Final Environmental Assessment

Pier 23 Replacement, Sediment Remediation, and Slag Removal

Tacoma, Washington

U.S. Army Reserve
88th Regional Support Command, Ft. Lawton, Washington

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FINAL Environmental Assessment
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Responsible Agencies: The agency responsible for Pier 23 replacement is the U.S. Army Reserve (USAR). The Army Environmental Center (AEC) is responsible for sediment remediation and slag removal. However, the U.S. Army Corps of Engineers (Corps), Seattle District Environmental Resources Section has provided assistance in writing our Environmental Assessment (EA). The Corps will make a separate decision regarding Corps permits.

Summary: In accordance with the National Environmental Policy Act (NEPA), Sec. 102(C), this environmental assessment (EA) examines the potential impacts of replacement of an existing USAR pier structure, and cleanup of adjacent and underlying contaminated sediment and slag, located in Commencement Bay, Tacoma, Washington. Six hundred six feet of wooden pier and pilings would be replaced with concrete pilings and decking. Adjacent contaminated sediment would be removed and appropriate backfill similar to existing sediments would be applied. Contaminated shoreline slag accumulation would be removed.

Potential impacts associated with this work include degradation of water quality (turbidity and contaminant resuspension) during construction, leaching from the treated timber to adjacent sediments, and increase in ambient noise levels and air emissions during construction. There would be a benefit to aquatic resources from a net removal of (contaminated) pilings, but potential negative impacts from shock waves during piledriving. These impacts would generally be localized in nature, short in duration, and minor in scope, and would be offset to the extent possible using best management practices. None of these impacts would be significant either individually or cumulatively.

The public comment period for the draft EA closed 19 March 2009.

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1.0 INTRODUCTION AND BACKGROUND

Work proposed at Pier 23, on Commencement Bay at Tacoma, Pierce County, Washington, includes the demolition of the first 606 feet of timber pier beginning at the shoreline, the remediation of sediment under and around the demolished portion of the pier, the removal of slag material adjacent on the shoreline adjacent to the foot of the pier, and the reconstruction of a new concrete section of the pier.

In addition to the proposed work, there are new circumstances beyond those addressed in an Environmental Assessment (EA) dated December 2004 for repair of Pier 23 (USACE 2004a—see http://www.nws.usace.army.mil/ers/doc_table.cfm; scroll to Commencement Bay, Pier 23 Repair). The new circumstances include:

- development of new alternative actions:
    - replacement of a section of pier (distinguished from pier repair)
    - remediation of contaminated sediments underneath and adjacent to the pier as part of the project scope,
    - removal of slag on the shoreline at the foot of the pier
- the Endangered Species Act listing of southern resident orca as endangered in December 2005, and of Puget Sound steelhead as threatened in May 2007.

The Pier 23 property is located on the northwest end of the Port of Tacoma Industrial Yard, between the Hylebos and Blair Waterways along the Commencement Bay shoreline (T21N, R03E, Section 27). See Figures 1 and 2.

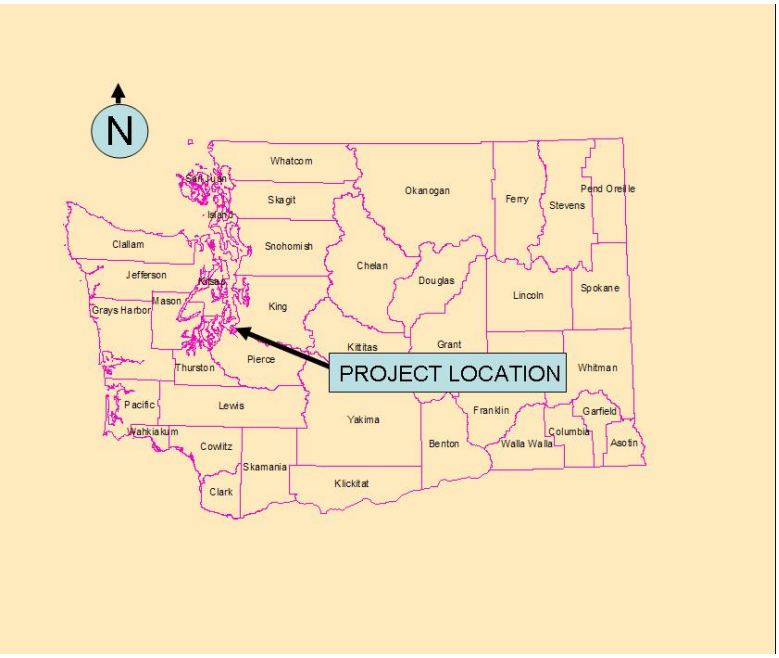

Figure 1. Project location in Pierce County, Washington.

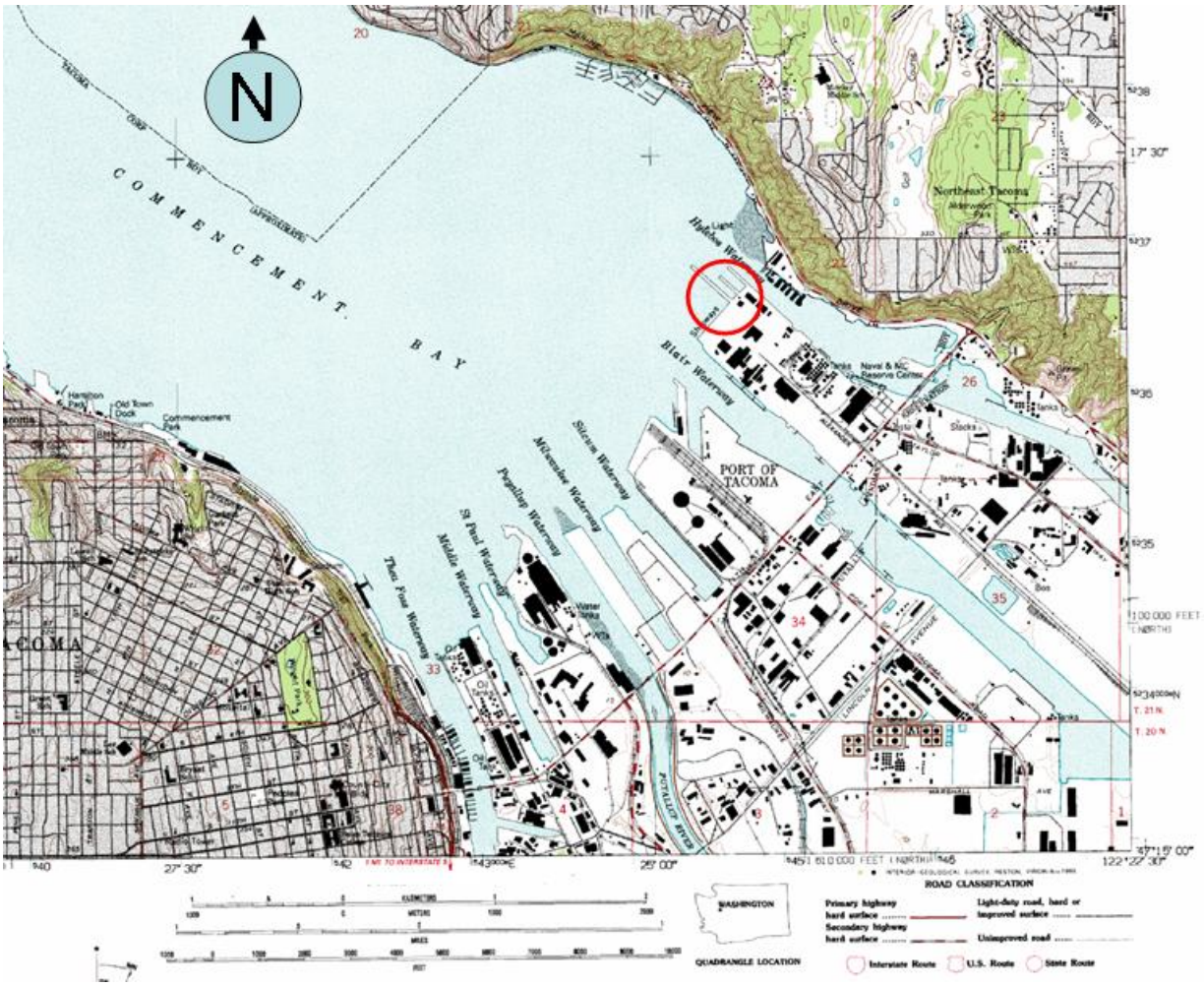

Figure 2. Project location (circle) in Commencement Bay at Tacoma, Washington.

The Pier 23 property is operated and maintained by the U.S. Army Reserve, which leases the 7.4 acres of submerged lands and 3 acres of uplands from the Port of Tacoma. The Army Reserve owns, controls, and has command of the pier structure, all facilities on the pier, and all structures and improvements on the upland property. Pier 23 and its associated facilities are required for use of Army watercraft maintenance and for the training of reserve soldiers. At full operational capacity, up to 400 reservists will utilize the Pier 23 facilities.

2.0 NEED, PURPOSE, PROBLEM DESCRIPTION, AND AUTHORITY

2.1 Need

The USAR acquired the pier and a former warehouse from the National Guard in 1996, and a new upland facility was constructed in December 2005. The pier was constructed prior to World War II. The outboard 610 feet were replaced with concrete in 1946. Repairs were made in 2005 to extend the useful life of the pier for 10 years. The inboard 606 feet of timber pier is in a deteriorated condition; it does not meet operational requirements, and is unsafe for USAR

personnel. Decking boards fail under load, so the timber trestle is load-limited, requiring extra vehicle trips on the pier to accomplish service functions. Fender piles have broken, requiring periodic replacement. Energy absorption of the fender piles is inadequate (CH2M 2007).

The deterioration of the pier structure has affected the Army Reserve's use of the facilities at this site. Loads on the pier are limited by the timber deck (requiring truck weight limits), and mooring loads are limited by the deterioration of the piles supporting the bollard bases. Approximately 530 pilings were replaced in 2006.

In addition to deterioration of the pier, contaminated sediment and metal slag exists around and under the pier. Tests for contaminants in the sediment and slag revealed hydrocarbons (including PAHs, PCBs), arsenic, copper, lead, mercury and zinc. Although testing results were not uniformly outside of criteria for all locations, the USAR wishes to ensure the biological integrity of the submerged lands at the same time as the pier deterioration is addressed.

2.2 Purpose

The purpose of the proposed project is to allow the U.S. Army Reserve to continue mooring and maintaining Army Reserve vessels at Pier 23, and to protect human health and the environment for long-term mission operations at the project site.

2.3 Description of Problem

In 1994, while the pier was owned and operated by the Washington National Guard, an underwater inspection of the pier structure was conducted. At that time, approximately 10 percent of the 960 load-bearing timber piles had moderate to heavy deterioration with material loss varying from 75 to 95 percent. A number of these piles had lengths of complete section loss. The timber fender pile system was also found to be in poor condition, with nearly 60 percent of the pilings moderately to heavily damaged by vessel impacts. A number of these piles were either completely missing or broken off at the waterline. The timber pile caps and stringers were in good condition with only six localized areas of moderate to heavy deterioration. The timber planks of the deck were typically sound and well secured; however, 287 of the individual planks had moderate to heavy weathering as indicated by cracking, splitting, abrasion damage, and soft wood fibers.

In 2001, after the Feb 28, 2001 Nisqually earthquake, a structural analysis of the pier was conducted. The condition of the timber piles was found to be much worse than described in the 1994 inspection report. Missing piles were determined to have degraded the load capacity for the bollards (pile clusters with concrete caps used for mooring large vessels). One bollard was missing 38 percent of its piles, reducing its design line pull capacity by 40 percent. Piles weakened by marine borer attack may have snapped off during the earthquake. A 2005 inspection report (Collins 2005) detailed other issues concerning the condition of the pilings, decking, and utilities. Repair of part of the pier took place in 2006, and entailed rebuilding the outer section of the wooden portion of pier with untreated wood decking, and replacing deteriorated creosote-treated pilings with ammoniacal copper zinc arsenate (ACZA)-treated wood pilings along the new section of pier. Bollards were repaired and strengthened, and utility and fire protection features were upgraded. However, problems remain. Decking boards fail

under load, so the timber trestle is load-limited, requiring extra vehicle trips on the pier to accomplish service functions. Fender piles have broken, requiring periodic replacement. Energy absorption of the fender piles is inadequate (CH2M 2007).

