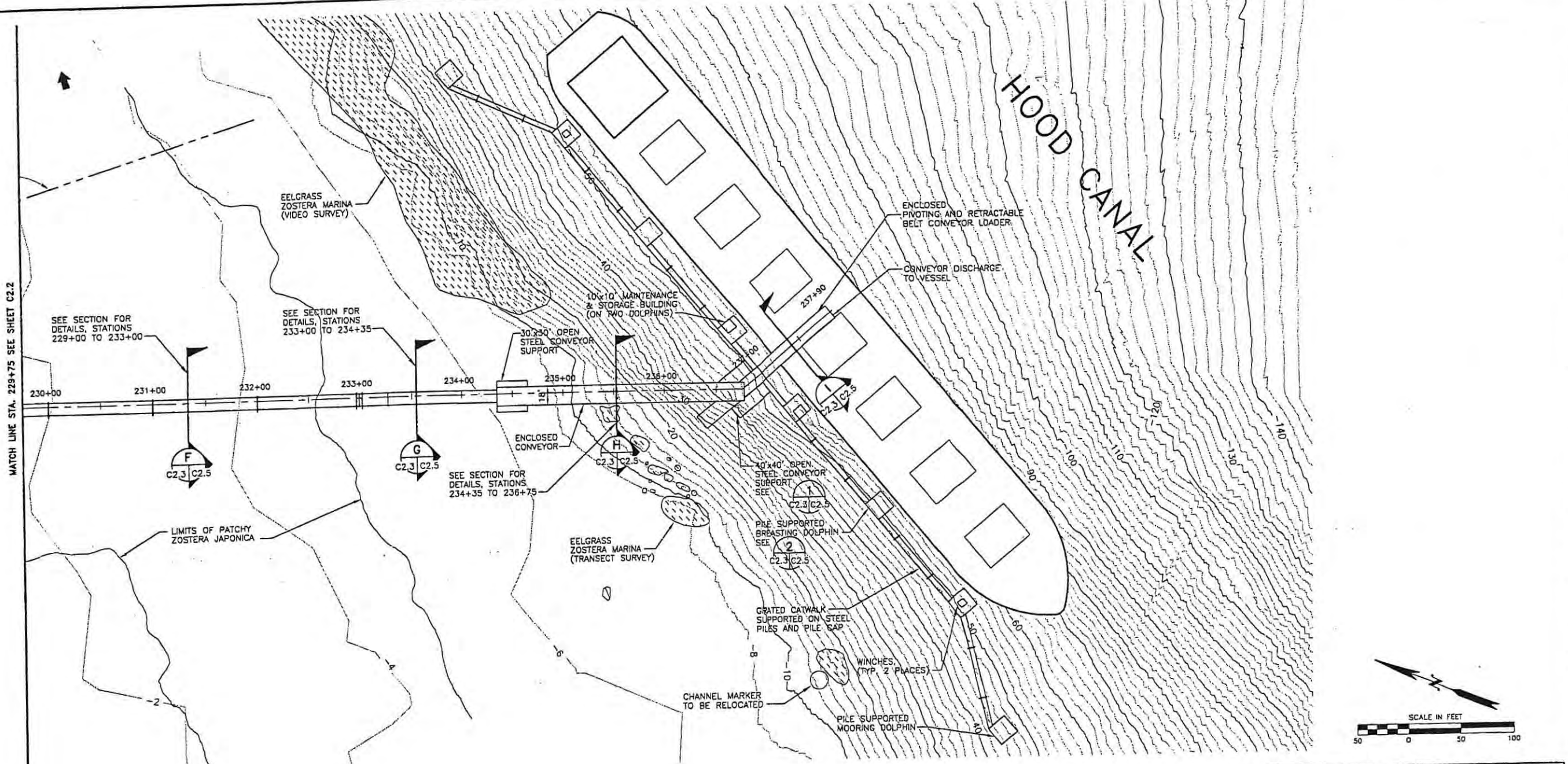
SCALE 1" = 50'
 SHEET NO. C2.2
 DATE 2/11/03
 24-01-012

CLIENT:
FRED HILL MATERIALS
P.O. BOX 6
POULSBORO, WA 98370
360-779-4431

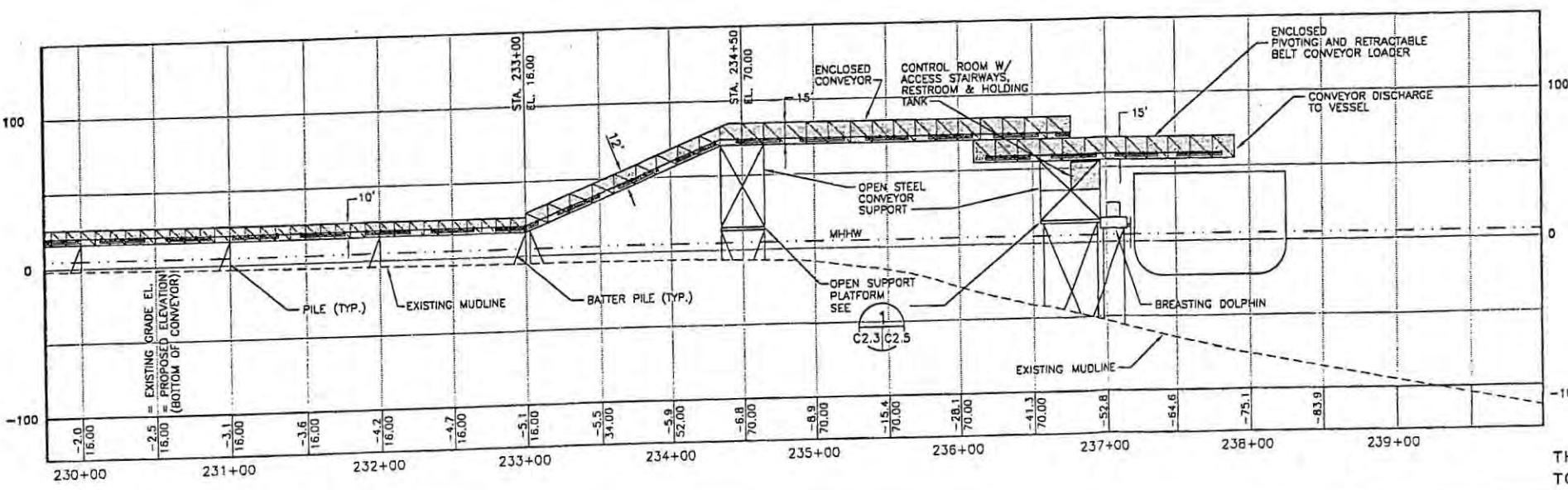
ReidMiddleton
728 134th Street SW - Suite 200
Everett, Washington 98204
Ph: 425-741-3800

FRED HILL MATERIALS
T-ROC CENTRAL CONVEYOR
SINGLE CONVEYOR CORRIDOR
PLAN AND PROFILE

SCALE 1" = 50'
DATE 2/11/03
SHEET NO. C2.3
OF 18 SHEETS
JOB NO. 24-01-012



DATUM: MEAN SEA LEVEL (NGVD 29) = 0
 NGVD = NATIONAL GEODETIC VERTICAL DATUM
 MEAN LOWER LOW WATER (MLLW) -6.0 ±0.5'
 MEAN HIGHER HIGH WATER (MHHW) +4.71
 MEAN HIGH WATER (MHW) +3.82



LEGEND

- EXISTING ROAD
- CONTOUR W/ELEVATION
- PROPOSED CONVEYOR ROUTE
- PROPERTY LINE
- PROPOSED EASEMENT LINE
- DELINEATED WETLAND
- WETLAND SETBACK LINE AND BUFFER
- FRENCH DRAIN
- DRAINAGE DITCH
- EELGRASS

THIS DRAWING REDUCED TO LESS THAN HALF SIZE
SCHEMATIC

NOTE: IF "L" DOES NOT MEASURE 1", ADJUST SCALES ACCORDINGLY.

APPENDIX C
MARINE RESOURCES SURVEY REPORT

***Thorndyke Resource Operations
Complex Central Conveyor and Pier
Marine Resources Survey Report***

Jefferson County, Washington

***Prepared for
Reid Middleton, Inc.***

***February 28, 2003
12007-47***

***Thorndyke Resource Operations Complex
Central Conveyor and Pier
Marine Resources Survey Report***

Jefferson County, Washington

***Prepared for
Reid Middleton, Inc.
728 – 134th Street SW, Suite 200
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***February 28, 2003
12007-47***

Prepared by
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THORNDYKE RESOURCE OPERATIONS COMPLEX CENTRAL CONVEYOR AND PIER MARINE RESOURCES SURVEY REPORT

1.0 INTRODUCTION

1.1 *General*

This report describes existing marine resources and habitat conditions of the nearshore (i.e., shoreline, intertidal, and shallow subtidal) environment in the vicinity of the proposed Thorndyke Resource Operations Complex (T-ROC) Central Conveyor and Pier. The information provided herein was obtained through field surveys conducted at the project site and through review of the literature, including Priority Habitats and Species (PHS) data from the Washington Department of Fish and Wildlife (WDFW). Field surveys included three intertidal beach surveys, an underwater video survey, a diver survey, and reconnaissance of two previously delineated wetlands. All field surveys were conducted between August 17, 2001, and July 12, 2002.

1.2 *Project Description*

The proposed T-ROC project will include an approximately 4-mile conveyor to transport sand and gravel from an upland gravel mining operation (the Shine Pit) in Jefferson County to an offshore loading Pier located in Hood Canal approximately 5 miles southwest of the Hood Canal Bridge (Appendix B, Sheet 1). During operation, the conveyor system will transport up to 3,000 tons of materials per hour to vessels docked at the Pier.

A detailed T-ROC Central Conveyor and Pier project description and fact sheet are provided in Appendix F.

2.0 INTERTIDAL BEACH SURVEYS

2.1 *General*

Three separate marine habitat surveys were conducted at the proposed Pier location (anticipated Conveyor centerline). For each survey, two Pentec marine biologists were guided to the site by the project manager. The initial survey, in mid-August 2001, included general characterization of the beach habitat from the high-tide line to lower intertidal zone and measurements of native eelgrass (*Zostera marina*) distribution along the low-tide line (approximately -2 feet mean lower low water [MLLW]). The second beach survey, 6 weeks later, primarily

focused on determining the extent (i.e., upper and lower boundaries) and density (via shoot counts) of the discontinuous patches of non-native Japanese eelgrass (*Z. japonica*) that were identified in the first beach survey, as well as during a subsequent underwater video survey. The third beach survey, conducted in mid-July 2002, primarily documented changes within the upper intertidal zone and along the upper beach face. Most of these changes occurred during the fall and winter months as a result of high tides and wave and current action. The survey also noted changes in the relative distribution and size of *Z. japonica*. The results of the three beach surveys are described below.

2.2 Intertidal Survey, August 17, 2001

The first intertidal survey was conducted during the morning of August 17, 2001. Low tide was -2.2 feet MLLW at 1001 hours. Weather was partly overcast early, with increasing sun by late morning. The upper beach and backshore are bordered on the northwest by a steep bluff that rises to about 100 feet above mean sea level (Photo 1 and Figure C-1). A slope failure in the 1990s deposited a substantial quantity of sand and silt on the backshore, significantly altering a wetland formed by seep water from sediment layers within the bluff. Vegetation of the riparian zone above the ordinary high water line is described in the beach wetland reconnaissance section herein. Along the high-tide drift line were scattered plants of saltbrush (*Atriplex patula*), jaumea (*Jaumea carnosa*), seaside plantain (*Plantago maritime*), meadow barley (*Hordeum branchyantherum*), pacific silverweed (*Potentilla ansirena*), and silver burweed (*Ambrosia chamissonis*) (Photo 2).

Below the high-tide line the beach face was moderately steep and sandy, with lenses of gravel; this beach face extending down to a broad sand flat that began at about +6 feet MLLW (Photo 2). Both on this upper beach and on the sandflat, low patches of unstable and shifting sand gave evidence of a net drift from southwest to northeast. Also prominent on the upper beach were lines of countless stranded and dead jellyfish (*Cyanea*), most on the order of 25 to 35 cm in diameter (Photo 3). The lowest line of drift from the previous high tide consisted of these jellyfish and dislodged eelgrass plants, and supported large numbers of beach hoppers (Hyalidae). No other macrobiota was evident on the beach face, but the substrate along and below the high-tide line appeared to be potentially suitable for spawning by surf smelt (*Hypomesus pretiosus*) and/or sand lance (*Ammodytes hexapterus*). According to the WDFW PHS, the nearest documented sand lance spawning occurs approximately one-third to one-half mile southwest of the proposed Conveyor alignment (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A). The PHS database

does not contain any records of surf smelt nearer than at least 1 mile to the northeast and 1 mile to the southwest of the proposed pier.

Where the lower edge of the beach face transitioned to the sandflat, seep water emerged at low tide to create shallow pools of standing water (near flagged stake in Photo 4) and eventually formed a channel that meandered across the flat. Patches of the green algae *Ulva* spp., *Enteromorpha intestinalis*, and *E. linza* occurred in these fresh or brackish seeps. Burrows of ghost shrimp (*Neotrypaea californiensis*) were abundant on the middle and upper portions of the flat. Associated with the ghost shrimp were the commensal bivalve *Cryptomya californica* and the polychaete *Nephtys* sp.

From about +4 feet MLLW to +1 foot MLLW the sandflat supported scattered and discrete patches of *Z. japonica* (Photo 5). Within each patch, shoots were very dense (see shoot density data in Table C-1) and fertile fronds were present where patches occurred in shallow standing water ponds (Photo 6). Cumulatively, in this band of *Z. japonica* patches, total coverage of the beach surface by eelgrass patches was estimated at about 25 percent, and the band was approximately 75 m wide (250 feet wide) along the approximate pier alignment (Figure C-1). *Z. japonica* is an introduced species that is known to occur throughout northern Puget Sound, although its distribution has not been well documented (Thom and Hallum 1990). Because it is an annual, it is expected to be variable in space and time. This is especially true on beaches such as this one, where the advancing sand waves bury individual patches while new patches form in the wake of each wave.

Also noteworthy on the sandflat were very high-density patches of sand dollars (*Dendraster excentricus*), primarily in shallow tidewater ponds and drainage channels (Photo 7). Occasional cockles, *Clinorcardium nuttalli*, were also seen, and small holes of the burrowing polychaete *Nephtys* sp. were widespread.

The beach surface was somewhat firmer on the outer portion of the sand flat. Where slope steepened somewhat, ghost shrimp were less abundant, and *Z. japonica* was no longer abundant but was present as widely scattered shoots. Below about +1 foot MLLW, very widely scattered geoduck (*Panope abrupta*) siphons were seen. Patches of green algae (*Ulva*, *Ulvaria*, and *Enteromorpha* spp., including *E. procera*) were scattered over the outer beach, often attached to the tubes of an abundant parchment-tube polychaete (Chaetopteridae). Beginning at about -1.5 feet and extending down into the subtidal zone was a band of patches of *Z. marina* (Photo 8). At the upper edge of the *Z. marina* band were a few scattered smaller eelgrass plants that may have been *Z. japonica*. The green algae/chaetopterid association was dense along this upper edge of the eelgrass and is visible as the lighter green area along the

upper margin of the eelgrass in Photos 8 and 9. Eelgrass was generally dense in the patches within this band, and the patches became larger and more continuous to the northeast of the proposed Pier centerline (Photo 9). Scattered tubular brown algae (*Scytosiphon lomentaria*) were present among the eelgrass, along with a small filamentous red alga (*Ceramium* sp.).