Contaminated sediment is fine-grained material from elevation minus 10 feet (mean lower low water) to minus 20 ft MLLW, adjacent to the pier. Test results (Kemron 2008) indicated sediment contamination to depths in the substrate potentially exceeding nine feet. Within the Pier 23 property boundaries, surface and subsurface sediments were contaminated with PCBs, PAHs, and metals at levels exceeding cleanup thresholds (SQOs: sediment quality objectives developed for the nearby Commencement Bay/Nearshore Tideflats [CB/NT] Superfund site). There may be 20,000 cubic yards of sediment affected (Kemron 2008).

The slag material is in the intertidal zone next to the sheet pile wall on the Pier 23 north shore property. Its volume is estimated at about 2,000 cubic yards, including 1,200 cy in the water and 800 cy upland (Kemron 2008). It is a dark granular material which has debris mixed in. The debris includes ceramics, wood, glass, bolts, cables and metal pipes. The slag is hardened up to one foot below its surface, possibly due to metal oxidation. Various constituents exceed SQOs (thus are contaminants of concern, or COCs), and there is concern about their bioavailability in the aquatic environment.

Kemron (2008) states that the SQOs for sediment and slag are consistent with Washington Administrative Code sediment management standards (SMS) at WAC 173-204. The SMS provide sediment quality standards (SQS) identified as constituent-specific applicable or relevant and appropriate requirements (ARARs). WDE accepts the use of SQOs in light of the Pier 23 project site's location within the CB/NT Superfund site (J. Mercuri, WDE, pers. comm. 2008).

2.4 Authority

The pier replacement is being undertaken by the U.S. Army Reserve under its operation and maintenance authority. Sediment and slag cleanup are being pursued onsite by the Army Environmental Command under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Sec. 121; there is no order under which this work is being done.

3.0 ALTERNATIVES

Multiple alternatives were considered as follows, grouped into pier replacement, sediment remediation, and slag treatment. The Preferred Alternative consists of a combination of preferred actions from these categories: timber pier demolition and reconstruction; sediment dredging and upland disposal; and slag removal. See Appendix E for drawings.

3.1 Pier Replacement

3.1.1 Pier Replacement Alternative 1—No Action

Under Alternative 1, the Army Reserve would not replace Pier 23. The deterioration of the pier structure would continue to affect the USAR's usage of the facilities at this site. As a result of the 2001 structural analysis, loads on the pier have been limited by the damaged timber deck (requiring truck weight limits), and mooring loads have been limited by the deterioration of the

piles supporting the bollard bases. These limitations affect the USAR's ability to safely moor watercraft, and carry out vessel maintenance and training activities. The damaged structure and outdated utilities are becoming increasingly unsafe for USAR personnel.

3.1.2 Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction (Preferred Alternative)

This action is part of the overall Preferred Alternative, and would consist of demolishing the shoreward, wooden 606 feet of the pier and replacing it with a new concrete-surfaced pier on concrete pilings. Approximately 1,100 creosote-treated timber piles (structural and fender) would be removed from the wooden section of the pier. These pilings would be replaced with 308 pre-cast concrete piles. Utilities running beneath the pier would also be replaced. All new utilities (fire suppression water, potable water, electric, communications, stormwater, compressed air) would be above deck. The deck is planned to be pre-cast, shipped in and then lifted into place. The deck joints would be grouted and forms would fully contain grout mix. The bents ("pile caps," or long rectangular sections on top of piles that the pre-cast deck would rest on) would be cast in place, as this is the only practical way to account for piles not being in perfect alignment after driving. Like the grouting however, the forms would fully contain the concrete mix used to form the pile caps.

There would be security lighting at night that would illuminate the pier and nearby surrounding water during pier operation. During the day, the pier would shade the substrate immediately underneath it, unless a means can be found to admit effective amounts of light without compromising the ability of the pier to support heavy loads and to simultaneously keep contaminants from vehicles and equipment from falling into the water.

There are two options for timber pier demolition and reconstruction, in order to accommodate continued operation of the pier, and to aid sediment remediation. Any in-water work for these options would occur during the approved work window.

- The preferred and anticipated temporary arrangement for the Army Reserve vessels during the Pier 23 Replacement construction is for all of the Army Reserve vessels to be relocated to Pier 24. Currently Trident Seafood Co. uses Pier 24 for its operations. Trident's vessels would be relocated to another existing facility for the duration of the construction at Pier 23.
- As a backup (contingency) plan in the event that the adjacent pier cannot be used by the Army Reserves during construction and it is necessary to maintain access and operations for the existing outer pier section, a temporary floating pier would be installed to connect the uplands to the existing outer pier section. The temporary floating pier would consist of a series of floating deck barges or floating pontoons connected together and extending from shore to the existing concrete portion of Pier 23 approximately 600 feet from shore. The barges or pontoons in the resulting access bridge would be secured and held in the planned position by spud piles or anchor lines, as required to safely stabilize the access bridge. No spud piles or anchoring would be allowed in the Pier 24 remediation area that has been capped. Measures would be included in contract documents such that the capped area adjacent to Pier 24 would be not be disturbed.

3.2 Sediment Remediation

In addition to the pier replacement alternatives, there were four alternatives formulated for sediment remediation by Kemron (2008). This reference detailed results of contaminant studies

they performed on the sediment and slag, and presented a feasibility study for addressing contaminated sediment and slag.

3.2.1 Sediment Remediation Alternative 1—No Action

No work would be done to remove or cap contaminated sediments under the No-Action Alternative. Contaminated sediment would be allowed to remain in place. Natural recovery processes (sedimentation, bioturbation, resuspension and lateral transport of sediments, and biodegradation of total petroleum hydrocarbons [TPH]) would be relied on, though those cannot address metals contamination.

3.2.2 Sediment Remediation Alternative 2—Capping

The intent of capping is to isolate contaminated sediment from aquatic receptors. Under this alternative, an engineered cap would incorporate multiple materials: about three feet of sand for contaminant containment; armoring with four feet of rock up to 24 inches in diameter to resist erosion from propeller wash and wind waves, and a surface layer of uncontaminated sediment, which to the extent possible would be similar to that existing on the site. Substrate depth would be reduced by up to seven feet. Kemron (2008) states:

> "The USEPA issued ROD [Record of Decision] for the CB/NT [Superfund site] requires that caps be a minimum of three feet thick unless proven otherwise. The cap material [would] be transported to the site by barge. For the open-water areas of the Pier 23 site, the cap could be placed using a clamshell bucket deployed from a derrick, large excavator on a barge or by use of an articulated conveyor deployed from a barge. If placed by clamshell, the clamshell is used to take material from the barge and distribute the material evenly over the area to be capped. The material is placed based upon a predetermined pattern using bucket capacity to determine volume placed per area to create desired thickness. The placement must be guided by computer based navigation system using the differential global positioning system (DGPS) to assure accurate placement. Any armoring required to prevent erosion is then placed on top of the three foot thick cap, increasing the total thickness of the cap."

The cap would be placed after placement of new pier pilings, to avoid the need to drive pilings through the cap.

This alternative would require long-term monitoring, and presents liability issues in the event of cap failure. Future maintenance dredging would require removal of the cap as well as the contaminated sediments if deeper depth is required.

Under the pier, this alternative could be used in conjunction with a surrounding sheetpile wall to contain sediments.

3.2.3 Sediment Remediation Alternative 3—Dredging and Disposal (Preferred Alternative)

This action is considered one component of the Preferred Alternative. It consists of dredging about 20,000 cubic yards (Kemron 2008) adjacent to the shoreward 200 feet of pier, backfilling with clean (uncontaminated) material. The area to be dredged would be about 58,000 square feet,

and possibly 12 feet in depth in some places. Sediment to be removed does not pose a human health risk, allowing some flexibility in handling and disposal.

Prior to the start of dredging, a debris sweep of the dredge area would be performed with the intent of removing debris that would interfere with the dredging operations. Debris would be placed on a barge, transferred to an upland transfer site (location to be determined), resized and sorted as necessary for recycling or disposal, and transferred by truck and/or train to a permitted facility for recycling (if possible) or for disposal.

After the debris sweep is completed, dredging would commence using a mechanical dredge with a closed, environmental bucket wherever possible. A heavier digging bucket may be necessary in certain areas. Dredged material would be placed in a haul barge. Dredged material would be dewatered as necessary to meet the disposal facility's acceptance criteria. Decanted water would be treated (filtered at minimum) and discharged in accordance with the project's water quality certification and National Pollutant Discharge Elimination System permit.

The dredged area would be backfilled to surrounding grade with uncontaminated sediment which to the extent possible would include material similar to sediments existing at the site.

Dredged material would be taken by barge to be offloaded at an upland site (location to be determined), then shipped by truck and/or train to a permitted landfill for disposal.

Three options were considered for disposal as follows, but only the upland disposal option is considered feasible.

Confined Near-shore Disposal

Confined near-shore disposal would entail placement of sediments into a sheet-pile enclosure 62 feet wide and 140 feet long, and 15 feet high (above substrate), adjacent to the pier with its base below MLLW. The sheetpile would be driven to a depth of 45 feet below the substrate. Sediment placed in the enclosure would be capped with one foot of clean fill, 0.5 foot of topsoil and a vegetative cover, leaving 13.5 vertical feet of room for sediment disposal. There would be a polyethylene sheet lining the sheetpile walls, and a geotextile drainage lining of the bottom of the enclosure. However, according to Kemron (2008), there are currently no available nearshore disposal areas, and development of a new one is not considered feasible for the amount of sediment to be removed from Pier 23, due to schedule constraints for permitting, public review and construction. *Thus, this alternative was not evaluated further or carried forward into remedial design.*

Confined Aquatic Disposal

Confined aquatic disposal would use a disposal site in Commencement Bay; the recommendation is to use the Port of Tacoma's Blair Slip One in the Hylebos Waterway. Dredged material would be transported to the site and discharged from a split-hulled barge or through a vertical pipeline diffuser. Capping material would be placed on top of the dredged material. But as with nearshore disposal, there is no available aquatic disposal site, and creation of such a site has unacceptable procedural constraints. *Thus, this alternative was not evaluated further or carried forward into remedial design.*

Upland Disposal (Preferred)

Upland disposal would involve dewatering of dredged material, and transportation to an approved landfill.

3.2.4 Sediment Remediation Alternative 4—Partial Dredging With Capping

In this alternative, removal of soft sediments would occur, in a lesser amount than that described for dredging, above, with capping over sub-sediments that are considered more stable. Methods would be similar to those described above for dredging and capping. Advantages would include avoiding concern from displacement of soft sediments in placing cap materials; navigational depth could also be maintained. Disadvantages would include the need for long-term monitoring; possible impedence of long-term maintenance activities; the possible need for operational restrictions; and the possibility of exposure of higher concentrations of contaminants of concern during dredging, and thus a more contaminated surface for cap installation. See Sections discussion above for disposal options for material that is dredged.

3.3 Slag Treatment

3.3.1 Slag Treatment Alternative 1—No Action

Slag would be left in place along the north shoreline adjacent to and behind the existing sheetpile wall.

3.3.2 Slag Treatment Alternative 2—Slag Removal (Preferred Alternative)

Slag removal would entail mechanical cutting back into the bank to a depth of approximately 3 feet below water surface. Volume to be removed is estimated at about 1,200 cubic yards in the water, and about 800 cubic yards upland. Removal would entail use of an excavator and/or dredge mounted on a barge for the in-water portion, and possibly for the upland portion as well, due to limited upland working space. A digging bucket may be used, or a hoe-ram if the slag is too hard. Underlying soft slag material would be dredged. A temporary construction sheet pile wall near the existing machine shop would first be installed and the existing sheet pile walls to remain would be stabilized by new soil tie-backs before the dredging of the slag and contaminated sediment starts. With the temporary sheet pile wall in place, the existing sheet pile wall in the vicinity of the slag remediation would be removed. Following the slag removal and backfill with clean material, a new permanent sheet pile wall would be installed in the same location as the sheet pile wall that was removed. A geotechnical investigation is currently in progress, and this would assist in determining the sheet pile wall installation methods. The contractor would be encouraged to use vibratory drivers whenever possible. The position of the temporary construction sheet pile wall near the existing machine shop is approximately at the edge of the slag excavation limits as shown in Kemron (2008). This position is also practically as close as it can be placed to the existing machine shop without causing significant constructability issues and impacting the structural integrity of the recently constructed upland structure (machine shop). The existing pile caps at the machine shop must be avoided with the sheet pile wall. The contractor could drive the sheet piles from shore or from a barge. The new steel sheet pile wall in the final position near the existing machine shop would be designed with a corrosion allowance (additional sheet thickness) or a coating to ensure the design life of the bulkhead wall is achieved. Slag would be disposed of at an approved upland site.

3.4 Other Alternatives Considered But Rejected

3.4.1 Institutional Controls

Institutional controls (IC) would involve "informational devices, deed restrictions and government restrictions[. This would] entail process options of fish advisories, land use restrictions, and waterway use restrictions respectively. IC included in this alternative would include posting "FISHING ADVISORY" signs and publishing advisories warning of the risks associated with ingesting marine life from the area" (Kemron 2008). The immediate project area is generally not accessible to the public, and such controls are not considered completely effective (Kemron 2008). Also, vessel use restrictions may be necessary, which poses issues for Pier 23 use. This alternative does not address contaminant levels and therefore would not address the project purpose and need. *Institutional controls are therefore not considered further in this evaluation.*

3.4.2 Natural Recovery of Sediment with Monitoring

Monitored natural recovery is similar to the No-Action Alternative, and would rely on natural recovery processes to reduce contaminant levels below minimum cleanup levels within 10 years. However, this alternative would add annual sediment sampling for 10 years, or until contaminant (TPH) levels are verified to be below minimum cleanup levels (SQO's). Again, this would not address metals contamination. This alternative does not meet EPA standards since, according to Kemron (2008), the contaminated sediments near shore may be disturbed by prop wash and waves; there would be an ongoing need for replacement of fender piles, which does not promote stability of the sediment bed; and PCBs are a bioaccumulator. *Monitored natural recovery is thus not considered further in this analysis.*

3.4.3 Sediment Treatment in Place

This alternative would entail some method to render site sediment quality acceptable without removing it or capping it, or to reduce the mobility, concentrations, bioavailability or toxicity of the contaminants. Treatment methods can include electricity, chemicals, microbes, or use of plants for uptake. *In-place treatment is not considered further here because these technologies have not been shown to be effective.*

3.4.4 Other Forms of Containment for Sediment or Slag

Options other than described in Sec. 3.2.3 above for containment of contaminated sediments include thin-layer capping, concrete and reactive capping (Kemron 2008). Concrete (shotcrete) would be used for placement over the slag. There is also vertical containment, entailing installation of a sheetpile wall to contain sediment (under the pier) or slag; this would be used to complement other containment technologies. These technologies, however, are not considered further because they do not address wave action or propeller scour (thin-layer capping), would require long-term monitoring and inspections (concrete) or are not proven (reactive capping) and would require considerable modeling with intensive long-term monitoring. *These options are therefore not considered further.*

3.5 Preferred Alternative

The Preferred Alternative consists of partial pier demolition and replacement, complete removal of contaminated sediment with upland disposal, and slag removal with upland disposal. Figure 3

provides a site diagram showing the (wood) section of the pier to be removed, and the areas of slag and contaminated sediment that would be removed. The construction sequence would be essentially as follows: removal of pier decking, removal of pier pilings, removal of contaminated sediment and shoreline slag, backfilling excavated areas and placement of new sheetpile, placement of new concrete piles, and pier deck replacement.

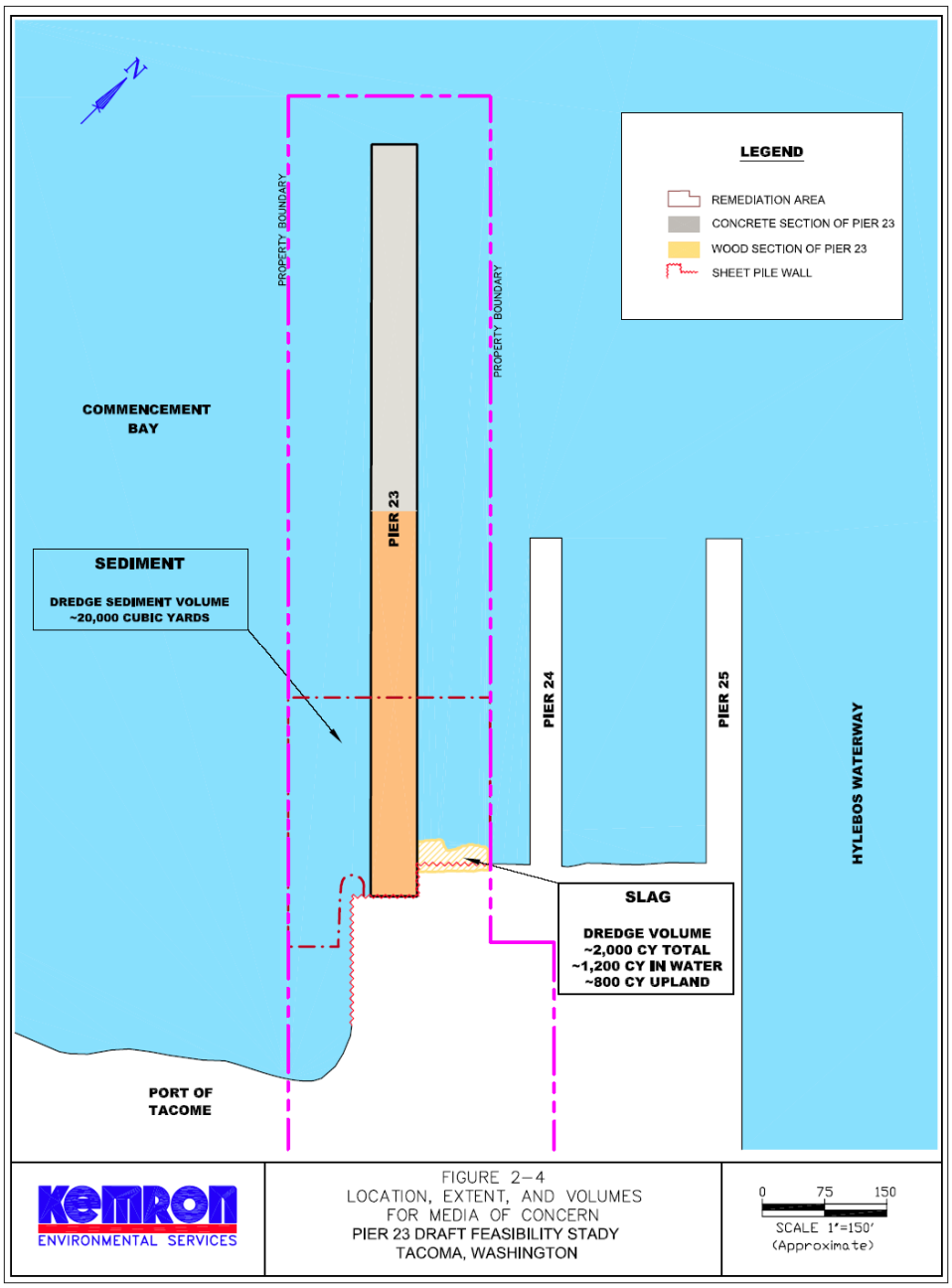

Figure 3. Site diagram showing areas of Preferred Alternative (from Kemron 2008).

3.6 Conservation Measures

Several measures and best management practices would be taken to ensure that the effects of the project activities on natural resources would be minimal. They are intended to be performance-based as much as possible, and include the following:

3.6.1 General

- In-water work activities (pile removal/replacement, dredging/backfill and dredge material dewatering, slag removal/backfill, and habitat mix placement) would occur during the August 16 to February 14 in-water work window to reduce the likelihood of impacts to migrating juvenile salmon and bull trout. Note that because of the extensive nature of the project, and the need to maximize time for in-water work, an extension of the work window is being requested, to start on July 16 instead of August 16. This is based on evaluation of salmonid movements and use of the project area, and on communications with NMFS and WDFW staff.
- All night-time debris removal, demolition, remediation and construction lighting would be kept to the minimum necessary for the intended purpose, for both intensity and area illuminated.
- Barges would not be allowed to ground out in the intertidal zone.
- All floating debris would be confined and collected and would not be allowed to float offsite. The contractor may employ a debris boom, skiff and net for this task.
- Precautions would be taken to prevent the discharge of petroleum products, chemicals, or other material into Commencement Bay. Equipment and work vehicles would be stored on-site during construction; however, refueling would occur away from the water. No breakdown maintenance on engines would occur near the water. Fuel spill kits with absorbent pads would be onsite at all times.
- A floating oil boom would be deployed to contain surface sheens, if they occur during any activity.
- Contractor would maintain a continual watch for distressed, injured or dead fish. If distressed, injured or dead fish are observed in the project vicinity, work would stop until the cause is determined and appropriate corrective action taken.
- All permit conditions, and conditions provided through ESA coordination/consultattion would be observed. The water quality certification issued by the Washington Department of Ecology (WDE) would be followed and is expected to include requirements such as: (a) background water quality measurements would be taken to establish background water quality conditions in the project area, (b) mixing zone of 200 feet for water quality compliance would be used as established in the Washington Administrative Code (WAC 173-201A-400(7)(b)(i)); (c) twice daily water quality measurements for the first three days of each different type of project operation (pile removal, dredging, dredge material dewatering, backfill and habitat mix placement, and new pile driving); (d) periodic turbidity, temperature, and dissolved oxygen measurements would be required during in-water activities after the first three days and would be reported in the daily construction reports, and a monthly WQM report would be sent to WDE; (e) operational measures (best management practices) to prevent/minimize WQC exceedances would be employed; and (f) visual monitoring for the presence of oily sheen or distressed, injured or dead fish would be required during construction.

3.6.2 Pier Repair

- To minimize turbidity associated with project activities, equipment operators would immediately be requested to stop or change operation as necessary if maximum criteria are exceeded or are expected to be exceeded based on daily water quality measurements. An operational change or stop-work request would be initiated in the field prior to consultation with WDE as described in the water quality certification. Upon consultation with WDE, operations would follow outcome of discussion.
- Debris, removed piles and pile stubs would be contained on a barge for transportation from the site to an upland staging facility for resizing and subsequent disposal or recycling if possible. No creosote-treated piling would be recycled. Such piling would be resized as necessary into maximum 4-foot lengths and disposed of at a permitted upland facility.
- Upon removal from substrate, a pulled pile would be moved expeditiously from the water onto the barge. The pile would not be shaken, hosed off, left hanging to drip or any other action taken that is intended to clean or remove adhering material from the pile.
- Sediments removed from the water with removed piles would be contained and disposed appropriately.
- A floating surface boom surrounding the work area would be used during pile removal to contain and collect any floating debris or sheen. The contractor would retrieve and store any debris generated during construction until it could be disposed of at an appropriate upland facility. Retrieval would occur at slack tide or when current velocity is low.
- If heavy (sinking) debris enters the water during the demolition and removal work, the location of the debris would be documented. When construction is complete a diver (or other suitable means) would retrieve debris that has entered the water and sunk during the demolition and removal work.
- Contractor would be held accountable for verification that structures, piling and debris designated for demolition or removal have been demolished and removed.
- The fact that new decking components would mainly be precast concrete instead of cast-in-place concrete would help ensure water quality integrity. Exceptions would be joints and "bents" (cross-pieces between piling caps) which would be poured and contained in forms.
- Marbled murrelet presence and behavior would be monitored for signs of disturbance or distress during pile driving. If disturbance or distress are noted, work would stop until corrective measures are determined and implemented.

3.6.3 Dredging

- An environmental bucket would be used to the maximum extent practicable to minimize turbidity and recontamination during dredging operations.
- A debris sweep would be performed prior to dredging, to minimize the chance of debris interfering with dredging operations.
- Any water discharged into Commencement Bay from dredged material would meet water quality standards for turbidity and contaminants. Sediment that cannot be dewatered without meeting water quality standards must be disposed of at an upland site approved for material that includes water.
- Dredging would be avoided within a month of either end of the in-water work window, in order to minimize the chance of impacts to migrating salmonids.

- Backfill of clean material would be used to bring dredged areas back to the surrounding grade.

3.6.4 Slag Removal

- All shoreline fill material excavated or placed on the shoreline would be graded in the dry during periods of low tide.

4.0 EXISTING ENVIRONMENT

The following resources may be affected by the alternatives being evaluated; this section is adapted from USACE (2004a).