Scattered moon snail (*Polinices lewisii*) egg cases were found on this lower beach along with an occasional moon snail, usually well buried in the sand (Photo 10). Other animals seen in random excavations of the lower elevation sand (e.g., at -1.5 feet MLLW) included chaetopterid, oweniid, and capitellid polychaetes and another very deep-dwelling parchment-tube polychaete (possibly Onuphidae). The sand clam *Macoma secta* was common, and geoduck and cockles were increasingly abundant at lower tidal elevations. Another burrowing species was the anemone *Anthopleura artemisia*. In shallow water along the shoreline and in the runoff channels, a small cottid was very abundant; a few graceful crab (*Cancer gracilis*) were also present.

2.3 Intertidal Survey, September 28, 2001

The second intertidal beach survey was conducted during the morning of September 28, 2001. Low tide was +1.2 feet MLLW at 0907 hours. Weather was partly overcast with a light southerly breeze.

Beach conditions were generally similar to those observed during the first intertidal beach survey, although the overall abundance of green macroalgae (e.g., *Ulva* spp.) appeared to be less than that observed in mid-August. As was observed during the first survey, the upper beach contained lines of stranded/dead jellyfish (*Cyanea*), although in lower numbers.

The primary purpose of the second survey was to delineate the upper and lower boundaries of the *Z. japonica* patches that were identified during the initial beach survey and during the subsequent underwater video survey (see below), and also to measure shoot densities (as number of shoots per square meter [m²]) within the eelgrass patches.

The upper and lower boundaries of the *Z. japonica* patches were delineated using a hand-held differential global positioning system (DGPS) unit. These boundaries are presented in Figure C-1, which also shows the general boundaries of eelgrass beds (both *Z. japonica* and *Z. marina*) identified in the video and diver surveys discussed in the following sections.

Shoot-count densities (based on the average of three individual counts) of *Z. japonica* within representative patches ranged from 677 to 1,483 shoots

per m² (Table C-1). The mean density in all patches surveyed was 1,099 shoots per m². As was noted in the first beach survey, the patches of *Z. japonica* appeared to occupy about 25 percent of the total beach surface within the eelgrass band, which is a highly dynamic zone due to wave action and shifting of sand.

2.4 Intertidal Survey, July 12, 2002

A third intertidal beach survey was conducted on July 12, 2002. The primary purpose of this survey was to observe and document changes in the intertidal zone and backshore that had occurred since the beach surveys conducted in 2001. The low tide was -2.8 feet MLLW at 1300 hours. The weather was clear and there was a light breeze.

There were noticeable differences along the upper shoreline in the immediate vicinity of the Conveyor/Pier alignment. Above the extreme high-tide line the vegetation within the disturbed zone below the bluff had matured, particularly the young alders (*Aldus rubra*). Just below the upper tide line (driftwood line), a sand/cobble berm that in 2001 existed along the ordinary high water mark (Photographs 2 and 3) had shifted waterward by several meters (Photographs 11 and 12). Such dynamic changes in this upper tidal zone are likely to occur yearly as a result of abundant sediment sources, high tides, and intense wave action over the fall and winter months.

On the sandflat within the zone of *Z. japonica* (approximately +4 feet MLLW to +1 foot MLLW) there appeared to be differences in the relative distribution and size of *Z. japonica* between the 2001 and 2002 beach surveys. As previously noted, seasonal variability in this annual eelgrass is to be expected. In July 2002, the isolated patches of *Z. japonica*, particularly within the lower tidal range, appeared to be more scattered and generally less dense compared with the previous summer, although no eelgrass shoot counts were made during the latter survey (Photograph 13). In addition, the blades of *Z. japonica* appeared in general to be shorter and narrower than in summer 2001. We do not have any quantitative information to verify this observation, but it suggests the possibility of reduced seasonal growth in spring and early summer 2002.

Farther waterward, beginning about -1 foot MLLW, was the upper boundary of a band of *Z. marina* that was previously documented in 2001. In contrast to *Z. japonica*, boundaries of the *Z. marina* patches and densities of *Z. marina* within this band appeared to be relatively unchanged between August/September 2001 and July 2002, although no shoot densities were measured during the latter survey (Photographs 14, 15, and 16). It should be noted that some *Z. japonica* was also present within this band.

3.0 UNDERWATER VIDEO SURVEY

On August 28, 2001, Pentec mapped the extent of the *Z. marina* eelgrass beds using Pentec's proprietary **Sea-All™** video mapping system. On the day of the survey, the weather was calm and partly cloudy.

The **Sea-All™** consists of a high-resolution color underwater camera integrated with a DGPS unit. The camera was lowered to directly view the bottom habitat while the survey vessel slowly moved along a transect line. Video tracks run are shown on Figure C-2. Positioning information was superimposed onto the video image before recording onto Digital-8 videotape. The positioning information was also logged onto a computer. These data were then imported into AutoCAD® to create a map of the actual location of the eelgrass. Boundaries were drawn by hand around the areas where eelgrass was found during the survey (Figure C-3).

Z. marina was found to occur in a narrow band along the outer edge of the broad sandflat as described from the intertidal survey. This band of eelgrass lies between approximately -1 foot and -16 feet MLLW. The slope begins to increase significantly starting about -2 feet MLLW. The survey transects were aligned to be roughly parallel to the shoreline, to simplify keeping the camera a consistent distance off the bottom while surveying along this slope. Several transects were surveyed along 2,700 feet of shoreline at the project site (Figure C-2). The **Sea-All™** system logged the presence of eelgrass once per second, logging over 9,400 discrete data points during the survey. The spacing of these transects was usually less than 40 feet apart; however, in some places there were larger gaps. The eelgrass tended to occur in dense patches that were surrounded with bare sand. In general, the patches were larger and more continuous toward the northeastern portion of the study area (i.e., northeast of the proposed Pier centerline) (Figure C-3 and Photos 9 and 14). Only trace amounts of macroalgae were observed.

Just outside the southwestern boundary of the project area, several small cage-like structures were observed that were deployed in grid patterns on the bottom. The purpose of these objects is not known, but they most likely are some kind of an experiment.

Four additional transects were surveyed that extended from the shoreline out past the eelgrass beds. These transects were aligned to cover some possible alignment corridors for the Pier that were under consideration at the time of the survey. Bare sand predominated along these transects, with the exception of patches of *Z. japonica* that were observed. Insufficient video data were collected to accurately map the *Z. japonica* beds, which have been described

above. The upper and lower boundaries of the zone containing these beds were mapped using a hand-held DGPS unit during the second beach survey and are shown on Figure C-1.

4.0 DIVER SURVEY

4.1 General

On September 27, 2001, Pentec divers conducted a concentrated eelgrass/macroalgae/geoduck habitat survey along the anticipated alignment of the conveyor. The following sections outline the methods and observations of the diver survey.

The eelgrass/macroalgae survey generally conformed to WDFW "intermediate" protocols for macrovegetation surveys (WDFW 1996). Eleven parallel transects were surveyed and information recorded regarding the presence and quantity of eelgrass, the presence of macroalgae, and the nature of the substrate. Vertebrate and invertebrate species observed during the survey were noted.

4.2 Study Area

The 100- to 140-foot transects were spaced 20 feet apart, and observations were made every 20 feet along each transect. Transects were laid out along a 200-foot baseline crossing the anticipated Pier alignment and approximately parallel to the beach contours (Figure C-4). Based on the previous survey data, all eelgrass appeared to be inshore of the baseline. For verification, additional observations were made 20 feet waterward (south) of the baseline.

The slope of the study area was uniformly gradual (6 percent or less) from the inshore end of the transects to about -5 feet MLLW, where it increased to 20 percent. The steep slope continued beyond the lower boundary of eelgrass. Eelgrass was present in this area between 0 and -9.5 feet MLLW (Figure C-4). Eelgrass was more plentiful toward the southwest end of the study area, south and west of the Pier centerline. Of the 77 total observation points, 14 (18 percent) contained eelgrass, and 11 of those were southwest of the proposed alignment. Eelgrass was highly patchy throughout the study area, with most patches smaller than 20 feet in diameter and a mean density over the area surveyed of 22.9 shoots per m² (Table C-2). Eelgrass appeared to be healthy, with densities ranging from 20 to 428 shoots per m² (mean 189.1 shoots per m²) in quadrats containing eelgrass; i.e., within the patches shown on Figure C-4. Higher densities were found toward the southwest end of the study area.

Within the 75-foot strip from 25 feet southwest of the proposed Conveyor centerline to 50 feet northeast of the centerline (the zone of maximum potential shading), eelgrass was very sparse. Of the 32 observation points within this zone, only three contained any eelgrass at all (Table C-2). Overall density was 1.75 shoots per m², about 1 percent of the density in eelgrass patches southwest and northeast of the centerline.

The substrate was fine sand over most of the study area. In dense patches of eelgrass, where the substrate is protected by the blades from current and wave action, silty sand was observed. No discarded debris was noted.

Diatoms and a slender chaetopterid tubeworm were observed over most of the study area. Other invertebrates seen included sunflower star (*Pycnopodia helianthoides*), coon-stripe shrimp (*Pandalus danae*), and long-horned nudibranch (*Hermisenda crassicornis*). An egg case from a moon snail was also observed. Crabs observed included Dungeness (*Cancer magister*), graceful (*C. gracilis*), and hermit crabs (*Pagurus* spp.). Fish included Pacific staghorn sculpin (*Leptocottus armatus*) and a cabezon (*Scorpaenychthys marmoratus*). No geoduck siphons were seen.

Macroalgae in the study area was limited to *Ulva* spp. and was most concentrated in and around patches of eelgrass. Coverage less than 20 percent was observed in areas with no eelgrass, whereas eelgrass beds showed coverage up to 90 percent. Average algal cover over the entire study area was 5.4 percent (Table C-2).

4.3 Reference Area

A single reference transect was surveyed in the near-continuous eelgrass bed that begins about 75 feet northeast of the proposed centerline (Figure C-4). Mean density of eelgrass in the four sample points that lay within the southwest portion of the bed was 169.3 shoots per m².

4.4 Summary

In general, eelgrass was very patchy in the diver survey-transect area, and more plentiful southwest of the alignment than immediately northeast of it. Shoot density was also generally higher toward the southwest. Average shoot density over the transect study area was 22.9 shoots per m² (compared with 169 shoots per m² in the continuous *Z. marina* band beginning farther to the northeast). The substrate was fine sand throughout, with areas of silty sand among dense patches of eelgrass. Associated fauna was typical for the area, and obvious macroalgae was limited to ulvoids.

5.0 WETLANDS RECONNAISSANCE

A Pentec wetlands scientist visited wetlands near the Hood Canal shoreline crossing point of the proposed site of the pier on September 12, 2001. The purpose of the visit was to review and provide comment on the delineation of two wetlands near the shoreline conducted by Krazan & Associates. The Pentec wetlands scientist was escorted to the wetlands by the project manager.

Pentec used the Routine Determinations wetland delineation method described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1996) to evaluate the Krazan wetland delineations. According to the manual, an area is considered a jurisdictional wetland when hydrophytic (wetland) vegetation, hydric (wetland) soils, and wetland hydrology are present. With few exceptions, all three parameters are required for an area to be a jurisdictional wetland. Hydrophytic vegetation is considered to be present if more than 50 percent of the dominant plants in an area have wetland indicator statuses of facultative (FAC), facultative wetland (FACW), or obligate wetland (OBL), as defined by Reed (1988) and Reed et al. (1993).

Based on the survey map provided by Team 4 Engineering and site conditions on September 12, 2001, Pentec agreed with most of the wetland boundaries flagged on the project site. Pink "wetland boundary" flagging was clearly identifiable and was found to follow the jurisdictional wetland boundary of the wetland in the gully above the bluff (Wetland A). However, based on this review, the Wetland A boundary (and corresponding wetland buffer) was subsequently extended approximately 30 feet farther southeast down the steep portion of the gully (Appendix B, Sheet C2.2). Although the boundary was extended, the wetland did not appear to connect to Wetland B, adjacent to the beach (Appendix B, Sheet C2.2).

Pentec also disagreed with small portions of the boundary initially delineated on Wetland B, adjacent to the beach on the northeast end of the site. On the southwest end of the wetland, standing water, wetland plants, and hydric soil extended south and east from the flagged boundary. Dominant plants included toad rush (*Juncus bufonius*, FACW), and saltbush (*Atriplex patula*, FACW). Subsequently, the Wetland B boundary was extended to the edge of the vegetation and close to the ordinary high water mark.

In addition, Pentec determined the area just outside of the original northwest boundary of Wetland B had some wetland characteristics but was not definitively wetland throughout. This area included a portion of the bluff that had recently slumped off. Wetland plants were dominant here and hydric soils were seen in some places. Red alder (*Alnus rubra*, FAC) was the dominant plant

and appeared to be 2 to 4 years old. Wetland hydrology was not seen at the time of the wetland review; however, evidence of wetland hydrology may be established if the site is visited during wetter months. It appears that a wetland was buried by the material that slid off the bluff, and that wetland conditions may be reestablishing on the slide area. Observations of conditions in and adjacent to Wetland B in the course of the intertidal surveys described above indicate that conditions of standing water and vegetation seem to vary considerably over seasons. Therefore, the Wetland B boundary was extended to the west to include this disturbed area, as shown in Appendix B, Sheet C2.2.

A third wetland was seen on the southwest end of the site. Most of the wetland is on the property to the southwest, but the wetland overlaps the property boundary by approximately 50 feet. Because this wetland is more than 200 feet from the project, it was not delineated.

Based on the Washington State Wetland Rating (Ecology 1996), Pentec would rate the wetland adjacent to the beach, Wetland B, as Category II. This rating is based on the facts that the wetland is less than 1 acre in size, the buffer is undisturbed, and features include woody debris, contiguous freshwater wetland, and high saltmarsh. The wetland in the gully, Wetland A, would also rate as Category II, primarily because of the undisturbed condition, good buffers, and connection to a stream. Jefferson County and the Washington State Department of Ecology should be consulted for a final wetland rating.

6.0 REFERENCES

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PHOTOS



Photograph 1 – View from beach toward upper shoreline at approximate location of conveyor crossing.



Photograph 2 – Upper beach and backshore, looking southwest.



Photograph 3 – Upper beach, looking northeast. Stranded/dead jellyfish (*Cyanea*) visible along high tide line.



Photograph 4 – View looking east from upper beach across tideflat along conveyor alignment.



Photograph 5 – View looking southwest. Scattered patches of *Zostera japonica* present on tideflat.



Photograph 6 – Dense stand of *Z. japonica* in tide pool.



Photograph 7 – Sand dollars (*Dendraster excentricus*) on tideflat.



Photograph 8 – View looking southwest at low tide (approximately -2 feet MLLW). Scattered patches of *Z. marina* beginning north of channel marker.



Photograph 9 – Eelgrass reference bed: low tide (-2 feet MLLW) view looking northeast from north of proposed conveyor alignment (lighter green on left is ulvoid algae).



Photograph 10 – Moon snail (*Polinices lewisii*) partially buried in sand.



Photograph 11 – View from upper beach looking southwest on July 12, 2002.



Photograph 12 – View from upper beach looking northeast on July 12, 2002.



Photograph 13 – View looking southwest across tideflat on July 12, 2002. Scattered patches of *Z. japonica*.



Photograph 14 – View looking northeast from north side of Pier alignment on July 12, 2002. Eelgrass (*Z. marina*) reference bed surveyed in 2001.



Photograph 15 – View looking southwest at low tide on August 17, 2001. Patches of *Z. marina* beginning north of channel marker.