4.1 Site Description

Pier 23 is an approximately 1,134-foot-long, 56-foot-wide wooden and concrete pier dating to WWII, supported by wooden and concrete pilings. The inshore 606 feet of the pier consists of timber construction built around 1940 and the offshore remainder consists of concrete construction built in 1946. Pilings supporting the outer half of the wooden portion of the pier were replaced in 2005-2006, and are wood treated with ammoniacal copper zinc arsenate (ACZA). Decking in the outer section of the wooden portion of the pier was replaced with untreated wood in the same operation. The remainder of the decking on the wooden portion of the pier is wood, some untreated and some creosote-treated. The deck surface is approximately at elevation 17.3 feet (MLLW). The inner 600 feet of pier consists of deteriorated wood decking and deteriorated and broken creosote-treated wood pilings. Utilities to Pier 23 include electrical, potable water, fire protection, and communications connections. Upland features include new buildings for training, administration and maintenance, and paved parking plus access drives. The pier is used by the U.S. Army Reserve for vessel training and maintenance. At this time, there are usually 11 ships and five barges docked at the pier. Once a month, on drill weekends, an average of four vessels get underway and return later the same day or the next day.

Several Army Reserve office and maintenance/storage trailers are located on the paved surface of the pier. A large (150 ton) floating crane is moored along the pier and is used to lift small vessels onto the pier for maintenance. A floating dock structure (50 feet x 8 feet) attached to the pier is used for loading equipment onto vessels. Approximately 30 vessels can be moored along the pier and floating dock, and may range in length from 18 meters (60 ft) to the 83-meter-long (237 ft) Logistics Support Vessel.

The bottom is mud, and slopes variably from the shoreline to reach a depth of minus 35 ft (mean lower low water) at the end of the pier. There is some sediment mounded up under the pier, making it about two feet shallower than the substrate on either side.

Shading of substrate underneath the pier is an ongoing condition. At the same time, lighting from the pier at night for operations and security is an existing condition.

4.2 Water and Shoreline Resources

4.2.1 Wetlands

The project area is in an estuary, and near the mouth of the Puyallup River. The intertidal and subtidal substrate are classified as marine deepwater wetland (E1UBL—see Fig. 4), and other wetlands are nearby. The intertidal area consists generally of mud substrate, with some gravel and cobble. There is no wetland area on the upland portion of the property; much of what existed as estuarine wetlands prior to development has been filled and developed for industrial and commercial use throughout the inner Commencement Bay. The intertidal wetland habitat has been used for industrial purposes and still has steel rails left from boat launching activities. Intertidal mudflats are important as habitat for small marine invertebrates; those organisms are in turn important as food resources for outmigrating juvenile salmon such as (threatened) Chinook, which rear in the estuary before moving offshore. Only a small percentage of formerly existing mudflats in Commencement Bay remains at present, as a result of extensive filling and development of the Puyallup River delta.

Figure 4. National Wetland Inventory rating for Pier 23 site, from USFWS (2008). Pier 23 extends from the shoreline in the middle of the photo. E1UBL signifies estuarine and marine deepwater wetland classification. The beach area immediately south of the foot of the pier is intertidal mudflat E2US3, and actually extends outward into area designated E1UBL. Note that the rectangle outlined right of center is in fact upland paved surface, and is bordered along its waterward edge by the slag deposit. North is toward top of photo.

4.2.2 Shoreline Condition

See Sec. 4.2.1 concerning wetlands, above; the nearshore natural substrate is generally intertidal mudflats.

The intertidal and shoreline areas of Commencement Bay are dominated by industrial waterfront features. Structures such as piers, wharves, and buildings extend over waters of the action area. In many places, shorelines consist of steeply sloped banks armored with riprap, concrete slabs, or other miscellaneous debris. Two other large industrial piers, Pier 24 and Pier 25, are located adjacent to Pier 23, and are used for transfer and processing of seafood.

The shoreline adjacent to the pier is composed of industrial slag material, concrete, fill dirt, and bricks. The slag is thought to be a mix of rusted molten wastes that originated from on-site shipbuilding activities, but may include some waste from the Asarco smelter.

Slag volume is estimated at about 2,000 cubic yards, including 1,200 cy in the water and 800 cy upland (Kemron 2008). It is a dark granular material which has debris mixed in. The debris includes ceramics, wood, glass, bolts, cables and metal pipes. The slag is hardened up to one foot below its surface, possibly due to metal oxidation. Various constituents exceed SQOs as shown in Table 1. There is concern about their bioavailability in the aquatic environment.

Table 1. Contaminants of concern in Pier 23 slag mass, with test values in comparison to SQOs (Kemron 2008).

Contaminant	*SQO (mg/kg)*	*range of tested values (mg/kg)*
arsenic	57	120 - 150
cadmium	5.1	5 - 41
copper	390	442 - 884
lead	450	760 - 2820
zinc	410	1100 - 3750

Underneath the slag is sediment that may contain organic material, based on odors detected. This was not duplicated in upland site evaluations; it may be that the source is deteriorated wood piling material.

Below this artificial bank is a mix of silt and crumbled slag that transitions to mudflat in the lower intertidal zone. Portions of the bank are reinforced with debris ranging from cobbles, to refractory bricks, to old timbers. On the adjacent property, there is a wide intertidal zone composed of gently sloping mudflat. The shoreline of the project site lacks overhanging vegetation. The shoreline northeast of the pier is composed of the same slag material. In early 2003, a 50-meter long sheet pile wall was installed landward of the mean higher high water elevation (MHHW) along this portion of the shoreline.

During the fall of 2004, the Army Reserve reconstructed the shoreline of the Pier 23 property. A 230’ long sheet pile wall was installed landward of MHHW along the western shoreline of the Pier 23 property. This wall provided support for a 12-foot widening of a portion of the driving surface adjacent to the new Reserve Center. Debris, orphan pilings, and molten metal (or slag)

material waterward of the sheet pile were then removed. The shoreline was reconstructed using riprap and cobble/gravel that incorporated fish-friendly habitat features. In some areas along the shoreline, a buffer was planted with native plants. This work is described in detail in the April 2004 U.S. Army Reserve Pier 23 Shoreline Reconstruction Final Environmental Assessment (USACE 2004c).

4.2.3 Bathymetry and Substrate

Waterward of the Pier 23 property's near-vertical slag banks, the surface grade slopes to a depth of about 35 feet and then levels off near the end of the pier. The slope is considerably steeper along the pier, as compared to the gentle mudflats along the southwest boundary of the property.

The intertidal and subtidal zones of the project area are composed of material with high percentages of silt, very fine sand, and fine sand (Hart Crowser 2004), as well as decomposed slag. At other sites, dock pilings have been found to alter adjacent substrates with increased shell hash deposition from piling invertebrate communities (Pentilla 1990 and Shreffler 1999). This may result in native dominant communities typically associated with sand, gravel, mud, and seagrass substrates being replaced by communities associated with shell hash substrates (Nightingale and Simenstad 2001). Shipways with iron rails are embedded in the substrate just south of the Pier 23 property, where shipbuilding facilities once were located.

4.2.4 Tides and Currents

Tides in Commencement Bay (measured at Sitcum Waterway) have a mean range of 8.09 feet, and a spring range of 11.83 feet (NOAA 2007). According to NOAA (2008[?]), tidal currents in Commencement Bay are weak and variable.

Currents generated by vessel propellers can affect bottom contours in waters as deep as 30 to 40 feet (NMFS 2003). Prop wash can produce scouring, remove fine sediments, and dislodge and/or bury benthic organisms. Prop wash may also increase turbidity, possibly resuspending contaminants, and directly displace fish due to strong currents (NMFS 2003). In addition, large wakes from vessels may contribute to shoreline erosion. In the case of Pier 23, operational measures reduce the potential for these types of impacts. Often, barges are docked along the portion of the pier nearest to shore and larger ships moor in deeper waters. The shallow draft of the barges minimizes the potential for vessel groundings at low tide, as well as propeller scour in the zone most heavily used by juvenile salmon (landward of -10 feet MLLW).

4.2.5 Water Quality

Water quality in Commencement Bay has experienced a significant decline in the past 70 years due to hazardous and non-hazardous runoff from industry, homes, and municipalities. The bay and waterways are the receiving waters for treated and untreated industrial, commercial, and municipal discharges. NOAA (2008) states that there are 763 pipes, channels, seeps, and other nonpoint-source and point-source discharges into the bay.

Nutrient and contaminant loading from vessel discharges, engine operation, propeller-induced scouring, bottom paint sloughing, boat wash downs, boat scraping, painting, and other vessel maintenance activities pose water quality degradation and sediment contamination risks adjacent to any large industrial pier structure (Nightingale and Simenstad 2001). As of June 2006, the

Army Reserve has updated Pier 23's stormwater pollution prevention plan (Weston Solutions, Inc. 2006). The Army Reserve has a National Pollutant Discharge Elimination System (NPDES) Permit (WAR05A56F, dated April 4, 2001) that addresses stormwater that flows through an oil-water separator before discharging through the outfall located under the pier. The facility also has a Vessel Oil Spill Response Plan for vessel units located at the 88th Regional Support Command facility, and includes any oil transport and transfer conducted aboard unit vessels.

Marine water next to the slag mass exceeded EPA's National Recommended Water Quality Criteria (NWRQC) value for copper of 0.0031 mg/l, with values of up to 0.007 mg/l (Kemron, 2008). Leachate tests showed that the State of Washington chronic marine water quality (Washington Administrative Code, WAC 173-201A-240(3)) maximum criteria were exceeded by copper, lead, and mercury (Kemron 2005).

The Washington Administrative Code (WAC 173-201A-612) lists aquatic life uses (excellent), shellfish harvest, primary contact recreation, wildlife habitat, harvesting, commerce/navigation, boating, and aesthetics as uses of inner Commencement Bay marine waters. Water quality impairment under Sec. 303(d) of the Clean Water Act has been documented by WDE (2007). Inner Commencement Bay is impaired under Category 5[1] for dissolved oxygen, dieldrin and PCBs, the latter two constituents based on mussel and fish tissue samples. Inner bay water quality is also listed under Category 2 for benzene, copper, tetrachloroethylene and trichloroethylene, and meets Category 1 standards for a large number of other organic contaminants as well as lead, zinc and mercury.

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[1] Impairment categories are described by WDE (2007) as follows:
***"Category 5*: Polluted waters that require a TMDL** [total maximum daily load]. Placement in this category means that Ecology has data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL or pollution control plan. TMDLs are required for the water bodies in this category."
***"Category 4*: Polluted waters that do not require a TMDL** is for waters that have pollution problems that are being solved in one of three ways. ***Category 4*a** is for water bodies that have an approved TMDL. ***Category 4*b** has is for water bodies that have a pollution control plan in place. While pollution control plans are not TMDLs, they must have many of the same features and there must be some legal or financial guarantee that they will be implemented. ***Category 4*c** is for water bodies that are impaired by a non-pollutant. These impairments include low water flow, stream channelization, and dams. These problems require complex solutions to help restore streams to more natural conditions.
***"Category 2* is for waters of concern**. There are several reasons why a water body would be placed in this category. A water body might have pollution levels that are not quite high enough to violate the water quality standards, or there may not have been enough violations to categorize it as impaired according to Ecology's listing policy. There might be data showing water quality violations, but the data were not collected using proper scientific methods. In all of these situations, these are waters that we will want to continue to test.
***"Category 1*: Meets tested standards is for clean waters**. Placement in this category does not necessarily mean that a water body is free of all pollutants. Most water quality monitoring is designed to detect a specific array of pollutants, so placement in this category means that the water body met standards for all the pollutants for which it was tested. Specific information about the monitoring results may be found in the individual listings."

The Army Reserve has taken several steps to improve water quality conditions adjacent to Pier 23. As part of the ongoing upland redevelopment of the property, a new stormwater system with an oil-water separator was installed. With completion of upland construction activities, many maintenance facilities and operations previously occurring on the pier were moved to the new upland buildings. This further reduced the likelihood for releases of fuel or solvents to waters adjacent to the pier. There were no major spills of pollutants from the Pier 23 facility for the three years prior to 2006. In 2002, there was a diesel fuel spill following a barge fuel system rebuilding operation; the spill was contained and the Coast Guard responded (Weston Solutions, Inc. 2006).

4.2.6 Sediment Quality

Sediment contaminants in Commencement Bay originate from a large variety of industrial, commercial and municipal sources. According to NOAA (2008), sediment contamination has been linked to "only a fraction" of the 400 or so storm drains discharging into Commencement Bay.

Elevated levels of polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), copper, mercury, and zinc have been detected in sediments adjacent to Pier 23 (Kemron 2008). Contaminated sediment is fine-grained material from elevation minus 10 feet (mean lower low water) to minus 20 ft MLLW, adjacent to the pier. The Hylebos Superfund site is located adjacent to the Pier 23 property, but does not include the Pier 23 property. Sediment remediation at the Hylebos site began in 2003. WDE (2007) lists inner Commencement Bay as Category 5-impaired under Sec. 303(d) of the Clean Water Act for sediment contaminants including copper and various organic compounds, and Hylebos Waterway sediments as a source of bioassay response. Inner Commencement Bay is listed as impaired under Category 4B for arsenic, silver, lead, mercury and several more organic compounds. Inner Commencement Bay and Hylebos Waterway are also listed as Category 2 impaired for other organic compounds, and inner Commencement Bay generated a bioassay response, also qualifying it as Category 2 impaired.

Accumulation of polycyclic aromatic hydrocarbons (PAH) in sediments on the Pier 23 property may be attributable to diffusion from creosote-treated wood supporting the pier. PAH in creosote-treated wood continues to migrate from structures for decades. Sediment accumulations of PAH are greatest at and immediately adjacent to the structure, though PAH contamination can be patchy and relatively mobile (Poston 2001). PAH contamination has been linked to carcinogenesis, as well as developmental, nervous system, and hormone regulation impacts in marine organisms (Poston 2001).

Test results (Kemron 2008) indicated sediment contamination to depths in the substrate potentially exceeding nine feet. Within the Pier 23 property boundaries, surface and subsurface sediments were contaminated with PCBs, PAHs, and metals at levels exceeding cleanup thresholds (SQOs: sediment quality objectives developed for the nearby Commencement Bay/Nearshore Tideflats [CB/NT] Superfund site). An estimated 20,000 cubic yards of sediment are affected (Kemron 2008). Sediment contaminants exceeding SQOs (referred to also as contaminants of concern, or COCs) are as shown in Table 2.

Table 2. Contaminants of concern in Pier 23 sediments, with test values in comparison to SQOs (Kemron 2008). The value of 19 for organic compounds represents a value below detection limits.

Contaminant	*SQO (mg/kg)*	*range of tested values (mg/kg)*
copper	390	13.4 - 441
mercury	0.59	0.1 - 1.73
zinc	410	22.4 - 565
total HPAH	17,000	19 - 18,470
total PCBs	300	19 - 637

Cleanup and capping were previously conducted next to Pier 24 in an area within about 150 feet from shore and within about 100 feet of Pier 24 on the southwest side (Anchor Environmental and Hart Crowser 2004). Cleanup was also conducted under and to the northeast of Pier 24 by the Port of Tacoma.

4.3 Biological Resources

4.3.1 Marine Resources

No eelgrass is found on or directly adjacent to the Pier 23 property, but some macroalgae (e.g., *Fucus* spp.) is present. The fine silt/sand and slag substrates on the Pier 23 property do not provide adequate attachment substrate for macroalgae, but a small amount of macroalgae is present on pier pilings and the riprap/concrete debris that lines parts of the shore.

The lack of native vegetation communities in this area of the bay likely results in low detrital input, which would affect the production of benthic and epibenthic invertebrates upon which outmigrating juvenile salmon depend. In addition, the bulkheads, riprap, and other artificial substrates present in the action area provide little opportunity for colonization by benthic organisms. Contaminant exposure would be expected to reduce invertebrate abundance in the action area. Typical responses of benthic and epibenthic communities to contaminant exposure include alterations in species assemblages, reductions in abundance, and lack of recruitment of more sensitive taxa. These effects have been documented in Commencement Bay, where sampling efforts have shown a high abundance of only a few taxa of invertebrates. Invertebrates which may be found on Commencement Bay mud substrate (EPA 2002) include crustaceans (harpacticoid copepods, dungeness crabs, ostracods, shore crabs, coonstripe shrimp, and sand shrimps), polychaete worms, nematodes, oligochaete worms, and sea urchins.

A variety of forage fish utilize Commencement Bay and adjacent Puget Sound waters. Sand lance spawning occurs on beaches near the lighthouse at Brown's Point, near the lighthouse at Dash Point, and on a small pocket beach in southern Commencement Bay along Ruston Way. Surf smelt spawn on the beach near the Brown's Point lighthouse. Pacific herring spawning occurs along the southeastern shoreline of Vashon Island and southern Maury Island. Herring holding occurs in Dalco Passage.

Environmental conditions in the action area are degraded by overwater structures, including Piers 23, 24, 25 and a private marina for recreational vessels near the mouth of the Hylebos Waterway. Alteration of light, wave energy, substrate type, depth, and water quality by

overwater structures can interfere with key ecological functions such as spawning, rearing, and refugia (Nightingale and Simenstad 2001). The reduction of light levels caused by these piers affects both plant and animal communities below. Distributions of plants, invertebrates, and fishes have been found to be limited in under-dock environments when compared to adjacent, unshaded vegetated habitats (Nightingale and Simenstad 2001). Most fishes rely on sight for spatial orientation, prey capture, schooling, predator avoidance, and migration. The reduced light conditions under an overwater structure limit the ability of fishes, especially juveniles and larvae, to perform these essential activities. Shading from overwater structures reduces prey organism abundance and habitat complexity by reducing aquatic vegetation and phytoplankton abundance (Kahler et al. 2000, Haas et al. 2002). These factors are thought to be responsible for the observed reductions in juvenile fish populations found under piers when compared to open habitats. Studies of the under-pier ecology of juvenile salmon in Commencement Bay found that Chinook preferred to migrate along the edge of a pier, rather than pass under it (Ratte and Salo 1985). The number of large ships and vessels docked at Pier 23 and adjacent industrial piers would be expected to exacerbate the shading impacts of the pier structures.

Intertidal habitat (+11.8 ft to -4.0 ft MLLW) is located southwest of the existing Pier 23, extending to the mouth of the Blair Waterway. No eelgrass is found on or directly adjacent to the Pier 23 property, but some macroalgae (e.g., *Fucus* spp.) is present. USFWS and NOAA (1996) characterized the species which utilize intertidal habitat in Commencement Bay. During periods of inundation, this area may be used by Dungeness crab (*Cancer magister*), juvenile English sole (*Pleuronectes vetulus*), Pacific staghorn sculpin (*Leptocottus armatus*), starry flounder (*Platichthys stellatus*), and chum salmon (*Oncorhynchus keta*). Bird species which may utilize intertidal habitat include gulls (*Larus* spp.), Canada goose (*Branta canadensis*), common goldeneye (*Bucephala clangula*), great blue heron (*Ardea herodias*), and greater yellowlegs (*Tringa melanoleuca*), among others. Mammals which may use this habitat include harbor seal (*Phoca vitulina*), black rat (*Rattus rattus*), and raccoon (*Procyon lotor*). Macroalgae and invertebrates use cobble and manmade structures like pilings as substrates for anchorage and shelter.

Shallow subtidal habitat (-4.0 ft to -10.0 ft MLLW) is located waterward of the intertidal habitat described above, beneath Pier 23, and northeast of Pier 23. USFWS and NOAA (1996) characterized the species which utilize shallow subtidal habitat in Commencement Bay. Fish species include Pacific staghorn sculpin, starry flounder, shiner perch (*Cymatogaster aggregata*), and juvenile Chinook salmon (*Oncorhynchus tshawytscha*). Bird species include western grebe (*Aechmophorus occidentalis*), double-crested cormorant (*Phalacrocorax auritus*), American coot (*Fulica americana*), and common goldeneye (*Bucephala clangula*), grebes, pigeon guillemot, loons, osprey and bald eagle. Mammals include Pacific harbor seal, California sea lion (*Zalophus californicus*), and harbor porpoise (*Phocaena phocoena*). Although some high quality habitat in Commencement Bay is utilized by some shorebird and waterfowl species, the project site does not provide important habitat for these species (USFWS and NOAA, 1996).

Deep subtidal habitat (-10.0 ft to -30.0 ft MLLW) is located further waterward of the shallow subtidal habitat described above. USFWS and NOAA (1996) indicate that deep subtidal habitat in Commencement Bay is utilized by fish species such as starry flounder, Pacific sculpin, shiner

perch, and juvenile Chinook salmon, and by the bird and mammal species which frequent shallow subtidal habitat. Mergansers may also be present.

Pier pilings in Puget Sound are typically home to a variety of marine algae and invertebrates, as well as an associated community of fish species. Algae include red, green and brown macroalgae, as well as microscopic diatoms. Attached invertebrates include anemones, mussels, tubeworms, barnacles, tunicates, and bryozoans. Motile invertebrates species include crabs and sea stars. Fish species include pile perch (*Rhacochilus vacca*), shiner perch, and rockfish (*Sebastes* spp.).

4.3.2 Sensitive, Threatened and Endangered Species

Fourteen stocks of salmonids utilize rivers and streams which discharge into Commencement Bay (WDFW and WWTIT 1994; WDFW 2005). These stocks of Chinook (3 stocks), chum (3 stocks), coho (2 stocks), pink (1 stock), steelhead (3 stocks), cutthroat (1 stock) and bull trout (1 stock) are differentiated by their run and spawn timing, distribution, and genetic composition. The estuarine and nearshore marine areas of Commencement Bay provide juveniles with important habitat for physiological adaptation, foraging, and refuge. Juvenile salmonids are generally present in Commencement Bay and adjacent waterways from March until July (Duker et al. 1989).

According to WDFW (1998, 2002[?], 2005), salmonid stocks using the Puyallup system are in varying degrees of health; see Table 3.

Table 3. Status of salmonid stocks using the Puyallup River system (WDFW 2005) and Hylebos Creek (R. Ladley, Puyallup Tribe, pers. comm. 2009).

Stock	**1992 status**	**2002 status**	**Stock origin**	**Production**
Puyallup R. Chinook* (formerly fall Chinook)	unknown	unknown	mixed	composite**
White R. spring Chinook*	critical	critical	native	composite
White R. fall Chinook*	unknown	unknown	unknown	composite
Hylebos Cr. fall chum	unknown	unknown	unknown	unknown
Fennel Cr. fall chum	healthy	healthy	unknown	wild
Puyallup/Carbon fall chum	healthy	healthy	native	wild
Puyallup R. coho	depressed	healthy	mixed	composite
White R. coho	healthy	healthy	mixed	composite
Puyallup R. pink	healthy	depressed***	native	wild
Puyallup R. winter steelhead*	healthy	depressed	native	wild
White R. winter steelhead*	healthy	depressed	native	wild
Carbon R. winter steelhead*	healthy	depressed	native	wild
Puyallup R. coastal cutthroat	n/a	unknown	native	wild
Puyallup R. bull trout*/ Dolly Varden	n/a	unknown	native	wild
Hylebos Cr. fall Chinook		depressed (2009)	mixed	hatchery
Hylebos Cr. coho		depressed	mixed	natural

		(2009)		

* Listed under Endangered Species Act.
** Composite refers to a combination of natural/wild and hatchery spawning.
*** However, the 2003 run of pink salmon was several times higher than any previous run since 1987.

A variety of forage fish utilize Commencement Bay and adjacent Puget Sound waters. Sand lance spawning occurs on beaches near the lighthouse at Brown's Point, near the lighthouse at Dash Point, and on a small pocket beach in southern Commencement Bay along Ruston Way. Surf smelt spawning has been documented on the beach near the Brown's Point lighthouse. Pacific herring spawning occurs along the southeastern shoreline of Vashon Island and southern Maury Island. Herring holding occurs in Dalco Passage. No documented forage fish spawning areas are located in the immediate vicinity of Pier 23.

Marine mammals protected under the Marine Mammal Protection Act, including Pacific harbor seals (*Phoca vitulina richards*i), California sea lions (*Zalophus californianus*), and harbor porpoises (*Phocoena phocoena*) occur in the project vicinity. Harbor seals and California sea lions commonly utilize buoys, floats, and log booms in northeast Commencement Bay as haul-out sites (Jeffries et al. 2000).

There is a heron rookery about one half mile to the east of the project location on the opposite side of the Hylebos Waterway. A peregrine falcon pair uses the 12th Street bridge across the Hylebos waterway about nine tenths of a mile to the southeast of the project site; no nesting has been confirmed. Purple martins nest about two fifths of a mile to the north-northeast of the project, in boxes on pilings on the east shore of the bay.

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, Federally funded, constructed, permitted, or licensed projects must take into consideration impacts to Federally listed and proposed threatened or endangered species. Several species protected under the Act are potentially found in Commencement Bay. These species are listed below in Table 4 and discussed further in subsequent narratives.