Photograph 16 – View on July 12, 2002 from same location north of channel marker. Patches of *Z. marina* appear relatively unchanged.

TABLES

Table C-1 - Japanese Eelgrass Density, September 28, 2001*

Patch No.	Rep.	Shoot Count (per 1/16 m ²)	Density (Shoots/m ²)	Average (Shoots/m ²)
1	a	66	1,056	1,072
	b	58	928	
	c	77	1,232	
2	a	55	880	949
	b	71	1,136	
	c	52	832	
3	a	82	1,312	1,424
	b	89	1,424	
	c	96	1,536	
4	a	29	464	677
	b	57	912	
	c	41	656	
5	a	48	768	988
	b	65	1,040	
	c	68	1,088	
	d	66	1,056	
6	a	91	1,456	1,483
	b	94	1,504	
	c	93	1,488	
Average density within patches				1,099

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***Notes:**

All counts taken within patches; data do not represent density over the entire beach.
 Low Tide: 1.2 feet at 0700 hour

Table C-2 - Diver Quadrat Data and Observations, September 27, 2001*

Transect	Distance	Tide	Depth	MLLW	Substrate	Eelgrass Shoot Counts			Macroalgae			Comments
						Quad 1	Quad 2	Quad 3	Quad 1	Quad 2	Quad 3	
Reference	0	10.5	13	2.5	Sand	21	37	40	40	30	50	Grain-size sample
	10	10.5	14	3.5	Sand	47	50	66	20	30	20	
	30	10.5	14	3.5	Sand	54	47	39	20	20	30	
	55	10.5	15	4.5	Sand	56	20	31	20	10	20	
	75	10.5	19	8.5	Sand	0	0	0	0	0	0	No more grass
0	0	10.5	25	14.5	Sand	0	0	0	0	0	40	Hermit
	20	10.5	20	9.5	Sand	12	0	0	20	0	0	
	40	10.5	16	5.5	Sand	0	0	0	0	0	0	
	60	10.5	13	2.5	Sand	0	0	0	0	0	0	
	80	10.5	12	1.5	Sand	0	0	0	0	0	0	
	100	10.5	12	1.5	Sand	0	0	0	0	0	5	
20	-20	10	31	21	Sand	0	0	0	11	20	40	Worm tubes
	0	10	24	14	Sand	0	0	0	0	30	0	Worm tubes, diatoms
	20	10	20	10	Sand	0	0	0	0	5	5	Worm tubes, diatoms
	40	10	16	6	Sand	0	0	0	0	0	5	Worm tubes, diatoms
	60	10	14	4	Sand	0	0	0	0	5	15	No worm tubes, diatoms
	80	10	12	2	Sand	0	0	0	0	0	0	
	100	10	12	2	Sand	0	0	0	0	0	0	
	120	10	12	2	Sand	0	0	0	0	0	0	Moon snail egg case, diatoms
40	-20	9.5	27	17.5	Sand	0	0	0	0	30	10	Worm tubes, Dungeness crab
	0	10.5	24	13.5	Sand	0	0	0	0	0	0	Worm tubes, diatoms
	20	10.5	19	8.5	Sand	0	0	0	0	20	10	Worm tubes, diatoms
	40	10.5	15	4.5	Sand	0	0	0	0	0	0	Worm tubes, diatoms
	60	10.5	13	2.5	Sand	0	0	0	0	0	0	Worm tubes, diatoms
	80	10.5	13	2.5	Sand	0	0	0	0	20	0	Worm tubes, diatoms
	100	10.5	12	1.5	Sand	0	0	0	0	0	0	Diatoms
60	-20	10	28	18	Sand	0	0	0	0	10	0	Diatoms
	0	10	23	13	Sand	0	0	0	0	5	0	Diatoms
	20	10	19	9	Sand	0	0	0	0	5	10	Worm tubes, diatoms
	40	10	15	5	Sand	20	0	0	0	10	10	Worm tubes, diatoms
	60	10	12	2	Sand	0	0	0	0	5	5	Diatoms
	80	10	12	2	Sand	0	0	0	0	0	0	Diatoms
	100	10	11	1	Sand	0	0	0	0	0	0	Diatoms
	120	10	10	0	Sand	0	0	0	0	0	0	Hermit
80	-20	9.5	25	15.5	Sand	0	0	0	0	5	0	
	0	10	22	12	Sand	0	0	0	0	5	10	
	20	10	18	8	Sand	0	0	0	0	0	10	Ulva
	40	10	13	3	Sand	0	0	0	0	10	20	
	60	10.5	14	3.5	Sand	0	0	10	0	5	5	Ulva, hermit crab
	80	10.5	12	1.5	Sand	0	0	0	0	0	0	
	100	10.5	12	1.5	Sand	0	0	0	0	0	0	
	120	10.5	24	13.5	Sand	0	0	0	0	0	0	
100	0	9.5	21	11.5	Sand	0	0	0	0	5	0	
	20	9.5	28	18.5	Sand	0	0	0	0	5	5	Worm tubes, diatoms
	40	9.5	18	8.5	Sand	0	0	0	0	5	5	Worm tubes, diatoms
	60	9.5	14	4.5	Sand	0	0	0	0	5	0	Worm tubes, diatoms
	80	9.5	12	2.5	Sand	0	0	0	0	10	5	Worm tubes, diatoms
	100	9.5	11	1.5	Sand	0	0	0	0	0	0	Eelgrass nearby
	120	9.5	11	1.5	Sand	0	0	0	0	0	0	
	140	9.5	10	0.5	Sand	0	0	0	0	0	0	
120	0	10	22	12	Sand	0	0	0	0	5	0	
	20	10	19	9	Sand	0	0	0	5	0	0	
	40	10	16	6	Sand	0	0	0	10	20	10	
	60	10	13	3	Sand	94	80	78	10	10	10	Cabezon
	80	10	12	2	Sand	0	12	0	5	0	0	
	100	10	10	0	Sand	0	0	0	0	0	0	
140	0	7.5	18	10.5	Sand	0	0	0	0	65	0	Diatoms
	20	7.5	14	6.5	Sand	0	0	0	0	5	0	Worm tubes
	40	7.5	12	4.5	Sand	26	36	37	90	90	90	Sea star, Dungeness crab, shrimp
	60	7.5	11	3.5	Sand	0	0	25	0	5	80	
	80	7.5	10	2.5	Sand	0	0	0	0	0	0	
	100	7.5	10	2.5	Sand	0	0	0	0	0	5	
160	0	9.5	20	10.5	Sand	0	0	0	5	0	0	Ulva
	20	9.5	17	7.5	Sand	0	0	0	0	0	10	Ulva
	40	9.5	15	5.5	Sand	0	0	0	0	0	5	
	60	9.5	12	2.5	Sand	83	67	41	10	10	10	Ulva, kelp
	80	9.5	12	2.5	Sand	0	0	0	0	0	5	
	100	9.5	12	2.5	Sand	0	0	0	0	0	0	
180	0	7.5	17	9.5	Sand	0	0	0	0	0	0	Diatoms
	20	7.5	13	5.5	Sand	0	0	0	0	0	0	
	40	7.5	10	2.5	Sand	60	69	74	25	40	40	Dungeness crab
	60	7.5	10	2.5	Sand	0	0	0	0	0	0	Diatoms on sand
	80	7.5	9	1.5	Sand	28	0	0	10	0	0	Nudibranch
	100	7.5	9	1.5	Sand	0	0	0	0	0	0	
	120	7.5	9	1.5	Sand	0	0	0	0	0	0	C. gracilis
200	-20	9.5	21	11.5	Sand	0	0	0	5	5	5	Ulva
	0	9.5	16	6.5	Sand	0	0	0	5	10	5	Ulva, Dungeness crab (claspings)
	20	9.5	12	2.5	Sand	0	0	0	0	0	1	Ulva
	40	9.5	10	0.5	Sand	44	37	49	0	0	0	1-foot-wide eelgrass
	60	9.5	9	-0.5	Sand	107	105	39	0	0	0	Ulva - edge of bed
	80	9.5	10	0.5	Sand	5	20	25	10	20	20	Ulva
	100	9.5	10	0.5	Sand	0	41	0	0	0	0	

Average within entire study area

22.9 shoots/m²

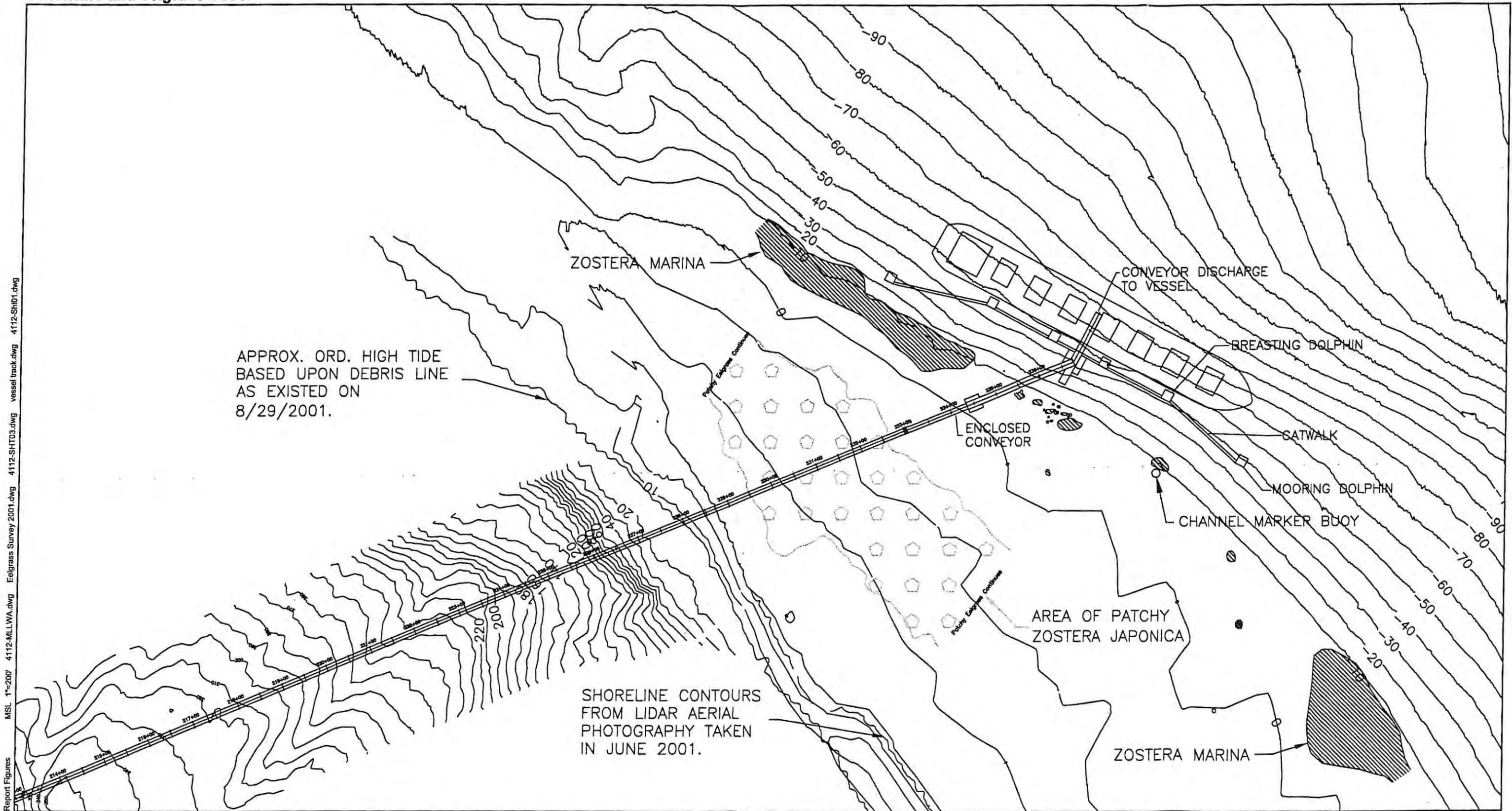
5.4 percent

00007-047eppc_table2.xls



* Shaded data are from the 32 quadrats within 25 feet south and 50 feet north of the Conveyor centerline.

FIGURES

T-ROC CENTRAL CONVEYOR AND PIER
 Thorndyke Beach showing conveyor
 centerline and eelgrass beds.



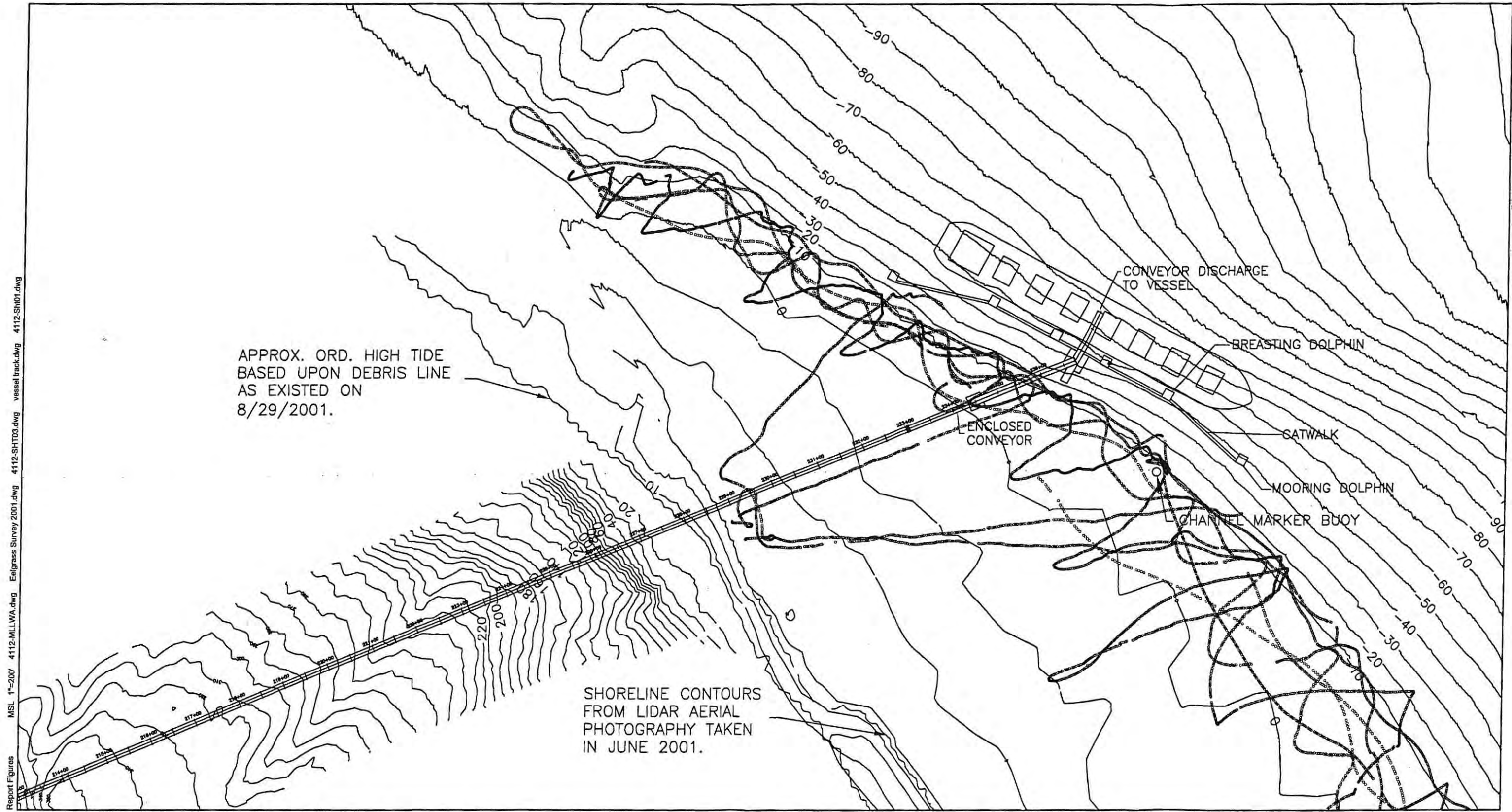
Report Figures
 MSL 1"-200'
 4112-MLLWA.dwg
 Eelgrass Survey 2001.dwg
 4112-SHT03.dwg
 vessel track.dwg
 4112-Sht01.dwg

-  Eelgrass (*Zostera marina*)
-  Patchy Eelgrass (*Zostera japonica*)

Elevations in Mean Lower Low Water (MLLW)



T-ROC CENTRAL CONVEYOR AND PIER
 Video survey vessel track.