Table 4. Species listed under ESA which may be found in the project area.

Species	**Listing Status**	**Critical Habitat**
Coastal/Puget Sound bull trout *Salvelinus confluentus*	Threatened	Designated
Marbled murrelet *Brachyramphus marmoratus*	Threatened	Designated—not in project area
Puget Sound Chinook salmon *Oncorhynchus tshawytscha*	Threatened	Designated, but Pier 23 excluded (NMFS 2005a)*
Puget Sound steelhead *Oncorhynchus mykiss*	Threatened	----
Southern resident killer whale *Orcinus orca*	Endangered	Designated, but Pier 23 excluded (NMFS 2006)*
Steller sea lion	Threatened	Designated—not in project

Eumetopias jubatus		area
Humpback whale *Megaptera novaeangliae*	Endangered	—
Leatherback sea turtle *Dermochelys coriacea*	Endangered	Designated—not in project area

*Several military installations around Puget Sound have areas excluded from critical habitat for these species. Although NMFS (2005) indicated a desire that critical habitat include the intertidal area above mean lower low water, at least for salmonids, they provided for exclusion based on the presence of an Integrated Natural Resources Management Plan (INRMP). The USAR has an Endangered Species Management Plan (Jones and Stokes 2006) that allows the critical habitat exclusion at Pier 23 to encompass the intertidal area as well. The ESMP was prepared under Army Regulation 200-3, Chapter 11-5a(1). Approved ESMPs become part of an installation's INRMP.

- Coastal/Puget Sound Bull Trout

The Coastal/Puget Sound bull trout population segment was listed as a threatened species under the Endangered Species Act of 1973, as amended, in October 1999. Bull trout populations have declined through much of the species' range; some local populations are extinct, and many other stocks are isolated and may be at risk (Rieman and McIntyre 1993). A combination of factors including habitat degradation, expansion of exotic species, and exploitation have contributed to the decline and fragmentation of indigenous bull trout populations. Bull trout and Dolly Varden (*Salvelinus malma*) are two closely related char species native to the Pacific Northwest and western Canada. The taxonomy of the species is difficult, and it was only in 1978 that the two separate species were recognized (Cavender 1978). The Washington Department of Fish and Wildlife (WDFW) manages the species together as "native char" because bull trout and Dolly Varden can be readily distinguished only by genetic testing. Washington's native char exhibit four life histories: anadromous, adfluvial, fluvial, and resident. Of these life histories, the least information is available on the anadromous form of bull trout.

The current distribution of bull trout within Puget Sound marine waters is not well known, but bull trout have been documented from the Canadian border to at least Commencement Bay to the south. Capture of bull trout in south Puget Sound has been extremely limited, with very few fish caught over the last 20 years (G. Grette, Grette Associates, pers. comm. 2008). One fish was caught in the Nisqually River delta (Fresh et al. 1978), and three adult fish were captured in Commencement Bay (PIE, 1999). Bull trout migrate and are captured throughout the inner bays of northeast Puget Sound from Possession Sound, Port Susan, Skagit Bay, Padilla Bay, out to Whidbey Island (F. Goetz, USACE, unpublished data). It is thought that bull trout primarily use the shallower nearshore waters along the eastern shore of Puget Sound, and occasionally use or cross deeper waters to access locations along the west side of the sound. Subadult and adult bull trout that enter marine areas show a wide range of habitats they pass through or may elect to use for short or longer-term habitation. The Seattle District Corps of Engineers has been conducting a multi-year acoustic telemetry study of sub-adult and adult bull trout use of nearshore marine waters from the Snohomish River to Padilla Bay. To date, during the documented marine residence phase, March to July, fish have been found in salinities from 1 to 28 parts per thousand (ppt). Salinity does not appear to limit the habitats bull trout may elect to use. In addition, substrate class does not appear to be important to selection of feeding areas or home territories,

as fish were found using substrates from mud, to sand, to large gravels. Finally, turbidity levels do not appear to influence the habitats selected by sub-adult and adult fish. The highest density of tagged fish during the study was found in a high turbidity area of the Snohomish River delta.

Depth range may change by time of day and may vary by age class. During one nearshore marine tracking survey, the largest tagged fish was found to occupy depths of 30-60 feet, a moderate sized bull trout was found at 10-20 feet and a subadult was found at 5-10 ft. The largest tagged fish was found to vary depth by time of day with the greatest depths occurring during daylight hours and the shallowest depths at night.

Designated critical habitat for bull trout includes the project area (USFWS 2005). Primary constituent elements (PCEs) applying to bull trout critical habitat in marine nearshore areas are:

- Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72° F (0 to 22° C) but are found more frequently in temperatures ranging from 36 to 59° F (2 to 15° C). These temperature ranges may vary depending on bull trout lifehistory stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence. Stream reaches with temperatures that preclude bull trout use are specifically excluded from designation;
- Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows;
- An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish; and
- Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited.

Utilization of the Action Area

Few data are available on the life history and distribution of bull trout in Puget Sound river basins (WDFW 1998). The 1998 WDFW Salmonid Stock Inventory recognized three stocks in the Puyallup River bull trout/Dolly Varden subpopulation: the Puyallup, White River, and Carbon River. It is unknown if these stocks are genetically distinct. These stocks are native, but no life history information is available. WDFW considers habitat for anadromous, fluvial, and resident forms to be available within the Puyallup basin (WDFW 1998). Urban development, agriculture, and logging are threats to native char populations within the Puyallup River basin. Anadromous sub-adults and adults utilize estuarine and nearshore marine habitats in Puget Sound for the feeding opportunities these areas present. Any bull trout occurring in the action area would not be resident fish, but individuals on foraging forays. The likelihood of encountering bull trout in the project area is low. As described earlier, only three bull trout have been documented in Commencement Bay. The Puyallup Tribe caught all three of these fish during an extensive, multiyear beach seine study. The study period covered 15 years (1980-1995) and encompassed greater than 1,600 beach seines (PIE 1999). Although there have been several other seining and tow-net/purse seine studies in Commencement Bay (Dames and Moore 1981; Duker et al. 1989; PIE 1999), no bull trout have been documented in Commencement Bay since 1984 (G. Grette, Grette Associates, pers. comm. 2003). We are unaware of any other evidence of observations or occurrences in bull trout since those documented in 1984.

In addition, research in the Skagit Basin (Kraemer 1994) shows that anadromous bull trout juveniles migrate to the estuary in April-May, then re-enter the river from August through November. A literature review of sub-adult and adult fish captured in Puget Sound and the Pacific Coast shows that 410 fish were captured in marine areas. Of that number, 395 were captured between March and July 31 (D. Pentilla, WDFW; E. Beamer, Skagit Systems Cooperative; D. Beauchamp, University of Washington; G. Grette; PIE; B. Footen, MIT; F. Goetz, USACE, unpublished data). The Skagit Systems Cooperative captured 211 fish during 2002-2003. Ninety-eight percent of those fish were caught from March to July, while only one percent were caught in either February or August. These data are supported by the first year of the Seattle District Corps of Engineers telemetry study which shows that 98 percent of all tagged fish (49 of 50) left the tidally influenced areas by July 31.

- Bald Eagle

The Washington State bald eagle population was listed as threatened under the Endangered Species Act of 1973, as amended (64 FR 16397), in February 1978. Since DDT was banned in 1972, bald eagle populations have rebounded. The bald eagle was delisted effective Aug. 8, 2007 (USFWS 2007), but is still protected under the Bald and Golden Eagle Protection Act (BGEPA). In order to assure that bald eagles are not adversely affected, the US Fish and Wildlife Service also published guidance under BGEPA, including a definition of "disturb". The bald eagle wintering season extends from October 31 through March 31. Food is recognized as the essential habitat requirement affecting winter numbers and distribution of bald eagles. Other wintering habitat considerations are communal night roosts and perches. Generally large, tall, and lush stands of trees on slopes with northerly exposures are used for roosting; eagles tend to roost in older trees with broken crowns and open branching (Watson and Pierce 1998). Bald eagles select perches on the basis of exposure, and proximity to food sources. Trees are preferred over other types of perches, which may include pilings, fence posts, powerline poles, the ground, rock outcrops, and logs (Steenhof 1978). Bald eagles nest between early January and mid-August. The characteristic features of bald eagle breeding habitat are nest sites, perch trees, and available prey. Bald eagles primarily nest in uneven-aged, multi-storied stands with old-growth components. Factors such as tree height, diameter, tree species, position on the surrounding topography, distance from water, and distance from disturbance also influence nest selection. Snags, trees with exposed lateral branches, or trees with dead tops are often present in nesting territories and are critical to eagle perching, movement to and from the nest, and as points of defense of their territory. Birds and fish are the primary food source for eagles in Puget Sound, but bald eagles will also take a variety of mammals and reptiles (both live and as carrion) when fish are not readily available (Knight et al. 1990). Eagles in tidally influenced habitats also scavenge and pirate more prey than do eagles at rivers or lakes, possibly resulting form expanded feeding opportunities provided by dead and stranded prey on tide flats (Watson and Pierce 1998).

Utilization of the Action Area

There are no freshwater wetlands in the project area that could attract waterfowl, which in turn could attract foraging bald eagles. In addition, there is little native vegetation near the project and no trees that could be used as perch sites. Because the site is a marine shoreline, bald eagles may occasionally travel through the area or, on a rare occasion, may hunt for fish just offshore of Pier 23. Because of the industrial nature of the site, the high level of human activity and boat traffic,

and the accessibility of better habitat close to Commencement Bay, regular bald eagle use of the site is unlikely.

A query of the Washington State Wildlife Heritage Database indicates that the closest eagle nest may be about two miles to the northwest of the project, on Brown's Point, and there is another one about 2.7 miles to the north of the project in Dash Point State Park. There is a nest about six miles east-northeast of the project site. Several nests appear to be located on Point Defiance (about six miles to the northwest) and on southern Vashon Island (about five miles to the northwest). Wintering bald eagles may occur in the vicinity of the Pier 23 site.

- Marbled Murrelet

The marbled murrelet was listed as a threatened species under the Endangered Species Act of 1973, as amended, in October 1992. Primary causes of population decline include the loss of nesting habitat, and direct mortality from gillnet fisheries and oil spills. Marbled murrelets forage in the near-shore marine environment and nest in inland old-growth coniferous forests of at least seven acres in size. Although marine habitat is critical to marbled murrelet survival, USFWS' primary concern with respect to declining marbled murrelet populations is loss of terrestrial nesting habitat. In the marine environment, USFWS is primarily concerned with direct mortality from gillnets and spills of oil and other pollutants (USFWS 1996). Marbled murrelets forage in areas 0.3 to 2 km from shore. Murrelets often aggregate near localized food sources, resulting in a clumped distribution. Prey species include herring, sand lance, anchovy, osmerids, seaperch, sardines, rockfish, capelin, smelt, as well as euphasiids, mysids, and gammarid amphipods. Marbled murrelets also aggregate, loaf, preen, and exhibit wing-stretching behaviors on the water. In the 1980s, a marbled murrelet nest was documented in Pt. Defiance park, so requisite nesting conditions may still exist there (P. Cagney, USACE, pers. comm. 2009).

Critical habitat was designated for the marbled murrelet on May 24, 1996 (USFWS 1996). The critical habitat units nearest to the project site are approximately 35 miles to the southeast in Snoqualmie National Forest, approximately 50 miles to the northwest in Olympic National Forest, and approximately 50 miles to the southwest in Capitol State Forest.

Utilization of the Action Area

Marbled murrelets occur in Puget Sound marine habitats in relatively low numbers (Speich and Wahl 1995). The species moves about a great deal over several temporal scales: seasonally, daily, and hourly. Regional patterns of activity tend to be seasonal, and are tied to exposure to winter storm activity. There is generally a shift of birds from the Strait of Juan de Fuca and British Columbia during spring and summer to areas in the San Juan Islands and eastern bays during the fall and winter (Speich and Wahl 1995). Murrelets are often found in specific areas (e.g., Hood Canal, Rosario Strait/San Juans), as foraging distribution is closely linked to tidal patterns. However, occurrences are highly variable as they move from one area to another often in short periods of time. Aerial surveys in 1993-1999 (data from PSAMP and WDFW) indicated no murrelets in Commencement Bay. P. Cagney (USACE, pers. comm., 2009) said that marbled murrelets were observed in other Commencement Bay surveys in the 1990s, but tended to be in the outer bay area. The Pier 23 Endangered Species Management Plan (Jones and Stokes 2006) did not document marbled murrelet occurrence in the action area. Nevertheless, it is considered possible for marbled murrelets to use the project area during the construction period, which

could begin in June or July, and run until the following May (in-water construction would be during the approved in-water work window of July 15 or Aug 16, to Feb 14).

- Puget Sound Chinook Salmon

The Puget Sound Evolutionarily Significant Unit of Chinook salmon was listed as a threatened species under the Endangered Species Act of 1973, as amended, in March 1999. Like all other Puget Sound Chinook, those observed in Commencement Bay are of the ocean-type race (NMFS 1998). Ocean-type Chinook return to their natal river in the fall, though actual adult run and spawning timing is in response to the local temperature and water flow regimes (Myers et al. 1998). Ocean-type Chinook migrate to sea during their first year of life, normally within three months after emergence from spawning gravel. Peak emigration generally occurs from March to June. Growth and development to adulthood occurs primarily in estuarine and coastal waters (NMFS 1998). The amount of time juveniles spend in estuarine areas is dependent upon their size at downstream migration and rate of growth. Juveniles disperse to deeper marine areas when they reach approximately 65-75 mm in fork length (Simenstad et al. 1982). While residing in upper estuaries as fry, juvenile Chinook have an affinity for benthic and epibenthic prey items such as amphipods, mysids, and cumaceans. As the juveniles grow and move to deeper waters with higher salinities, this preference changes to pelagic items such as decapod larvae, larval and juvenile fish, drift insects, and euphausiids (Simenstad et al. 1982).

Chinook salmon, and all other wild salmon, have severely declined in number from historic levels in Commencement Bay tributaries due to development and industrialization in the bay, logging, and overfishing. From an estimated historic 844 ha (2,085 acres) of intertidal mudflat and 1,576 ha (3,894 acres) of intertidal emergent marsh, only 76 and 23 ha (187 and 57 acres), respectively, remain in Commencement Bay (USFWS 1991, cited in USACE 1993). The salmon production of the estuary in 1988 was estimated to be four percent of the historic potential. Declines in the Puyallup River Chinook runs have been documented (Salo and Jagielo 1983), but it is difficult to separate the contribution of the loss of rearing habitat in Commencement Bay from other contributing factors within the basin (USFWS 1991). Other contributing factors to Chinook salmon declines include water withdrawals from the river, dam operations, poor logging practices, development of wetland and riparian zones, effects of hatchery fish (Salo and Jagielo 1983; Miller et al. 1990). Another potential threat is increased and persistent disease susceptibility from exposure to contaminants such as those found in the Hylebos Waterway (Arkoosh et al 1998; Arkoosh and Kaattari 1987).

Utilization of the Action Area

Adult spring Chinook migrate through Commencement Bay during April-June, while adult fall Chinook pass through the bay from July to September (Dames & Moore 1981). Several studies in Commencement Bay indicate that juvenile Chinook salmon use nearshore habitat before moving out to deeper water of the bay, and eventually toward the open ocean (Puyallup Tribal Fisheries Division unpub; Duker et al. 1989; Miyamoto et al. 1980). Chinook salmon fry appear to congregate at the mouth of the Puyallup River and then disperse along nearshore habitat at the head of the bay. Chinook salmon outmigrants are generally present between late March and the first week of July in Commencement Bay, with peak numbers between late May and early June (Duker et al. 1983). Relative use of nearshore habitat in the vicinity of Pier 23 was rated “medium” and “high,” corresponding to periods before and after the release of hatchery fish. Use

of the Hylebos Waterway was rated low (Duker et al. 1989). Young salmon appear to congregate at the head of the longer waterways and avoid the interior waters of these channels. Outmigrating juvenile salmon have shown no apparent preference for the north or south shore of Commencement Bay (Duker et al. 1989). They feed on harpacticoid copepods, insect larvae, amphipods, mysid and gammarid shrimp, and a variety of other invertebrates (Dames and Moore[?] 1981).

- Puget Sound Steelhead

The Puget Sound Distinct Population Segment (DPS) of steelhead was listed as threatened effective June 11, 2007 (NMFS 2007a). There are three stocks of the Puget Sound steelhead DPS using the Puyallup system: Puyallup River winter steelhead, White River winter steelhead, and Carbon River winter steelhead. They are native stocks sustained by wild production. All three stocks have gone from healthy in 1992 to depressed in 2002 (WDFW 2002). Steelhead are anadromous rainbow trout, and mature in saltwater. Unlike salmon, steelhead can spawn more than once during their lives, returning to saltwater afterwards. The three Puyallup steelhead stocks spawn from early March to mid-June. Eggs hatch in summer. There is a large variety of combinations of freshwater rearing and saltwater residence times (Scott and Crossman 1973). According to Wydoski and Whitney (1979), Washington steelhead adults often spend two years at sea; according to the 2005 Puget Sound Steelhead Biological Review Team (2005), about 70 percent of Puyallup system steelhead spawn for the first time at age 2, and 30 percent at age 3. Most (about 89 percent for the Puyallup system) rear for two years in freshwater before outmigrating as smolts to the estuary and saltwater, generally from April through June and peaking in mid-April. Wydoski and Whitney (1979) indicate that two-year-old steelhead smolts may be about 140-160 mm in length. That is larger than smolts and fry of other salmon such as Chinook which outmigrate in the spring in which they emerge from stream gravel. In saltwater, steelhead eat amphipods, as well as squid and small fish

Threats to steelhead are similar to those listed for Chinook salmon, above. However, steelhead reside as juveniles for considerably less time in the estuary than do Chinook, so vulnerability of steelhead to those factors is probably less than with other species of salmon. Steelhead smolts are also larger and more mobile than Chinook smolts, so they are more able to avoid some adverse circumstances as well.

Utilization of the Action Area

Adult steelhead use Commencement Bay mainly during winter, from November through January with a peak in December (Dames and Moore 1981). White River steelhead adults appear in Commencement Bay later in the spring, most likely peaking in early April. G. Grette (Grette Assoc., pers. comm., 2008) indicates that over approximately two decades of beach seine sampling in Commencement Bay in the 1980s and 1990s, only a very small number of juvenile (2-year-old outmigrant) steelhead were captured; it appears they are moving out of the area and offshore fairly quickly when they exit the Puyallup River.

- Southern Resident Killer Whale

The orca, or killer whale (*Orcinus orca*), is a toothed member of the order Cetacea, which includes whales, dolphins and porpoises. The southern resident population of killer whale was listed as endangered effective February 16, 2006 (NMFS 2005b). According to Osborne et al

(1988), killer whales can reach 24-30 feet in length. They are easily recognized by their black and white markings, tall dorsal fin, and white saddle patch behind the dorsal fin. Killer whales may be found worldwide, but are more abundant in higher latitudes and in areas of higher biological productivity. Killer whales occur in groups of about 5-20 animals, though sometimes they may congregate in numbers reaching over 100. Puget Sound/British Columbia killer whales are grouped into three major communities (Osborne et al 1988). The northern resident community occurs north of the tidal boundary halfway along the east side of Vancouver Island in British Columbia. Southern resident killer whales range within about 200 miles of the San Juan Islands, and do not overlap with northern residents (Osborne et al 1988), which is supported by genetic analysis (Hoelzel et al. 1998; Barrett-Lennard 2000; Barrett-Lennard and Ellis 2001). The transient group travels throughout the ranges of the southern and northern residents. The transients feed primarily on marine mammals, while the resident killer whales specialize in salmon. Each of these pod communities has specialized calls and migration routes, and interbreeds only within itself.

Wiles (2004) has compiled the information from a number of researchers on the status of killer whales. Among the threats to killer whales are contaminants such as organochlorines (includes PCBs) and DDT residues. These compounds accumulate in their tissues through their diets of fish and mammals; the latter prey makes the transient population especially susceptible. Organochlorines are fat-soluble and passed to offspring through mothers' milk, but organochlorine levels have not been established for the southern resident pods. Resident killer whales are also subject to impacts due to loss of prey availability. Salmon are major components of resident killer whales' food intake, and a number of stocks have been in decline in Puget Sound. In addition, reduction in size of individual salmon and changes in their body composition (energy and nutritional value) may also negatively affect killer whales. The third major impact to killer whales comes from noise and vessel operations. Sources of underwater noise pollution (vessel traffic, seismic activity, drilling, dredging, construction and sonar), especially in an industrialized area like Commencement Bay, create an ambient environment that may interfere with killer whales' echolocation capabilities as well as with their navigation and communication. Feeding by killer whales, as well as movements of their prey, may thus be impaired by loud noises. Vessel traffic itself is of potential concern; there are risks of vessel-killer whale collisions, and such activities as whale-watching boat tours may actively (though illegally and perhaps unintentionally) interfere with killer whale movements.

Utilization of the Action Area

Southern resident killer whales may be found in southern Puget Sound, including the Tacoma area, during summer and fall, and are more likely to appear in areas where adult salmon are abundant (Osborne et al 1988).

- Steller Sea Lion

The Steller sea lion was listed as a threatened species under the Endangered Species Act of 1973, as amended (64 FR 16397), in November 1990. In 1997, the North Pacific's population of Steller sea lions was separated into two distinct stocks, one of which was reclassified as endangered. The status of the eastern stock, which includes the population inhabiting the waters of the Washington coast, remains unchanged. The present range of the Steller sea lion extends from northern Japan, through the Bering Sea and Aleutian Islands, along Alaska's southern

coast, and south to California. The centers of abundance and distribution lie in the Gulf and Alaska and Aleutian Islands. Steller sea lions are not known to migrate, but they do disperse widely during portions of the year other than the breeding season. Most information on the distribution of Steller sea lions has been collected during summer months, so their distribution during late fall and winter is poorly known (Steller Sea Lion Recovery Team 1992). Two types of terrestrial habitats are utilized by Steller sea lions: rookeries are areas where adults congregate for breeding and pupping, and haul-outs are areas used for rest and socializing. Sites used as rookeries during the breeding season may be used as haul-outs during the remainder of the year. Steller sea lions haul-out on offshore islands, reefs, and rocks, while rookeries generally occur on beaches. Preferred rookeries and haul-out areas are located in relatively remote areas where from year to year (Steller Sea Lion Recovery Team 1992). On August 27, 1993, NOAA Fisheries designated critical habitat for Steller sea lions. All rookeries within U.S. borders, major haulouts in Alaska, aquatic areas associated with these terrestrial habitats, and aquatic foraging habitats in waters off Alaska were designated at that time (58 FR 53138). No critical habitat occurs in Washington.

Utilization of the Action Area

Steller sea lions may be observed in Puget Sound year round, but they are most abundant during the fall and winter months (Jeffries et al. 2000). No breeding rookeries have been identified in Washington waters; however, in 1992 a single pup was born on Carroll Island (WDFW 1993). The most frequented haul-out areas in Puget Sound are located north of Admiralty Inlet. However, the species is occasionally seen on navigation buoys in Puget Sound (Jeffries et al. 2000). Harbor seals and California sea lion regularly haul out on navigation buoys, floats, and log booms in northeast Commencement Bay, along the shoreline north of the project area (Jeffries et al. 2000).

- Humpback Whale

Humpback whales are large cetaceans, reaching 52 feet in length (Osborne et al 1988). They are well-known for their complex and evolving vocalizations. They have very long, knobbed pectoral fins, and a small dorsal fin. They have baleen instead of teeth; the baleen is comb-like material used for filtering large amounts of water as it is forced out of their mouths in order to retain the whales' prey, which includes krill and small fish such as herring.

Utilization of the Action Area

Although humpback whales are found in Puget Sound, they are currently relatively uncommon as a possible result of commercial whaling in the Strait of Georgia during the early 20th century (Osborne et al 1988). In southern Puget Sound, Osborne et al (1988) noted observations of one individual in June 1986. Calambokidis and Steiger (1990) documented a large number of sightings of two juveniles in southern Puget Sound, including Commencement Bay, in June-July 1988. Humpbacks are more common in the ocean offshore of Washington and Vancouver Island. Humpbacks are not likely to be found in the vicinity of the project at the time of the in-water work, due to their mobility and their likely desire to avoid areas of intense human activity.

- Leatherback Sea Turtle

According to the Pacific Sea Turtle Recovery Team (1998), the leatherback sea turtle is characterized by a slightly flexible, rubbery-textured carapace with seven ridges. Carapace length may be close to five feet, and front flippers are relatively long. This species is widespread

in the tropical and temperate Pacific, including the US and Canadian west coast from California to Alaska, and has been incidentally caught in commercial gillnets off the US west coast. There is, however, no known nesting along the US west coast.