Report Figures MSL 1"=200' 4112-MLLWA.dwg Eelgrass Survey 2001.dwg 4112-SHT03.dwg vessel track.dwg 4112-SHT01.dwg

APPROX. ORD. HIGH TIDE
 BASED UPON DEBRIS LINE
 AS EXISTED ON
 8/29/2001.

SHORELINE CONTOURS
 FROM LIDAR AERIAL
 PHOTOGRAPHY TAKEN
 IN JUNE 2001.

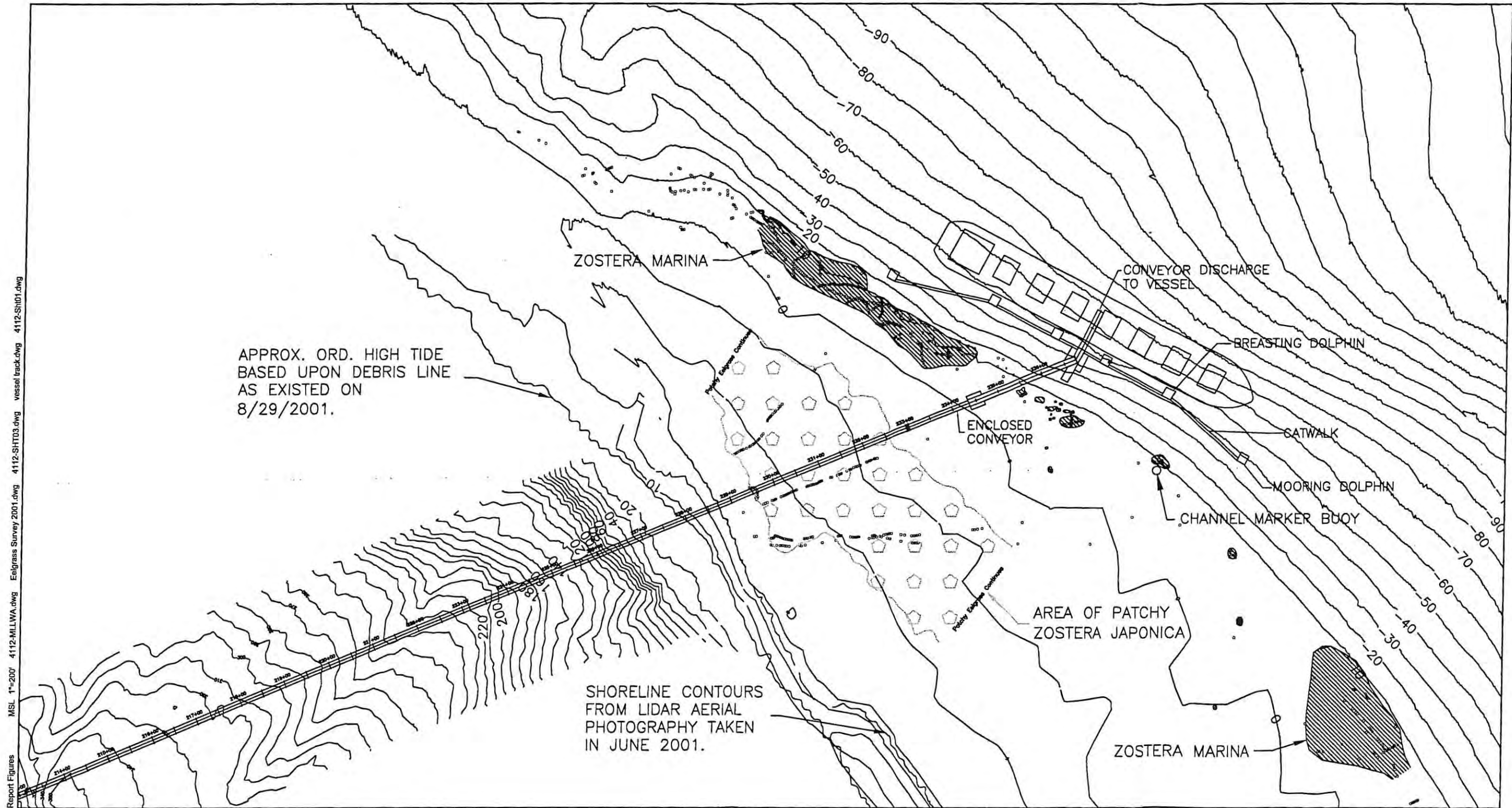
Note: Video survey completed on 8/28/01.

Vessel Track

Elevations in Mean Lower Low Water (MLLW)



T-ROC CENTRAL CONVEYOR AND PIER
 Eelgrass documented in the video survey.



Report Figures MSL 1"=200' 4112-MLLWA.dwg Eelgrass Survey 2001.dwg 4112-SHT03.dwg vessel track.dwg 4112-SHT01.dwg

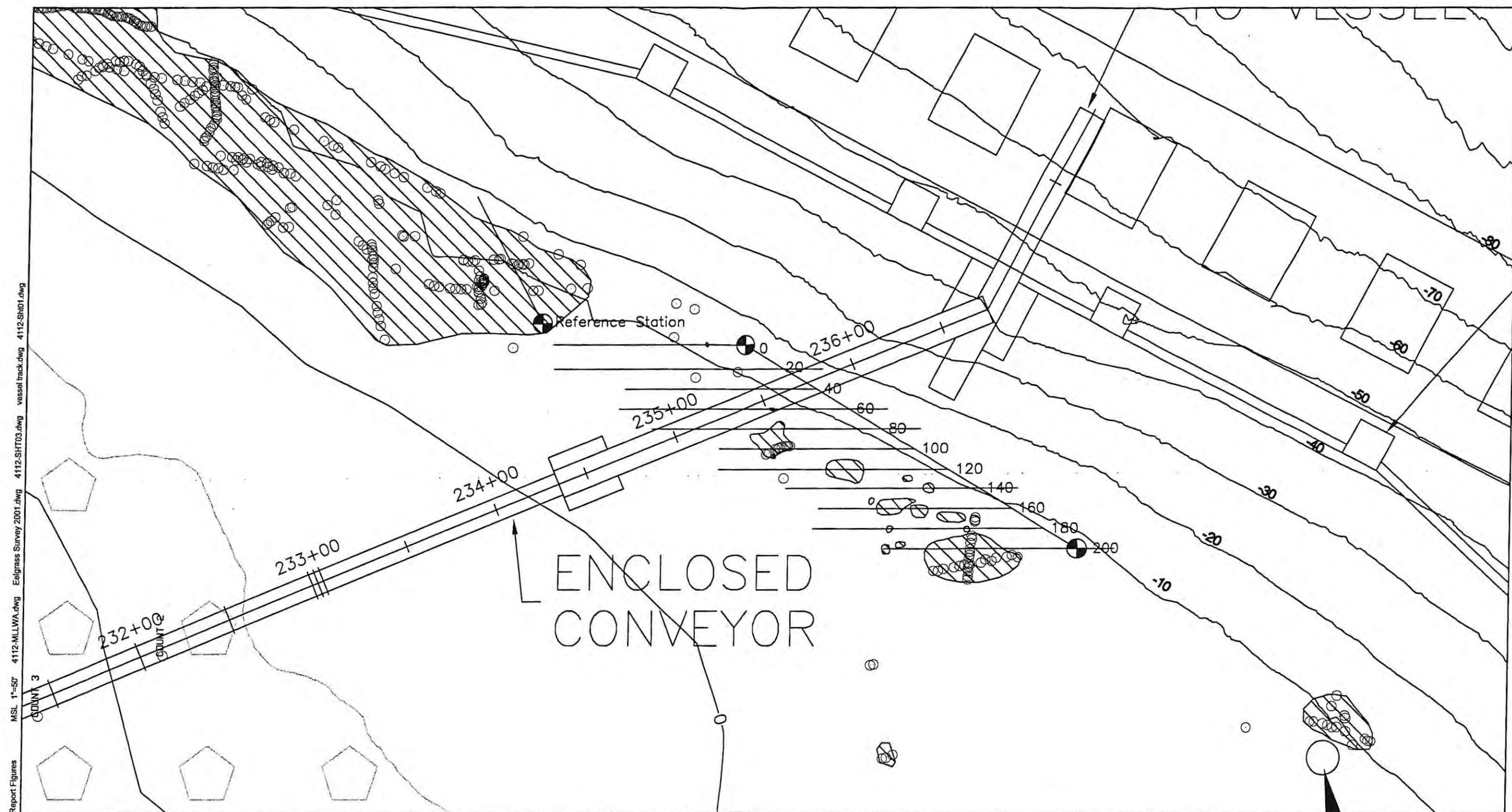
Note: Video survey completed on 8/28/01.

- Eelgrass (*Zostera marina*)
- Patchy Eelgrass (*Zostera japonica*)
- Eelgrass (SeaAll Survey)

Elevations in Mean Lower Low Water (MLLW)



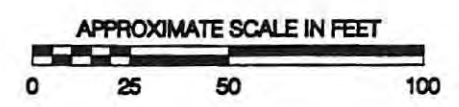
T-ROC CENTRAL CONVEYOR AND PIER
 Diver survey and eelgrass bed detail.



Report Figures
 MSL 1"=50'
 4112-MLLWA.dwg Eelgrass Survey 2001.dwg 4112-SHT03.dwg vessel track.dwg 4112-Sh01.dwg

Note: Diver survey completed on 9/27/01.

- | | | | |
|--|------------------------------------|--|-----------------------|
| | Eelgrass (SeaAll Survey) | | GPS Station |
| | Eelgrass (<i>Zostera marina</i>) | | Diver Survey Transect |



**APPENDIX D
HABITAT MANAGEMENT PLAN
FOR MARINE HABITAT AND BALD EAGLES**

***Thorndyke Resource Operations Complex
Central Conveyor and Pier
Habitat Management Plan
For Marine Habitat and Bald Eagles***

Jefferson County, Washington

***Prepared for
Reid Middleton, Inc.***

***February 28, 2003
12007-47***

***Thorndyke Resource Operations Complex
Central Conveyor and Pier
Habitat Management Plan
For Marine Habitat and Bald Eagles***

Jefferson County, Washington

***Prepared for
Reid Middleton, Inc.
728 – 134th Street SW, Suite 200
Everett, WA 98204***

***February 28, 2003
12007-47***

Prepared by
Pentec Environmental

Jonathan P. Houghton, Ph.D.
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J. Eric Hagen
Fisheries Biologist

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TABLE

D-1 Pile Area Calculations

THORNDYKE RESOURCE OPERATIONS COMPLEX CENTRAL CONVEYOR AND PIER HABITAT MANAGEMENT PLAN FOR MARINE HABITAT AND BALD EAGLES

1.0 INTRODUCTION

This Habitat Management Plan (the plan) addresses the design features of the proposed Thorndyke Resource Operations Complex (T-ROC) Central Conveyor and Pier project to minimize potential impacts to bald eagles (*Haliaeetus leucocephalus*), marine habitat, and resources. In addition, the plan proposes an approach to ensure that compensation is provided for any adverse impacts to important marine resources, especially those comprising habitat for salmonids listed as threatened under the Endangered Species Act (ESA).

2.0 PROJECT DESCRIPTION

The proposed T-ROC Central Conveyor and Pier project will include an approximately 4-mile Conveyor to transport sand and gravel from an upland gravel mining operation (the Shine Pit) in Jefferson County to an offshore loading pier located in Hood Canal approximately 5 miles southwest of the Hood Canal Bridge (Appendix B, Sheet 1). During operation, the Conveyor system will transport up to 3,000 tons of materials per hour to vessels docked at the Pier. Depending on the vessels' sizes, it is anticipated that one to six vessels will be loaded at the facility each day. It is assumed vessels would be loaded up to 300 days a year, up to 24 hours a day.

The main elements of the proposal include the Central Conveyor, which is composed of the Twin Conveyors (approximately 3.3 miles in length) and the Single Conveyor (approximately 0.7 mile), and the Pier (approximately 1,000 feet). The Central Conveyor was designed to avoid impacts to environmentally sensitive areas. According to the technical studies prepared to date (i.e., wetlands and preliminary geotechnical reports), the Twin Conveyors will not impact any existing wetlands or steep slopes. In addition, the entire Conveyor (including the Pier) will be covered or enclosed to minimize the potential for spillage. Best management practices (BMPs) will be implemented during Conveyor operations in both the upland and marine operating areas. These BMPs are designed to minimize the risk of materials spills, including fuel spills and other potential sources of contamination. Refueling of equipment will be conducted off site whenever possible. On-site refueling activities will adhere to strict safety guidelines. An approved spill response plan including details regarding on-site spill containment equipment will be developed prior to Conveyor operations.

Lighting of portions of the Single Conveyor and Pier crossing marine habitats will be kept to a minimum, while still conforming to all applicable safety-related requirements of the regulatory agencies (i.e., U.S. Coast Guard, OSHA, WISHA, etc.). Lighting of the water surface will be minimized with shielding. During nonoperation hours, lights will be turned off, except as needed for maritime safety requirements.

A detailed T-ROC Central Conveyor and Pier project description and fact sheet are provided in Appendix F. Additional information regarding project construction and operation and potential impacts are presented in the main body of the biological evaluation (BE).

2.1 Plan Objectives

The objectives of this plan are as follows:

- To evaluate the nature of the marine and littoral habitat effects of the construction and operation of the proposed Central Conveyor and Pier with emphasis on habitat for bald eagles and salmonids listed or potentially listed as threatened under the ESA.
- To describe monitoring that will be conducted to document any adverse impacts on important species or habitats.
- To describe a preproject enhancement action that will be implemented with approval of project permits (i.e., in advance of project construction). The enhancement will offset a majority of the reasonable worst-case loss of marine habitat (eelgrass) function that might result from the project, should such impacts occur. If no, or lesser, impacts result from project shading, the preproject transplanting would simply provide an overall increase in habitat function in the area.
- To identify habitat enhancement actions that would be implemented to offset documented adverse impacts, should such impacts occur that exceed those mitigated in advance by the preproject enhancement action.

3.0 AVOIDANCE AND MINIMIZATION

The T-ROC Central Conveyor and Pier project is proposed as an alternative that would avoid or minimize the overall impacts of transporting similar quantities of sand and gravel by truck. An environmental impact statement (EIS) will analyze alternative transportation methods and the levels of impact associated with overland movement of different quantities of material.

Several aspects of the Conveyor are designed to avoid or minimize the potential for impacts to bald eagles, which utilize the forests and marine shorelines bordering Hood Canal, and to the nearshore marine environment, which provides critical habitat for ESA-listed salmonids, as well as other resources.

3.1 Marine Habitat

The Pier will terminate in deep water (>30 feet mean lower low water [MLLW]) to avoid impacts to macrovegetation from direct shading or from propeller scour. The Conveyor width will be minimized as it crosses the littoral zone (from ordinary high water [OHW] to –10 feet MLLW) and constructed with maximum use of open girders to reduce the extent of shading. The height of the Conveyor, particularly over the lower intertidal and subtidal areas, will further lessen the shadowing effect. The enclosed belt design will help contain dust, eliminate runoff of turbid water during rainy periods, and minimize the potential for spillage. The undersurface of the Conveyor will be light in color to minimize attenuation of reflected light.

The Conveyor will be supported across the intertidal and subtidal zone (i.e., <30 feet MLLW) with a minimum number of piles (spaced at 100-foot intervals). The footprint will be further minimized by the use of the smallest-diameter piles meeting the design requirements. Piles for the Pier and Conveyor support will be steel to eliminate any potential for hydrocarbon leaching that would result from use of wood piles.

The proposed Conveyor and Pier location was selected to avoid patches of native eelgrass (*Zostera marina*) found below approximately –1 foot MLLW and extending down into the subtidal depths, thus minimizing the overall area of eelgrass that may be affected. However, the Pier cannot be located to totally avoid eelgrass, because of the presence of non-native eelgrass, *Z. japonica*, as discussed below.

3.2 Bald Eagles

The Single Conveyor will pass approximately 0.5 mile south and west of a known bald eagle nesting site, as identified in the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A). Pope Resources previously developed a *Bald Eagle Management Plan* for this nesting site (identified as South Point Bald Eagle Nest #382) in preparation for a clearcut timber harvest on Pope property located immediately north of the Conveyor (Raedeke 1995). Under this previous *Bald Eagle Management Plan*, 24 trees were identified to be retained as current and future

perch and nest trees. Three of these trees are located immediately (25 to 80 feet) north of the proposed Conveyor and will not be disturbed. No other large trees that currently exist within South Point Bald Eagle Territory #382 will be removed for construction of the Conveyor, and only minimal clearing of smaller trees will occur.

4.0 EXISTING CONDITIONS

4.1 *Marine Habitat*

The existing marine intertidal habitat and associated species are described in detail in the *Marine Resources Survey Report* (Appendix C). The upper beach is bordered on the northwest by a steep bluff. A previous slope failure deposited a substantial quantity of sand and silt on the backshore, significantly altering a wetland formed by seep water from sediment layers within the bluff. A variety of plants are found in this riparian zone and along the high-tide drift line.

Below the high-tide line, the beach face is moderately steep and sandy, with lenses of gravel; this beach face extends down to a broad sandflat that begins at about +6 feet MLLW. Both on this upper beach and on the sandflat, low patches of unstable sand give evidence of a net drift from southwest to northeast. The substrate along and below the high-tide line appears potentially suitable for spawning by surf smelt (*Hypomesus pretiosus*) and/or sand lance (*Ammodytes hexapterus*), although no documented spawning by either species occurs within at least one-third to one-half mile southwest of the proposed Central Conveyor and Pier (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A).

Where the lower edge of the beach face transitions to the sandflat, seep water emerges at low tide to create shallow pools of standing water, eventually forming a channel that meanders across the flat. Noteworthy biota on this flat is described in detail in Appendix C.

From about +4 feet MLLW to +1 foot MLLW the sandflat supports scattered and discrete patches of *Z. japonica*. *Z. japonica* is an introduced species known to occur throughout northern Puget Sound, although its distribution has not been well documented (Thom and Hallum 1990). Because it is an annual, it is expected to be highly variable in space and time. This is especially true on beaches such as this one, where the advancing sand waves bury individual patches while new patches form in the wake of each wave. Surveys in 2001 indicated shoots were very dense (approximately 1,100 turions per square meter [m²]) and fertile fronds were present where patches occurred in shallow standing-water ponds. However, in July 2002, the isolated patches of *Z.*

japonica, particularly within the lower tidal range, appeared to be more scattered and generally less dense compared with the previous summer, although no eelgrass shoot counts were made during the latter survey (see Appendix C). In addition, the blades of *Z. japonica* appeared in general to be shorter and narrower than in summer 2001, suggesting there may have been reduced seasonal growth in spring and early summer 2002.

The beach surface is somewhat firmer on the outer portion of the sandflat. Below about +1 foot MLLW, very widely scattered geoduck (*Panope abrupta*) siphons were observed in August 2001. Beginning at about -1.5 feet MLLW and extending down into the subtidal zone (approximately -16 feet MLLW) is a band of patches of native eelgrass (*Z. marina*). In contrast to *Z. japonica*, boundaries of the *Z. marina* patches and densities of *Z. marina* within this band appeared to be relatively unchanged between August/September 2001 and July 2002, although no shoot densities were measured during the latter survey. As reported in both the 2001 and 2002 surveys, eelgrass was generally dense in the patches within this band, and the patches became larger and more continuous to the northeast of the proposed Conveyor centerline. The diver survey in September 2001 indicated most patches were smaller than 20 feet in diameter, with densities ranging from 20 to 428 shoots per m² (mean 189 shoots per m²) in quadrats containing eelgrass (i.e., within the patches shown on Appendix C, Figure C-4).

Z. marina is very sparse within the 75-foot strip from 25 feet southwest of the proposed Conveyor centerline to 50 feet northeast of the centerline (the zone of maximum potential shading). Of the 32 diver-survey observation points within this zone, only three contained any eelgrass at all. Overall density was calculated at 1.75 shoots per m², about 1 percent of the density in eelgrass patches southwest and northeast of the centerline.

No specific sampling of salmon use of the project site has been done; however, large numbers of adult pink salmon were observed in the shallows near the project site during a low-tide visit in August 2001. Several species of juvenile salmon, including threatened Puget Sound chinook salmon (*Oncorhynchus tshawytscha*) and Hood Canal summer-run chum salmon (*O. keta*), migrate past the project site during their spring outmigrations from streams to the south. The middle and lower intertidal sandflats are expected to provide moderate quantities of crustacean prey for juvenile salmonids, with greater abundance of prey produced in patches of eelgrass.

4.2 Bald Eagles

As described above, a bald eagle nest site (South Point Nest #382) exists about 0.5 mile northeast of the proposed Conveyor. Eagles have been observed on and near the site by other consultants working on this project, and foraging in shallow waters along the site and onsite beaches during low tides.

Most of the upland areas along the proposed Conveyor have been logged within the past 10 years and are in early stages of regeneration. Eagles may forage in these disturbed habitats, but level of use is expected to be less than in the marine shoreline areas. As noted above, known and potential perch trees were not cut during that logging, and additional large trees, especially Douglas fir and red alder, remain along the shoreline.

5.0 IMPACT ANALYSIS

5.1 Marine Habitat

Project construction will result in destruction of isolated local areas of marine benthic habitat and species in the footprint of each pile. Short-term disturbance of fish fauna will result from pile driving and work vessel activity during Conveyor construction. Noise levels associated with pile driving and other aspects of the proposed action will be temporarily elevated above existing background noise levels. Feist et al. (1996) investigated the impacts of driving concrete piles on juvenile pink and chum salmon behavior and distribution in Everett Harbor, Washington. The authors reported that there may have been changes in general behavior and school size, and that fish appeared to be driven toward the acoustically isolated side of the site during pile driving. However, the prevalence of fish schools did not change significantly with or without pile driving, and schools were often observed about the pile-driving rigs themselves. No impacts on feeding were reported. The study concluded that any effects of pile-driving noise on juvenile salmonid fitness would be very difficult to measure quantitatively.

More recent experience in Puget Sound and elsewhere, however, has documented more severe effects from use of an impact hammer to drive large-diameter hollow steel piles such as those that will be required for this project. Impact driving of 24-inch steel piles in late 2002 at a ferry terminal in Puget Sound resulted in deaths of a number of pile perch (*Embiotocidae*); similar or larger piles, driven by impact hammer at the Port of Seattle, resulted in kills of Pacific herring (Erstad, P., WDFW, personal communications). However, impact driving of 24-inch piles at the Mukilteo Ferry dock in early 2003 did not result in documented fish kills; a bubble curtain was deployed at Mukilteo and shown to

significantly reduce measured water-borne sound pressures (J. Houghton, Pentec, personal observation).

For the proposed project, all support and batter piles in the marine and shoreline areas will be installed using a vibratory method (site conditions permitting), which produces much lower inwater noise levels than installation using an impact hammer like those that have had documented impacts to fish. Furthermore, the inwater construction activities will occur outside of periods when significant numbers of juvenile salmonids are expected to be present. Thus, no significant noise-related disturbances to salmonids are expected from these construction activities.

Pile driving may have temporary, short-term effects on other federally managed fish species that may occur in the project area, such as starry flounder (*Platichthys stellatus*), English sole (*Pleuronectes vetulus*), or sand sole (*Psettichthys melanostictus*). However, because these species lack swim bladders, no significant short-term, direct impacts to essential fish habitat are anticipated as a result of construction noise.

During project operation, additional short-term disturbance of fish fauna in deeper waters will result from movements of vessels to and from the Pier.

The Conveyor will cast shadows on portions of the adjacent beach and subtidal bottom areas; however, overall impacts (direct and indirect) to eelgrass beds are expected to be very limited. Shadows from the Conveyor and Pier (including vessels) are not expected to reach the large patch of *Z. marina* east of the Conveyor and north and east of the Pier (Appendix B, Sheet C2.3) during major growth periods (spring and summer). However, due to the Conveyor's proximity to patches of *Z. japonica*, some shading of *Z. japonica* is likely to occur. The amount of shading and the amount of eelgrass potentially affected cannot be determined. However, because of the height of the Conveyor, its shadow will move constantly throughout each day, falling on any given area that may contain eelgrass patches for a maximum of an hour or two each day. *Z. japonica* occurs in isolated patches within a 250-foot-wide zone over which the shadow will move. It is conservatively predicted that light availability may fall below thresholds necessary for optimal eelgrass production in a zone of about 30 feet in width (three times the approximate effective diagonal dimension of the enclosed section of the Conveyor, given the south half of the structure will consist of a grated walkway) over the *Z. japonica* band. This is an area of about 7,500 square feet (sf) within which *some reduction* in eelgrass growth *may* occur. This estimate is conservative because production of eelgrass at higher intertidal elevations is limited by desiccation, not by light levels. Thus, it is

probable that there will be no reduction in *Z. japonica* productivity as a result of shadows cast by the Conveyor.

Shading from the two open support platforms and from mooring dolphins will not reach areas of eelgrass (*Z. marina*) during the great majority of the day. The shadow from the northern mooring dolphin and from the outer support tower will reach adjacent eelgrass beds briefly during early morning, when the sun is very low in the eastern sky. Because of the low sun angle, light refraction off the water surface will be great under these circumstances, and the amount of photosynthetically active radiation reaching the bottom (and eelgrass) will likely be below the threshold for photosynthesis with or without the project structures. Thus, the effect on eelgrass is expected to be minimal.

No long-term impact on potential forage fish spawning habitat will result from placement of pilings across the beach. The pilings will occupy approximately 734 sf of marine benthic habitat at depths between about +6 feet and -64 feet MLLW (Table D-1). The great majority of this area (about 613 sf) would be below depths of -30 feet MLLW. To offset this loss, a substantially greater area of hard surface will be provided for attachment of epibenthic plants and animals that will greatly exceed the lost benthic primary and secondary productivity. A total of over 11,000 sf of epibenthic surface area will be created at depths between +6 feet and -10 feet MLLW (Table D-1). Plants and animals colonizing this surface area will contribute to the primary and secondary productivity of the water column passing the site. The shells of barnacles and mussels sloughed from the pilings would support a suite of organisms that is different from that now present in the predominantly sandy substrate of the project site.

The overwater portion of the Conveyor will be fully enclosed out to the Pier. However, some sand and gravel could be spilled at the discharge point. If any spillage occurred over the beach due to an unanticipated catastrophic system failure, it will simply add sand and gravel to a sand-and-gravel beach. Any effects will be minimal, localized, and quickly dispersed by wave action. In deeper water (e.g., deeper than -30 feet MLLW), any small amount of sand and gravel that may spill at the transfer point could alter the nature of the benthic fauna and epibiota in localized areas to favor an assemblage adapted to a coarser substratum. Rates of accumulation will not be great enough to adversely affect larger infauna, such as geoducks (e.g., Westley et al. 1975).

5.2 Bald Eagles

Construction activities may result in short-term avoidance by bald eagles of the immediate project vicinity. Bald eagle breeding and nesting activity is not expected to be affected due to the distance from the Conveyor and Pier to

known nesting territories identified by the WDFW PHS Database (Guggenmos, L., WDFW, personal communication, February 12, 2003; Appendix A). Increased noise levels may temporarily disrupt foraging behavior of bald eagles in the vicinity of the project area. The Washington State Department of Transportation (WSDOT) conducted monitoring studies to determine the potential impacts on wintering eagles associated with pile-driving activities at Orcas and Shaw islands in San Juan County, Washington, from December 15, 1986, through March 15, 1987 (Bottorff et al. 1987). Each of the monitoring areas was associated with a Washington State ferry terminal. Background noise sources included ferry whistles, boat motors, chain saws, aircraft, front-end loaders, cranes, generators, diesel trucks, hammers, and other general noise sources associated with construction. Noise readings were taken at the construction sites and various intermediate points out to about 6,000 feet from the construction sites.

Driving wood piles did not visibly disturb the eagles observed during the course of the study. A steel pile, which produces some of the loudest noises during pile-driving activities, may have disturbed a bald eagle at a distance of 4,000 feet. However, this same pair of eagles had been in the same location during the driving of two steel piles earlier in the day and exhibited no visible disturbance reaction. Even after more than 100 wood piles were driven (Bottorff et al. 1987), the eagle pair returned to their preferred perch with no further adverse reactions observed. Environmental factors such as wind and wave action, movement of tree branches and forest litter, barking dogs, bird noises, automobiles, airplanes, human voices, woodcutting, light construction activities, boats, and other unidentified noise sources create ambient noise levels similar to those produced by pile driving at distances of 0.25 to 0.5 mile away from the point source (Bottorff et al. 1987).

WSDOT also monitored noise levels during pile-driving activities at their Anacortes facility (Visconty, S., Washington State Ferries, personal communication, March 9, 2000). For comparison purposes, background noise levels were monitored at the Friday Harbor terminal. At the Friday Harbor terminal, ambient noise levels around the closest bald eagle nest (located near the terminal) ranged between 45 and 72 decibels (dB), 40 to 51 dB for local harbor traffic noise, and 69 to 74 dB from use of a 100-ton crane at the terminal.

Pile-driving noise at the Anacortes ferry facility ranged from 105 to 115 dB at 15 m (50 feet) from the noise source. Noise levels were highest when a pile was first driven and decreased near completion because of a reduction of exposed surface area and increased stiffness as the pile became more embedded (Visconty, S., Washington State Ferries, personal communication, March 9, 2000). Simultaneous readings taken at several distances to determine

propagation loss at Anacortes indicated a 6-dB decrease in sound pressure for every doubling of distance. Given this information, at 560 m (1,850 feet) from the noise source at Anacortes, the sound was 70 dB, well within measured background ambient noise levels recorded at the Friday Harbor terminal (Visconty, S., Washington State Ferries, personal communication, March 3, 2000).

Again, the previously cited study included the use of an impact hammer to install piles. Because the proposed project will use a vibratory method (again, site conditions permitting), the increased ambient noise levels generated during construction activities will be lower, and therefore less likely to temporarily disturb bald eagles and marbled murrelets in the vicinity of the project area. Therefore, no significant short-term direct effects due to construction disturbances are anticipated for bald eagles.

Operation of the Conveyor is not expected to greatly affect bald eagles, which have been shown to adapt to relatively constant levels of noise and disturbance in urban areas. However, eagles may avoid foraging in the immediate vicinity of the Conveyor, or along the lower beach while vessels are moored at the Pier.

6.0 PROJECT AREA ENHANCEMENT

As noted above, some minimal reduction in *Z. japonica* productivity could occur in areas that receive repeated shading from the Conveyor. Given the expected variability in space and time of eelgrass on the site, this hypothesized reduction in productivity is not expected to be reasonably measurable. However, to ensure that no temporal loss of eelgrass productivity occurs, the Applicant proposes to conduct an eelgrass transplant in advance of incurring project impacts. This transplant will be conducted in the first spring following the issuance of project permits.

Two transplant areas will be identified during the preconstruction baseline survey, one for *Z. japonica* and one for *Z. marina*. Transplant areas will be within the appropriate depth range for each species of eelgrass in this area and will have the proper substrate for eelgrass (medium to fine sand), but will lack existing eelgrass beds. The donor sites will also be identified during the preconstruction baseline survey as areas with healthy and reasonably dense populations of eelgrass, at a depth similar to that at the respective transplant sites, and away from the area of potential project impact.

Biologists will harvest eelgrass shoots from the donor beds using a spading fork. Care will be taken to avoid damage to surrounding unharvested shoots and rhizomes. To avoid inducing erosion damage, harvest will avoid the edges of

existing beds. A maximum of 10 to 20 percent of the shoots in the donor beds will be harvested. Experience has shown that remaining eelgrass plants quickly fill in the spaces left in the bed by harvesting, such that harvested areas are not identifiable after 1 year (Houghton, J., Pentec, personal observation).

Harvested shoots and associated rhizomes will be bundled into groups of three shoots and loosely tied with degradable twine. Blades will be clipped to a uniform length of about 9 inches. A Z-shaped ungalvanized wire, about 6 inches long, will be slipped inside the twine to serve as an anchor. Each three-shoot bundle is considered to be a planting unit (PU). All plant processing will be conducted with minimal exposure time, and plants will be stored only in a seawater bath.

PUs will be inserted into the sediment with the aid of a trowel. Using this technique, PU survival of 40 to 100 percent has been achieved in two recent transplants (Pentec, unpublished data). In one of these transplants, expansion and spreading of surviving PUs increased overall shoot density 100 times over the initial planting density within 2 years.

PUs will be transplanted using approximately a 0.5-m (1.64-foot) grid spacing over a cumulative area of approximately 232m² (2,500 sf; 117m² [1,250 sf] for each species). This area was selected to represent 33 percent of the area (697 m² or 7,500 sf) over which the impact analysis suggests that some reduction in eelgrass productivity could occur. Should this reduced productivity actually occur, the enhancement transplant will have concurrently replaced some or all of the lost productivity.

7.0 MONITORING OF PROJECT IMPACTS

This section describes a detailed eelgrass-monitoring program that will quantify the baseline eelgrass distribution and density on both sides of the Conveyor before construction begins. Monitoring following construction and during the early stages of operation will define actual losses of eelgrass attributable to the project, as well as the success of the preconstruction eelgrass enhancement project. Compensatory mitigation is then described that will offset any losses due to the project that exceed the gains provided by the preconstruction mitigation.

Monitoring will be stratified by species to cover both the areas of *Z. japonica* and *Z. marina* distribution. All sampling will be done between June 1 and September 30 in each sampling year.

7.1 Baseline Monitoring

A detailed video mapping of subtidal eelgrass distribution in the project vicinity was conducted in the summer of 2001 and will be repeated in the summer preceding construction. The subtidal *Z. marina* stratum will be surveyed with the Pentec **Sea-All**™ video mapping system, providing a concurrent differential global positioning system (DGPS) georeferencing of resource distributions. The intertidal *Z. japonica* stratum will be mapped during low tides using a hand-held GPS. Both surveys will be tightly controlled to provide accurate positioning in relation to project structures and local bathymetry. Intensive mapping will be conducted in the subareas identified below. Monitoring will extend farther to the northeast, since that is the anticipated direction of any shading effects from the project and because the net sediment transport pathways are to the northeast. This design will maximize the potential for detection of any influence on eelgrass from any project changes in on longshore transport. An additional area, still farther to the northeast of the Conveyor, will be surveyed to locate a suitable reference site for quantitative sampling and areas where eelgrass beds could be expanded for the preproject enhancement, or, if compensation is needed, for project-related effects on eelgrass.

Eight subareas will be defined for quantitative monitoring of project effects on eelgrass and macrovegetation. Four of these will lie adjacent to the Conveyor as follows:

- *Z. japonica*-southwest (JS)—a rectangular area extending across the *Z. japonica* stratum on the southwest side of the Conveyor. Area JS will extend 30 feet southwest of the western edge of the Conveyor, thus representing approximately 7,500 sf (30 by 250 feet, assuming the stratum with eelgrass patches is 250 feet wide at this point).
- *Z. japonica*-northeast (JN)—a rectangular area extending across the *Z. japonica* band on the northeast side of the Conveyor. Area JN will extend 50 feet north from the western edge of the Conveyor, including the area directly under the Conveyor, thus representing approximately 12,500 sf (assuming the stratum with eelgrass patches is 250 feet wide at this point).
- *Z. marina*-southwest (MS)—an irregular area encompassing the scattered patches of *Z. marina* on the west side of the Conveyor. Area MS will follow the -1- and -10-foot contours southwest from the western edge of the Conveyor for approximately 150 feet. It will represent an area of approximately 7,500 sf (50 by 150 feet, assuming the *Z. marina* stratum is 50 feet wide in this area).

- *Z. marina*-northeast (MN)—an irregular area encompassing more or less continuous patches of *Z. marina* on the east side of the Conveyor. Area MN will follow the -1- and -10-foot contours northeast from the western edge of the Conveyor for approximately 400 feet.

Two subareas will be *Z. japonica* and *Z. marina* reference areas (JR and MR, respectively) located in the same strata at least 400 feet northeast of the Conveyor. Exact location of the reference areas will be determined by the baseline video mapping. Each of these areas will be 50 sf, selected to encompass eelgrass beds comparable to those in the potentially shaded areas nearer the Conveyor.

The final two subareas relate to the preconstruction eelgrass enhancement action and include the *Z. japonica* and *Z. marina* transplant sites (JT and MT, respectively). These locations will be identified following the preconstruction survey, shown on maps to be prepared and submitted to cognizant agencies prior to construction.

Video and visual mapping described above will be used to identify changes in the distribution and total coverage area of the two species of eelgrass in the project area. Quantitative monitoring (quadrat counts) will be used to document any changes in density of eelgrass within the mapped patches. Within each subarea, 25 randomly located replicate sample points will be established and permanently marked to allow relocation. During one or more surveys, it is expected that some of these points will fall in areas not supporting eelgrass. Where eelgrass is present, counts of shoot density will be made in accordance with WDFW protocols, which call for three 0.25-m² counts oriented 60 degrees apart at each sample point. Because of the high density of eelgrass within these patches (exceeding 1,000 shoots/m²), subsampling with smaller quadrats may be used, where appropriate. Macroalgal cover will also be estimated. The mean of the three counts or cover estimates at each point will be used in statistical testing.

7.2 Postconstruction Monitoring

Postconstruction monitoring will be conducted in the first summer season following construction and will consist of mapping and quantification identical to those described above for the baseline survey.

Maps of the eelgrass distribution from pre- and postconstruction surveys will be compared to determine qualitatively if the degree of change in eelgrass distribution and boundaries at the Pier exceeds that at the reference subareas.

The proposed quantitative sampling design will allow statistical testing of several null hypotheses of the following forms:

- H_o1 There is no difference between eelgrass density (shoots/m²) northeast and southwest of the Pier within each stratum, tested pre- and postconstruction.
- H_o2 There is no change in density (shoots/m²) of eelgrass in any subarea from pre- to postconstruction (e.g., test subarea MN preconstruction vs. MN postconstruction).
- H_o3 There is no difference in density (shoots/m²) of eelgrass in either stratum from the east to the west side of the Conveyor (e.g., test subarea MN postconstruction vs. MS postconstruction).

All statistical testing will be stratified within the same depth stratum. If there is a significant preconstruction difference between the densities of eelgrass in the upper or lower stratum at the Pier and densities in the same stratum at the reference site, the ratio of density at the reference to that at the Conveyor site will be used to adjust densities determined in postconstruction monitoring before making tests for significant project impacts.

Operational monitoring will be conducted in the summer of years 1, 3, and 5 of project operation to determine if any reduction in eelgrass densities has occurred as a result of the project, and to assess the extent of any sand and gravel spillage that has occurred.

7.3 Enhancement and Mitigation Site Monitoring

The success of the eelgrass transplant will be qualitatively examined by comparison of the total number of shoots (density times area) of eelgrass in the transplanted area with the number of shoots of eelgrass transplanted (number per PU times number of PUs) to obtain percent survival of the transplant. Number of shoots in the transplanted area will also be compared against any loss of eelgrass shown to have occurred in the project operational monitoring.

The eelgrass transplant site will be monitored as described for the preconstruction monitoring to determine the total bed area and the density and number of eelgrass shoots provided.

8.0 COMPENSATORY MITIGATION

An intensive monitoring program has been described above to assess the degree to which the project actually impacts eelgrass. Compensatory mitigation in the form of replacement of area and numbers of eelgrass shoots will be required if the monitoring program demonstrates that a loss has occurred that exceeds the gains provided by the preconstruction transplant. A loss will be considered to have occurred if one or more of the following conditions is met:

- If postconstruction monitoring shows that eelgrass standing crop (density times area) at the upper or lower strata at the project site (subareas JN and JS or MN and MS) has declined significantly in relation to the upper or lower strata at the reference site (subareas JR or MR), and if those declines exceed increases in standing crop (density times area) at the transplant site.
- If operational mapping shows that the areas of eelgrass within northeastern (partially shaded) subareas at the project site have declined but no similar magnitude of decline has occurred at the southwestern (unshaded) subareas at the project site or at the reference subarea within the same stratum, and if such decline exceeds the increased bed area provided at the transplant site.
- If operational monitoring shows that eelgrass standing crop (density times area) at the upper or lower strata northeast of the Pier (subareas JN or MN) has declined significantly in relation to the upper or lower strata southwest of the Pier (subareas JS or MS), and if those declines exceed increases in standing crop (density times area) at the transplant site.

If any of these conditions are met (i.e., if the extent of loss [shoot density times area] exceeds any gains provided by the preconstruction transplant), compensatory mitigation will be required. Final selection of the mitigation action(s) will be made by mutual agreement between the Applicant and WDFW, the U.S. Army Corps of Engineers, NOAA Fisheries, and the U.S. Fish and Wildlife Service. The most probable mitigation action is likely to be additional transplanting of eelgrass from existing beds into areas within or adjacent to existing beds that currently lack eelgrass. The preconstruction survey will be used to identify such areas that may be suitable for additional eelgrass establishment in the event that mitigation is required. These locations will be displayed on maps to be prepared and submitted to cognizant agencies for review before transplanting begins.

The amount of mitigation required will be based on the degree of impact shown by the postconstruction or operational monitoring. Because mitigation for any effects that exceed the preproject enhancement will not occur in advance of the

impact, the amount of mitigation required will be two times the amount of loss. Also, the size of the mitigation area may be increased by an additional factor to account for the fact that eelgrass transplanting may not be 100 percent effective. Final consideration of appropriate mitigation actions will be based on the experience gained from the proposed preconstruction eelgrass transplant.

9.0 HABITAT MITIGATION/ENHANCEMENT OPPORTUNITIES

As noted above, the need for and the amount of mitigation required will be determined by the monitoring program and the extent of documented impacts, and on the success of the preconstruction transplant. Also, the nature of compensatory mitigation actions will depend on the opportunities available. One of the objectives of the preconstruction survey will be to identify areas near the Conveyor site where eelgrass transplanting could be expected to be successful. Specifically, areas where eelgrass is not present within the depth ranges known to support each eelgrass species in the area will be identified. Factors limiting eelgrass in these areas also will be identified, if possible, so that the probability of achieving a successful transplant can be evaluated. A total area of up to 3,000 sf where successful eelgrass transplanting could be accomplished will be sought in each species stratum, and approximately 1,250 sf of this area will be used in the preconstruction enhancement transplants.

Additional eelgrass transplanting, if required for mitigation, will be accomplished in a manner similar to the preconstruction transplant, modified, as needed, to reflect the current state knowledge of factors contributing to the success of such transplants. Typical planting will be in a 0.5-m (1.64-foot)-grid pattern, but higher densities may be used if deemed more appropriate for meeting the mitigation objectives.

10.0 OBJECTIVES/PERFORMANCE STANDARDS

The overall objective of the habitat management plan is to avoid a net long-term loss of eelgrass density and area in the project vicinity. The primary means by which this objective will be met is that advanced enhancement will be provided that is expected to exceed project related losses. Subsequent compensation will be provided for any areas in the project vicinity with documented losses of eelgrass that exceed the amount provided by the advanced enhancement. This compensation will be provided by transplanting eelgrass to areas where it does not currently exist.

An additional performance standard is that any short-term loss that is documented (e.g., due to project shading) be compensated by a 200 percent replacement.

11.0 CONTINGENCY PLANS AND BONDING

If areas exist where off-site transplanting as mitigation for project losses do not meet the performance criteria stated above, additional transplantings will be accomplished in additional areas identified by the Applicant and approved by WDFW. Alternatively, a similar level of effort/cost will be expended by the Applicant to accomplish another type of mitigation action, approved by WDFW, which will provide similar benefits to the resources impacted by the project.

The Applicant will establish a \$25,000 performance bond to be surrendered to WDFW in the event that the Applicant fails to meet the performance criteria described above or to take the contingency efforts described in this section. Upon surrender of this bond, the Applicant is released from all obligations under the mitigation plan described above.

12.0 REFERENCES

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TABLE

Table D-1 - Pile Area Calculations

Pile Type	Diameter (ft)	Number of Structures	Piles per Structure	Benthic Area (sf)		Assumed Ave. Depth (ft)	Epibenthic Area (sf)	
				Per Pile	Total		Per Wetted Foot of Pile	Total area (+6 to -10 ft)
Truss supports	1.5	7*	4	1.8	42.4	+3 ft	1.8	127.2
Catwalk supports	1.5	12	3	1.8	63.6	-40 ft	1.8	1,017.4
Support structures	2.5	2	16	4.9	157.0	-20 ft	4.9	2,512.0
Dolphins	2.5	8	12	4.9	471.0	-40 ft	4.9	7,536.0
Total					734.0			11,192.5
Ratio of littoral zone epibenthic area gained to infaunal area lost								15.2

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*Six truss supports below OHW

APPENDIX E
ASSESSMENT OF ESSENTIAL FISH HABITAT
FOR THE THORNDYKE RESOURCE OPERATIONS COMPLEX
CENTRAL CONVEYOR AND PIER

ASSESSMENT OF ESSENTIAL FISH HABITAT FOR THE THORNDYKE RESOURCE OPERATIONS COMPLEX CENTRAL CONVEYOR AND PIER

ACTION AGENCY

U.S. Army Corps of Engineers, Seattle District

LOCATION

The project is located off the northwest shore of Hood Canal, approximately 5 miles southwest of the Hood Canal Bridge, Jefferson County, Washington.

PROJECT NAME

Thorndyke Resource Operations Complex (T-ROC) Central Conveyor and Pier

ESSENTIAL FISH HABITAT BACKGROUND

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with the National Marine Fisheries Service (now NOAA Fisheries) on activities that may adversely affect essential fish habitat (EFH). EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. "Waters" include aquatic areas—and their associated physical, chemical, and biological properties—that are used by fish, and may include aquatic areas historically used by fish, where appropriate. "Substrates" include sediment, hard bottom, structures underlying the waters, and associated biological communities (NMFS 1999).

The objective of this EFH assessment is to determine whether or not the proposed action "may adversely affect" designated essential fish habitat for relevant federally managed commercial fisheries species within the proposed action area. It also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

IDENTIFICATION OF EFH

Groundfish, coastal pelagic, and salmonid fish species that have designated essential fish habitat in Puget Sound are listed in Table E-1. Some or all of these species may occur in the project area. Refer to the relevant EFH designations

(Casillas et al. 1998; PFMC 1998a, 1998b, 1999) for life history stages of species that may occur in the project vicinity. Assessment of the impacts to these species' EFH from the proposed project is based on this information.

DESCRIPTION OF THE PROPOSED PROJECT

The Applicant proposes to construct and operate a Conveyor to transport sand and gravel from an existing sand and gravel site (the Shine Pit) located in Jefferson County on land owned by Pope Resources, a Delaware Limited Liability Company, and leased by the Applicant. As an alternative to using trucks, sand and gravel will be transported via an approximately 4-mile Conveyor to a 1,000-foot-long Pier on the northwest shore of Hood Canal, approximately 5 miles southwest of the Hood Canal Bridge. Transported sand and gravel will be used for both environmental mitigation projects (specifically, beach restoration) and in the construction industry.

A detailed T-ROC Central Conveyor and Pier project description and fact sheet are provided in Appendix F. The project elements of importance to this assessment of EFH include the Single Conveyor and the Pier. Engineering drawings (project plans and profiles) for those elements are provided in Appendix B.

POTENTIAL ADVERSE EFFECTS OF PROPOSED PROJECT

The T-ROC Central Conveyor and Pier project may adversely affect EFH for groundfish, coastal pelagic, and salmonid species by altering intertidal and subtidal habitat through construction activities. Turbidity may be temporarily increased above background levels within the immediate vicinity of construction activities (e.g., work barge operations and pile driving). Minor increases in turbidity could also result from propeller wash from tugboats conveying vessels to and from the Pier, and any small spills of sand and gravel into Hood Canal during its transfer onto the vessels. However, turbidity increases resulting from these actions would be transient, and highly localized, and would not be expected to yield acute or chronic exceedances of state turbidity criteria.

Grounding of work barges during construction of the overwater portions of the conveyor will disrupt surface sediments and possibly Japanese eelgrass beds (*Zostera japonica*). This may result in a short-term compression of beach sediments, potentially altering the nature of benthic biota that succeed in these localized areas. This grounding is expected to occur above the elevation of the band of patchy Japanese eelgrass in an area with little macro-infauna. However, barges will likely drop spuds to hold position while working in a given area.

There is a probability that some of these spuds will drop on patches of Japanese eelgrass.

Pile placement would eliminate nonmobile benthic and epibenthic food sources within the footprint of each pile, although the amount of littoral zone epibenthic area would increase (see Appendix D, Table D-1).

The presence of the Pier will shade portions of the adjacent beach and subtidal bottom areas, including a band of patchy Japanese eelgrass between approximately +4 feet and +1 foot mean lower low water (MLLW). This shading may result in reduced eelgrass productivity over an area totaling 7,500 square feet (sf), or about 0.17 acre. A decrease in eelgrass productivity would reduce the eelgrass blade area available to support epiphytic zooplankton (an important food source for juvenile chinook salmon) and could reduce areas of refuge among the eelgrass blades for chinook and other small fish.

Spillage of fuels during construction activities and operation of the Conveyor is possible. However, the quantity released from such an event would be limited to that contained within the vessel, as no fueling of vessels would occur on site. Potential impacts to water quality from small spills or leaks are possible, but the impacts are unlikely to be long-term.

Tugboats and larger vessels calling at the Pier may release gray water within the confines of Hood Canal. However, quantities released will be limited, intermittent in time, and varied in location. Plumes of gray water are expected to disperse quickly in the substantial currents present in this portion of the canal. No short-term acute or chronic effects on biota are likely.

The project actions described above have the potential to adversely affect the EFH of managed species, but these effects are expected to be very localized, and not to reduce the overall value of the EFH to these managed species.

CONSERVATION MEASURES

The T-ROC Central Conveyor and Pier are proposed as an alternative to avoid or minimize the overall impacts of transporting similar quantities of sand and gravel by truck.

In addition to anticipated project construction windows, the proposed Central Conveyor and Pier were designed to avoid or minimize impacts to the area of the EFH managed fish species that may occur in the area. Potential adverse effects of the proposed project would be avoided and minimized through

implementation of the conservation measures specified in the BE (see Section 6.0 and Appendix D) as follows:

Timing Window—A primary factor in reducing the risk of impact to juvenile salmonids is the restriction of inwater construction to periods when few juveniles will be present in the work area. Construction of the Pier will be limited to the approved work window for this area, which is expected to be July 16 to February 15.

Best Management Practices—BMPs will be implemented to control stormwater, fuel spills, release of debris, and introduction of non-indigenous species.

Design Features—Alignment and location of the Pier were carefully chosen to avoid impacts to riparian marsh areas and to native eelgrass *Z. marina*; however, it was unavoidable that the near-continuous band of non-native *Z. japonica* must be crossed. The Pier will be constructed largely of open steel girders to minimize shading effects on this species. Height above water and narrowness of the structure will also minimize the potential for shading effects, which are considered to be unlikely. In addition, overwater portions of the conveyor will be enclosed to minimize the potential for spillage of sand and gravel.

However, these timing windows, BMPs, and design features cannot fully eliminate the potential for adverse impacts to the EFH of these managed species. To address these unavoidable impacts (e.g., possible reduced productivity in eelgrass habitat that must be crossed by the Conveyor), a Habitat Management Plan for Marine Habitat and Bald Eagles was developed (Appendix D). The plan provides for advanced mitigation in the form of establishment of an area of eelgrass habitat in the action area that is equal to the predicted area that may experience reduced eelgrass productivity. The eelgrass transplant would be conducted in the first spring following issuance of project permits. The plan also proposes a monitoring program to document any reduced productivity that does occur and to ensure that any adverse impacts to important marine resources, especially those comprising habitat for threatened salmonids, will be appropriately compensated.

CONCLUSION

As described above, the proposed activities may result in localized adverse impacts to certain EFH parameters. Therefore, we conclude that the proposed project may adversely affect designated groundfish, coastal pelagic, and salmonid EFH. However, we anticipate that implementation of the above-listed conservation measures and other considerations outlined previously will avoid,

minimize, or otherwise offset potential adverse effects to EFH in the proposed action area.

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PFMC (Pacific Fishery Management Council), 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon (August 1999). PFMC, Portland, Oregon.

Table E-1 - Species of Fish with Designated EFH in the Project Area

Groundfish Species

spiny dogfish, *Squalus acanthias*
big skate, *Raja binoculata*
California skate, *R. inornata*
longnose skate, *R. rhina*
spotted ratfish, *Hydrolagus colliei*
Pacific cod, *Gadus macrocephalus*
Pacific hake, *Merluccius productus*
black rockfish, *Sebastes melanops*
bocaccio, *S. paucispinis*
brown rockfish, *S. auriculatus*
canary rockfish, *S. pinniger*
China rockfish, *S. nebulosus*
copper rockfish, *S. caurinus*
darkblotched rockfish, *S. crameri*
greenstriped rockfish, *S. elongatus*
Pacific ocean perch, *S. alutus*
quillback rockfish, *S. maliger*
redbanded rockfish, *S. babcocki*
redstripe rockfish, *S. proriger*
rosethorn rockfish, *S. helvomaculatus*
rosy rockfish, *S. rosaceus*
rougheyed rockfish, *S. aleutianus*
sharpchin rockfish, *S. zacentrus*
splitnose rockfish, *S. diploproa*
stripetail rockfish, *S. saxicola*
tiger rockfish, *S. nigrocinctus*
vermillion rockfish, *S. miniatus*
yelloweye rockfish, *S. ruberrimus*
yellowtail rockfish, *S. flavidus*

shortspine thornyhead, *Sebastolobus alascanus*
cabezon, *Scorpaenichthys marmoratus*
lingcod, *Ophiodon elongatus*
kelp greenling, *Hexagrammos decagrammus*
sablefish, *Anoplopoma fimbria*
jack mackerel, *Trachurus symmetricus*
Pacific sanddab, *Citharichthys sordidus*
butter sole, *Pleuronectes isolepis*
curlfin sole, *Pleuronichthys decurrens*
Dover sole, *Microstomus pacificus*
English sole, *Pleuronectes vetulus*
flathead sole, *Hippoglossoides elassodon*
petrale sole, *Eopsetta jordani*
rex sole, *Errex zachirus*
rock sole, *Pleuronectes bilineata*
sand sole, *Psettichthys melanostictus*
starry flounder, *Platichthys stellatus*
arrowtooth flounder, *Atheresthes stomias*

Coastal Pelagic Species

northern anchovy, *Engraulis mordax*
Pacific sardine, *Sardinops sagax*
chub mackerel, *Scomber japonicus*
market squid, *Loligo opalescens*

Salmonid Species

chinook salmon, *Oncorhynchus tshawytscha*
coho salmon, *O. kisutch*
Puget Sound pink salmon, *O. gorbuscha*

**APPENDIX F
CENTRAL CONVEYOR AND PIER PROJECT
DESCRIPTION AND FACT SHEETS**

Project Description

Jan. 31, 2003

Purpose

This application is for a permit to build a Central Conveyor and Pier to move sand and gravel from the T-ROC Operations Hub to Hood Canal for marine transport by barges and ships.

Introduction

Fred Hill Materials, Inc. (FHM) conducts its primary sand and gravel mining and processing operations in Jefferson County at the existing Shine Pit, which is the Operations Hub for the Thorndyke Resource Operations Complex (T-ROC). T-ROC encompasses both existing and proposed expanded operations in and around the Shine Pit.

FHM has undertaken a planning and development process to identify and then pursue its business objectives into the mid-21st century. As a result of this planning process, including analysis of the geologic resources and critical environmental areas within the Thorndyke Management Area (Thorndyke Block), FHM has established a series of proposals, which, if approved, would result in:

- Continued growth of existing activities (Shine Pit), including opening of new extraction areas approximately one mile west and south of the Shine Pit (Wahl and Meridian)
- Development of a marine transportation system for the delivery of sand and gravel (Central Conveyor and Pier)

General Location

T-ROC is located within the approximately 21,000-acre Thorndyke Block, which is a portion of the Pope Resources 72,000-acre Hood Canal Tree Farm. The Thorndyke Block is located in Jefferson County on the Toandos Peninsula, which is south and west of the Hood Canal Bridge. The area is locally known as the Upper Coyle Peninsula.

General Description of Central Conveyor and Pier

The proposed four-mile Central Conveyor originates at the southwest corner of the Shine Pit, travels south through the Thorndyke Block (within an approximately 34-acre easement), bridges over Thorndyke Road (just south of mile post 3), crosses a 14.7-acre parcel of waterfront property (owned by Hood Canal Sand and Gravel, LLC) and terminates at the end of the proposed 1,000-foot Pier on Hood Canal.

Hood Canal Sand and Gravel's waterfront property, from which the Pier will originate, is approximately five miles southwest of the Hood Canal Bridge, one mile northeast of Thorndyke Bay, and 1.25 miles southwest of South Point.

The Central Conveyor's route was specifically selected to avoid and/or minimize impacts to environmentally sensitive areas (steep slopes, wetlands, streams, and their associated buffers). An Environmental Impact Statement (EIS) is being prepared and when completed will accompany and be incorporated into this Central Conveyor and Pier Application and applications for other proposals identified herein.

The Pier is designed for ships and barges of various sizes and displacements to transport sand and gravel. Only ships will require opening of the Hood Canal Bridge. Only U.S. flagged ships will call at the Pier. At this time, the particular ships required for transport of sand and gravel at the proposed Pier are not available on the West Coast. It is anticipated that these ships will become available in approximately eight to 12 years after the Pier's construction and will be used subject to market demand.

Proposed Pier Operations

Initially, only barges will call at the Pier. Typical barge capacity is 5,000 dead-weight U.S. short tons (dwt).

In Year 1 of Pier operations, it is anticipated that the volume of sand and gravel transported by barge will be 2 million U.S. short tons (tons).

By Year 10, the volume of sand and gravel transported by barge is expected to reach 4 million tons annually.

In the first year that U.S. flagged ships become available (Year 8 to 12 of Pier operations), it is anticipated that 600,000 tons of sand and gravel will be transported by ship.

By Year 25, the volume of sand and gravel transported by ship is expected to reach 2.75 million tons annually.

By Year 25, it is anticipated that the combined volume of sand and gravel transported by ship and barge will reach 6.75 million tons annually (i.e. 4 million tons via barge and 2.75 million tons via ship), subject to market demand.

(For further details, see *Central Conveyor and Pier Fact Sheet*.)

History

The Thorndyke Block was logged in the early 1900s, with most of the logging having taken place in the 1930s. After a significant forest fire in 1939, much of the forest re-seeded naturally.

Currently, the area is managed as commercial forestland with periodic logging of small acreage units and predominant replanting of Douglas fir. Much of the commercial forestland crossed by the proposed Central Conveyor was logged within the past 10 years. Old tree stumps, small Douglas firs, forest brush, and shrubs dominate the landscape. In areas that were recently logged, second growth Douglas fir and stands of alder dominate.

Mining of sand and gravel in the general area of the Shine Pit began in 1959 to supply materials for the building of the Hood Canal Bridge revetment on the Jefferson County side. Since that time, various operators have mined sand and gravel in the same vicinity and provided truck delivery of materials.

In December 1979, FHM took over operation of the Shine Pit and obtained a Surface Mine Reclamation Permit (No. 70-011936) issued by the Washington State Department of Natural Resources (WSDNR). Since then, FHM has continuously operated the pit.

In addition to the WSDNR surface mining reclamation permit, FHM operates under a Washington State Department of Ecology (WSDOE) Sand and Gravel General Permit (No. WAG 50-1120), which regulates the treatment and

control of stormwater. All stormwater that falls on the existing 144-acre Shine Pit is prevented from leaving the site through application of infiltration techniques.

In June 1999, Ace Paving obtained a Jefferson County Conditional Use Permit (No. ZON98-0041) to operate a portable asphalt batch plant located on five acres within the 144-acre Operations Hub/Shine Pit. Ace Paving operates under its own Washington State Department of Ecology (WSDOE) Sand and Gravel General Permit (No. WAG 50-1237). The stormwater that runs off the asphalt batch plant site goes directly into FHM's central stormwater treatment and control system.

In March 2001, to prepare for the impending depletion of sand and gravel supplies at the existing Shine Pit, FHM submitted to WSDNR a preliminary application for the 156-acre Wahl Extraction Area as an expansion of the existing Shine Pit

In April 2002, FHM submitted a Mineral Resource Lands Overlay (MRL) application to Jefferson County. The submission complied with the new requirements (effective January 2001) of the Jefferson County Unified Development Code (UDC).

In September 2002, WSDNR determined that the March 2001 FHM application for the Wahl Extraction Area would need to be resubmitted as a new permit, independent of the existing permit. In addition, Jefferson County UDC requirements will be applicable.

In December 2002, Jefferson County approved a modified application for MLA-02-235, a Mineral Resource Land Overlay (MRL) designation for 690 acres, located approximately a mile west and south of FHM's existing T-ROC Operations Hub. This MRL designation formally recognizes the existence of commercially viable deposits of sand and gravel; provides for appropriate notification of adjacent landowners regarding likely future mineral resource activities in this designated area; and allows FHM to apply for specific excavation permits greater than 10 acres in size under the requirements of the Jefferson County UDC. The MRL designation alone does not authorize specific mining activities within the MRL.

Existing T-ROC Operations

T-ROC *currently* consists of five major activity components at the existing 144-acre Shine Pit:

1. Sand and gravel extraction area
2. Operations Hub, including
 - portable crushing, washing, and sorting equipment for sand and gravel
 - portable equipment for recycling of concrete waste
 - stockpile areas
 - trucks and loaders
 - scale house, maintenance building, caretaker home, well, and outbuildings
 - an access road to Hwy. 104
3. Portable conveyors used to move sand and gravel from the extraction area to the Hub
4. Asphalt batch plant (operated by Ace Paving)
5. Mined acreage in various stages of reclamation

In 2003, it is anticipated that the volume of sand and gravel transported by truck will be 500,000 tons, including sand and gravel used in asphalt mix. In approximately 10-15 years, the annual volumes of sand and gravel transported by truck are projected to reach 750,000 tons and remain constant due to the saturation of the local market.

Current and future volumes of sand and gravel transported by truck will be supported by the existing configuration of the T-ROC Operations Hub.

Continued Growth of Existing Activities

Current truck-based operations are expected to deplete the sand and gravel extraction area at the existing Shine Pit by 2004, requiring the opening of a new extraction area.

The analysis of geological resources within the Thorndyke Block, combined with the public concern with the visual impacts of existing mining operations, led FHM to propose a new extraction area approximately a mile west and south of the existing Shine Pit. This new extraction area (Wahl) is outside the public's general viewshed.

The proposed 156-acre Wahl Extraction Area is located west of Wahl Lake and is anticipated to have sufficient volumes of sand and gravel to supply truck-based operations for 20 years. After the Wahl Area is depleted, new permits would be sought to mine in the Meridian Extraction Area (a portion of MLA-02-0235).

Sand and gravel will be transported from the proposed Wahl and prospective Meridian Extraction Areas to the T-ROC Operations Hub via a 1.25-mile conveyor (located in an easement of approximately nine acres) referred to as the Wahl Conveyor. This conveyor will be built adjacent to an approved forestry service road. Much of the commercial forestland crossed by the proposed Wahl Conveyor has been logged within the past 10 years.

Since the extraction area located in the existing Shine Pit is nearing exhaustion, FHM reiterates that the proposed Wahl Extraction Area and Conveyor (a portion of MLA-02-235) are necessary to provide a continued supply for *existing* FHM truck-based operations.

Application for the Wahl Extraction Area and Wahl Conveyor has been initiated and will be considered in parallel to this application for the Central Conveyor and Pier.

In addition, FHM will initiate application for permission for processing concrete waste from outside sources.

Development of Marine Transportation System

Should FHM receive necessary approvals for the proposed Central Conveyor and Pier, the extraction rates from the Wahl Extraction Area will accelerate due to the added marine delivery. This acceleration would advance the time frame for application for excavation permits in some or all of the remaining MRL area (Meridian Extraction Area).

The prospective 525-acre Meridian Extraction Area is located generally south of Wahl Lake, and contains the remainder of MLA-02-235. FHM expects that as excavation is completed in the Wahl Extraction Area, permits for expansion of mining into some or all of the Meridian Extraction Area will be submitted. The exact timing of a prospective application for the Meridian Extraction Area will be a function of numerous variables, including but not limited to future market demand and successful development of marine transport capabilities (i.e. the Central Conveyor and Pier).

Upon construction of the Central Conveyor and Pier, reconfiguration of the T-ROC Operations Hub will be needed to accommodate the processing of increased volumes of sand and gravel. The reconfigured Operations Hub will be located on an 100-acre area within the existing 144-acre Shine Pit.

Summary

Under currently planned proposals, if approved, T-ROC would include:

- a 100-acre **Operations Hub** located within the existing Shine Pit, where up to 7.5 million tons of sand, gravel and recycled concrete will be processed annually and transported by trucks (750,000 tons), barges (4 million tons), and ships (2.75 million tons)
- a proposed 156-acre extraction area (**Wahl Extraction Area**), where sand and gravel would be mined to supply truck-based operations and initial years of marine operations

- a prospective 525-acre extraction area (**Meridian Extraction Area**), where up to 40 years of sand and gravel would be mined
- a proposed 1.25-mile conveyor (**Wahl Conveyor**) connecting the Wahl Extraction Area and subsequent Meridian Extraction Area to the Operations Hub
- a proposed 4-mile conveyor (**Central Conveyor**) connecting the Operations Hub to a 1,000-foot Pier located on Hood Canal, where ships and barges would be loaded up to 300 days a year, up to 24 hours a day

2/4/03 QED

CENTRAL CONVEYOR AND PIER FACT SHEET

Feb. 11, 2003

CENTRAL CONVEYOR

The proposed Central Conveyor will move sand and gravel from the T-ROC Operations Hub (at the existing Shine Pit) to a Pier on Hood Canal for marine transport by barges and ships. The Central Conveyor will be approximately four miles long and is made up of the Twin Conveyors and the Single Conveyor.

Twin Conveyors

Located at the northern portion of the Central Conveyor, originating at Shine Pit.

Location:	Station 25+23.69 to 200+00
Length:	3.3 miles long
Width (each conveyor)	5 feet wide
Gap between conveyors:	4 feet
Segments between transfer points:	4 of varying lengths
Stormwater:	Full dispersion

Single Conveyor

Located at the southern portion of Central Conveyor, originating at end of the Twin Conveyors and terminating at end of Pier.

Location:	Station 200+00 to 237+90
Length:	0.7 miles long
Width:	6 feet
Segments between transfer points:	2 of varying lengths
Color:	Natural color(s) to blend into existing environment
Stormwater:	Full dispersion

Belts

Central Conveyor belts travel on rollers forming a U-shaped trough that carries sand and gravel. Failsafe sensors on head pulley motor automatically shut down operation along the entire conveyor system in case of belt failure.

Power:	Electric motor at head pulley (tail pulley unpowered)
Rollers:	Self-lubricating
Materials:	Composite
Belt speed (approx):	6 miles per hour

Conveyor Assembly

Frame:	Steel channel, open box
Height (approx.)	5 feet
Vertical support:	20-foot spacing

Color(s): Natural to blend into existing environment

Cover

Installed over the Central Conveyor's belts to keep out rain and wind and to prevent fugitive dust, sand, or gravel from escaping.

Location: Station 25+23.69 to 228+00 (beginning of Pier)
Material: Metal
Height above belt: 2 feet 6 inches
Height above ground: 7 to 8 feet

Pan

Installed under the Central Conveyor's return belt over all stream crossings and from top of the shoreline bluff to beginning of the Pier.

Locations: Station 144+00 to 165+00 (stream crossings)
Station 226+00 to 228+00 (bluff to Pier)
Clearance from ground: Less than 2 feet

Enclosures

Enclosures can include a roof, siding, pan under return belt, and a grated walkway or solid floor.

Thorndyke
Road Location: Station 211+50 to 214+00
Components: Roof, siding, solid floor

Shoreline Location: Station 228+00 to 234+35
Components: Roof, siding, pan under return belt, and grated walkway

Pier Loadout Locations: Station 234+35 to 237+90
Components: Roof, siding, solid floor

Wildlife Crossings

Typical clearance: 2 feet below return belt
Large mammal crossings: 4-6 foot clearance below return belt
Spacing (approx.): Every 300 feet
Electrical Power: Underground
Control Lines: Underground

ROADS AND PARKING

A gravel forestry service road will provide access for forest firefighting, logging, and Central Conveyor maintenance. It will parallel the Central Conveyor and connect to the network of existing roads in the Thorndyke Block. Abandoned roads will be re-graded and reforested. A turn-out/parking area for a maintenance vehicle will be provided at each transfer point. A parking area will be provided for employees working at the Pier. Stormwater generated by roads and parking surfaces will be managed via full dispersion.

Roads

Location:	Station 25+69 to 211+50, 214+00 to 217+50
Width:	14 feet
Surface:	Gravel
New surface area:	7.3 acres (includes road surfaces at transfer points, 10 employee parking stalls at Pier and concrete access road)
Abandoned roads:	6.3 acres
Net increase:	1.0 acres

Employee Parking for Pier

Location:	Station 214+50 to 215+50
Number of stalls:	10
Surface:	Gravel
Lighting:	Shielded

Turn-out/Parking at Transfer Points

Location:	Transfer Points 2, 3, 4, 5, & 6
Number of stalls:	One
Surface:	Gravel
Lighting:	None

Concrete Access Road

Location:	217+50 to 222+00
Width:	24 feet

TRANSFER POINTS

Each of the six segments of the Central Conveyor terminates at a transfer point, where sand and gravel on the incoming conveyor segment will drop into a hopper and funnel on to the next conveyor segment. A utility shed at each transfer point will enclose the conveyor and hopper to protect electrical equipment, contain fugitive dust, and minimize noise. The Central Conveyor shifts direction slightly at Transfer Points 2, 3, 4, and 5.

Locations:	Transfer Point 1 Station 25+23.69 Transfer Point 2 Station 39+27.09
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Transfer Point 3 Station 87+16.4
Transfer Point 4 Station 134+44.87
Transfer Point 5 Station 200+00
Transfer Point 6 Station 221+55

Utility Shed

At each transfer point, a small building will house a head pulley and electric motor, unpowered tail pulley, hopper, and return belt cleaning equipment.

Location: Transfer Points 1, 2, 3, 4, 5, and 6
Size: 12 feet by 16 feet
Material: Wood and metal
Lighting: Interior only
Stormwater: Downspout infiltration system or dispersion

PIER

The proposed Pier consists of a stationary and retractable load-out conveyor supported on pilings spaced at 100-foot intervals, support towers, and eight dolphins (six breasting and two mooring dolphins), with an elevated catwalk. The Pier is the only structure to be placed above the water's surface and will be as low profile as possible. The Pier will be painted to blend into the existing environment and constructed in a manner that will minimize visual intrusion and glare. To minimize shading effects, the Pier will be constructed largely of open steel girders.

Pier Location: 5 miles southwest of Hood Canal Bridge
Total Length (measured from the
Ordinary High Water mark [OHW]): 990 feet
Stationary Conveyor: Station 228+00 to 236+75
Length: 875 feet

Station 228+00 to 233+00

Station 228+00 is the location of the first pilings, marking the beginning of the Pier, and is located at approximately the Ordinary High Water mark.

Length: 500 feet
Truss Height: 10 feet
Truss Width: 13 feet
Top Elevation: 32 feet above MLLW (26 feet MSL)
Invert Elevation: 22 feet above MLLW (16 feet MSL);
Clearance for Boats: 11 feet MHHW
Clearance from Beach (MSL): 19 or more feet above mudline/existing grade

Station 233+00 to 234+35

Station 233+00 begins the incline toward the first support structure.

Length:	135 feet
Truss Height:	12 feet
Truss Width:	13 feet
Top Elevation:	Slopes from 32 feet MLLW to 91 feet MLLW (26 feet MSL to 85 feet MSL)
Bottom of Conveyor:	Slopes from 22 feet MLLW to 76 feet MLLW (16 feet MSL to 70 feet MSL)

Station 234+35 to 236+75

Station 234+35 is supported by the first steel support structure. Station 236+75 is supported by the second steel support structure.

Length:	240 feet
Truss Height:	15 feet
Truss Width:	18 feet
Top Elevation:	91 feet above MLLW (85 feet MSL)
Bottom of Conveyor:	76 feet above MLLW (70 feet MSL)

Station 236+75 to 237+90

This modular enclosed distribution (load-out) conveyor pivots and retracts to conform to various vessel loading configurations.

Length:	165 feet long
Overlap (Retractable Conveyor):	50 feet
Truss Height:	15 feet
Truss Width:	15 feet
Top Elevation:	76 feet above MLLW (70 feet MSL)
Bottom of Conveyor:	61 feet above MLLW (55 feet MSL)
Channel Elevation at end of pier:	-79 feet MLLW (-73 feet MSL)

Support structures

Two open steel structures will support the conveyor near the end of the pier. The first structure supports the conveyor. The second structure supports both the conveyor and the load-out conveyor. The Central Conveyor's second support structure will have an overall height of approximately 76 feet above MLLW (70 feet MSL). This is the minimum height necessary to be able to load sand and gravel on ships.

Support #1: Station 234+35 to 234+65

Dimensions:	30 feet by 30 feet
Top Elevation:	76 feet above MLLW (70 feet MSL)
Channel Elevation (measured at center of support):	13 feet MLLW (7 feet MSL)

Support #2: Station 236+55 to 236+95

Dimensions: 40 feet by 40 feet
Top Elevation: 61 feet MLLW (55 feet MSL)
Channel Elevation (measured at center of support): -52 feet MLLW (-46 feet MSL)

Pilings

Pilings will be installed to support the Pier (truss supports), support structures, and breasting and mooring dolphins.

Material: Steel
Diameter: 18-inch (Truss supports)
18-inch (Catwalk supports)
30-inch (Support structures)
30-inch (Dolphins)
Spacing: 100-foot (Truss supports)
50-foot (Catwalk supports)
Number: 4 each (Truss supports)
16 each (Support structures)
12 each (Dolphins)
3 each (12 Catwalk Supports)

Control room

An enclosed control room with access stairways, storage area, restroom, and holding tank is located within the second support structure. These facilities will not increase the area of over-water coverage.

Dimensions: 20' x 40' x 20'
Material: Same siding as enclosures
Lighting: Shielded

Maintenance walkway

The pile-supported breasting and mooring dolphins will be connected by a grated maintenance catwalk.

Material: Galvanized or Aluminum steel
Width: 5 feet
Length: 710 feet
Railings: 36 – 42" high
Elevation: 22' MLLW or 16' MSL

Breasting and Mooring Dolphins

The end of the Pier will consist of six pile-supported breasting dolphins and two pile-supported mooring dolphins.

Water depth range: -49 feet to -64 feet MLLW
(-43 feet to -58 feet MSL)
Shallowest dolphin depth: -37 feet MLLW (-31 feet MSL)
Pilecap Dimensions: 20-foot by 20-foot, 7-foot thick
Pilecap material: Concrete
Pilecap invert elevation: 15 feet MLLW (9 feet MSL)

Maintenance and Storage Buildings

Two maintenance/storage buildings will be located on dolphins.

Dimensions: 10 feet by 10 feet
Material: Same siding as enclosures

Lighting

Lighting of the intertidal and subtidal portions of the Central Conveyor and Pier will be kept to the minimum required for safe operation. Lighting of the water surface will be minimized with the use of shielding and directional fixtures. During non-operation hours, lights will be turned off except as needed for maritime safety requirements.

VESSEL DESCRIPTION

The Pier is designed for ships and barges of varying sizes and displacements to transport sand and gravel. Only ships will require opening of the Hood Canal Bridge. It is anticipated that the first ships will call at the Pier eight to 12 years after the Pier's construction.

	Ship		Barge		Typical Barge
Maximum Length (LOA):	745'		400'		240'
Maximum Width (berth):	110'		100'		60'
Maximum Draft:	45'		25		16'
Volume Range (dead weight tons [dwt]):	20,000 to 65,000		2,500 to 20,000		5,000 to 7,000
Estimated Loading Time (hrs):	10-24		1-8		2-3