Utilization of the Action Area

It is not clear that this turtle is found in Puget Sound, though it may be found in the Strait of Juan de Fuca and off the Washington coast. There appears to be no information that would indicate that the leatherback sea turtle is likely to be present in the project area. NMFS (2007) states that sightings of this species are very rare, and there are no known breeding areas in NMFS's Northwest Region jurisdictional area, which includes Puget Sound.

4.4 Cultural Resources

The project area is located on the former ceded lands of the Puyallup Indian Tribe, and in 1874 it was an intertidal mudflat area within the original Puyallup Indian Reservation. The original Puyallup Reservation was established by the Medicine Creek Treaty of December 16, 1854, and was later enlarged to 18,062 acres in 1857 and 1873. People from several tribes lived on the reservation, including some Nisqually, Cowlitzes, Muckleshoots, Steilacooms, and Indians of other tribes. Between 1890 and 1909 the Puyallups lost most their original reservation land, including the project lands. Prior to filling and construction of the Port of Tacoma Industrial Yard during the 1907 to 1917 period, the project area was situated at the interface between the Puyallup River delta intertidal mudflats and the rapidly deepening waters of the subtidal bay.

The project vicinity has been used for industrial purposes since the 1920s. Common shoreline features within the project vicinity include bulkheads with structures, such as piers, wharves, and buildings, extending over the water, and steeply sloped banks armored with riprap, concrete slabs, and woody and miscellaneous debris. At Pier 23 the shoreline is composed of industrial slag material (fused metal debris), various types and sizes of firebricks, concrete, and fill dirt. Below this artificial bank is a mix of silt and crumbled slag that transitions to mudflat in the lower intertidal zone. Portions of the bank are reinforced with debris ranging from cobbles to refractory bricks and old timbers.

4.5 Air Quality and Climate

Air quality in the Puget Sound basin is generally good. However, urban areas experience moderately degraded air quality during certain times of the year. Particulates, sulfur dioxide, ozone, and carbon monoxide are the pollutants of concern. High concentrations of these pollutants generally occur during the dry late summer months when minimal wind conditions persist for long periods of time, or during mid-winter thermal inversions.

Commencement Bay is bordered by hills on its northeast and southwest sides. Air circulation in this "trough" is inhibited during periods of calm winds. The principal sources of air emissions in the project vicinity include chemical manufacturing plants, a pulp and paper mill, an aluminum smelter, and vehicular emissions.

The project area is within Clean Air Act attainment areas for all criteria pollutants, although it does fall within WDE's proposed Wapato Hills-Puyallup River Valley Nonattainment Area for

$PM_{2.5}$. The Seattle-Tacoma area has been classified as an attainment area for carbon monoxide and ozone since 1996, and for particulate matter (PM10) pollution since 2001.

Use of internal combustion engines, and burning of carbon-based fuels for other purposes worldwide, have caused climate change impacts. Indications are that average atmospheric temperatures have been trending upward over the previous several decades, and are correlated to increased atmospheric carbon dioxide levels (IPCC 2001). Internal combustion engines emit carbon dioxide (CO_2) as one byproduct of efficient burning of fuel (gasoline or diesel). International efforts are being directed at reducing carbon release into the atmosphere. The University of Washington Climate Impacts Group (2008) predicts warmer, wetter winters for western Washington as one manifestation of global climate change.

4.6 Land Use

The project area has been characterized by industrial uses for several decades. In general, land use is related to port activities, including shipping, warehousing, fuel storage, and manufacturing. The Pier 23 property is part of the Port of Tacoma's Earley Business Center, a 50-acre waterfront maritime-oriented industrial complex. The Earley Center comprises pier and moorage facilities designed for vessel lay-up, outfitting/repair, and crane-served manufacturing buildings/yard areas; these facilities are used primarily for boat manufacturing, metal fabrication and construction of floating structures. Facilities are available for lease by the Port on both long- and short-term arrangements.

In addition to USAR, current and/or recent uses of the Erley Business Center include fishing fleet maintenance and outfitting; boat manufacturing; metal fabrication; and rebar handling. Properties neighboring Pier 23 include a yacht manufacturing company, Occidental Chemical, and metal fabricating operations. Directly adjacent to Pier 23 are Trident Marine's shipyard and warehouse facility, and parking lots to the northeast and south. The nearest non-industrial areas include a greenbelt on the Hylebos Waterway, and a private marina and residential neighborhood approximately 0.5 mile to the north, on the far side of Hylebos Waterway.

The zoning classification for the Pier 23 site and the surrounding area is S-10 Shoreline District-Port Industrial (Tacoma Municipal Code, 2003). This classification includes all areas within 200 feet of the waters of Commencement Bay, but does not include the northern side of the Hylebos Waterway. Water-oriented industrial, commercial, and transportation uses are permitted in this area (City of Tacoma 1997).

The City of Tacoma's shoreline master plan designates the Pier 23 property as Shoreline District 10, Port Industrial. The stated intent for this area is: "To allow the continued development of the Port Industrial Area, with an increase in the intensity of development and a greater emphasis on terminal facilities within the city."

Some mixed use does occur near the project site. Across the Hylebos Waterway, there are residential areas, and along the waterway exist marina. In addition, there are some ecosystem restoration and mitigation sites (for example Slip 5 on the outer Blair Waterway, as well as a site on the outer Hylebos Waterway, in addition to a site proposed by the Port of Tacoma near the project site).

4.7 Socioeconomics

Estimated 2007 population for the City of Tacoma was 196,520 (U.S. Census Bureau 2008). Of these, whites predominated at 132,969, followed by African American at 22,727, Asian at 16,023, Hispanic at two or more races at 11,029, American Indian and Alaska native at 3,242, and Pacific islanders at 1,998.

The port area of Tacoma is based on shipping, fishing, and a variety of commercial enterprises. Per capita personal income for Tacoma in general rose from $28,866 in 2001 to $35,054 in 2006 (U.S. Bureau of Economic Analysis 2008). This is slightly below values of $31,777 to $38,578 for the same period for the state of Washington. In Tacoma, 15.9% were below poverty level in 2005-2007 (U.S. Census Bureau 2008). Tacoma occupations from 2005 to 2007 were diverse, but dominated by the sectors of educational/health care/social (20%), retail trade (12%), professional (11%), manufacturing (10%), arts/entertainment/accomodation/food services (9%), construction (7%), and transportation/warehousing/utilities (7%).

4.8 Transportation

4.8.1 Vehicle Traffic

The peninsula on which Pier 23 is located is used by industrial and commercial traffic. Large trucks as well as smaller vehicles regularly use its roads for shipments to and from facilities located there. Interstate 5 runs more or less east-west near the base of the peninsula, about six miles from Pier 23. Vehicle traffic on surface streets increases with proximity to I-5, along which is a denser concentration of commercial and retail development in the City of Fife. Alexander Avenue and Taylor Way are the main roads leading to Pier 23. Traffic along these roads averages several hundred vehicles per day. Truck traffic makes up a large percentage of total traffic. Closer to I-5, vehicle traffic is in the thousands per day, and comprises passenger vehicles as well as commercial and truck traffic.

A general description of the study area's roadway network is given below. Further details are in USACE (2002), the Environmental Assessment for upland construction at Pier 23.

Alexander Avenue is a two-lane arterial with a posted speed limit of 40 miles per hour (mph) north of State Route (SR) 509 and 35 mph north of Lincoln Avenue. Alexander Avenue is located east of, and parallel to, the Port of Tacoma's Blake Waterway. Rail lines exist on the west side of this road between Lincoln Avenue and its northern terminus. In addition, there are a number of at-grade railroad crossings on Alexander Avenue used for transporting containers.

Taylor Way is a two to three-lane roadway located between the Blair and Hylebos Waterways and runs parallel to Alexander Avenue. Taylor Way terminates at 11th Street to the north and becomes 54th Avenue south of SR 509. 54th Avenue has a full interchange with Interstate 5, providing access to the regional highway system. The posted speed limit varies between 40 mph north of SR 509 and 30 mph north of Lincoln Avenue. Like Alexander Avenue, at-grade railroad crossings exist along this roadway and connect to rail lines on the east side of the road.

SR 509 is a three- to five-lane state highway with a posted speed limit of 40 mph. It connects the Northeast Tacoma and Federal Way areas to Tacoma at Interstate 705. This roadway is also

known as Marine View Drive east of the intersection with Taylor Way-54th Avenue. SR 509 is a divided four-lane highway that includes 12 foot travel lanes, 5 to 8 foot on-street bicycle lanes, and 4 foot paved shoulders west of Taylor Way. Rail spur lines do not cross this highway.

11th Street is a two- to five-lane roadway with a posted speed limit of 35 mph. West of the Taylor Way intersection there are rail lines on the north side of the road.

Lincoln Avenue is a two-lane road with a posted speed limit of 35 mph. There are rail spur lines on the north side of the road which connect with lines along Alexander Avenue and Taylor Way.

54th Avenue is a five-lane arterial that forms the southern leg of the SR 509/Taylor Way intersection. It connects the Port of Tacoma and SR 509 with Interstate 5. The posted speed limit on this road is 35 mph.

4.8.2 Vessel Traffic and Navigation

Commencement Bay is a heavily travelled body of water, with a large variety of recreational, commercial and industrial vessel traffic. Large oceangoing vessels are frequent visitors to the Port of Tacoma, which hosts some of the largest shipping volumes on the west coast of the U.S. Several waterways in inner Commencement Bay provide access to commercial, industrial and shipping facilities. There are two commercial piers close to Pier 23. Pier 23 itself is used only by the USAR. Except for the first 40 to 50 feet of the pier inshore, there is sufficient depth along the pier for use by large vessels. The design vessel (largest and highest-powered) assumed for prop wash evaluations for sediment armoring requirements (Kemron 2008) is a 128-foot inland and coastal tug with a loaded draft of nearly 17 feet, although larger vessels do use the pier. The bottom depth at the end of the pier is about 35 feet (mean lower low water). Vessel traffic at Pier 23 is mainly on drill weekends and two weeks per year during annual activation of Reserve troops, but also involves an ongoing activity level that includes administration and maintenance.

4.9 Noise

The Pier 23 property is in a commercialized and industrialized area characterized by a wide range of noise. Traffic, both surface vehicles and marine vessels, as well as noise associated with warehousing, berthing of vessels, loading and unloading of material, and manufacturing, are all prevalent in the Pier 23 area.

No noise-sensitive land uses are located within the immediate vicinity of Pier 23, though mitigation sites (see Sec. 4.6) do occur nearby. There is a residential community approximately 0.5 mile to the north, on the northern side of Hylebos Inlet, and an abandoned great blue heron nesting colony approximately 0.5 mile away. Several other noise-producing facilities lie between the Pier 23 site and these receptors.

The Washington Administrative Code (WAC) contains a set of maximum permissible sound levels based on the land use of the noise source and the land use of the noise receptor. Pier 23 lies in a Class C area designated for industrial uses. As a result, noise generated at Pier 23 may not exceed the following maximum levels: 70 dBA (WAC 173-60). The Washington state regulations contain several exemptions for maximum permissible limits for certain activities.

Construction noise between 7 a.m. and 10 p.m. weekdays is exempt from maximum noise levels in the state noise regulations.

4.10 Aesthetics

The Army Reserve's Pier 23 property is located in a highly industrialized area in the Port of Tacoma industrial yard. The upland portion of the Pier 23 is relatively flat and slopes very gently to the west, toward Commencement Bay. Views into and out of the site from most vantage points are not extensive. This is due to the height of the industrial facilities immediately adjacent to the site. Views to the southeast and southwest include the surrounding industrial uses of a yacht manufacturing company, Occidental Chemical, and a metal fabricating operations. Views to the east and northeast include Trident Marine's shipyard, warehouse facility, and parking lots. Distant views to the west include the urbanized portions of downtown Tacoma. Distant views to the northwest include the waters of Commencement Bay, Brown's Point, and Vashon Island beyond. Distant views to the south and east are blocked by the industrial facilities immediately adjacent to the site. No known sensitive viewsheds are present. The site is not part of the fore, middle, or background of any historic or significant public or private viewing areas.

5.0 ENVIRONMENTAL CONSEQUENCES

Impacts anticipated for alternatives being fully evaluated are as follows, based in part on earlier analysis (USACE 2004a, 2004b).

5.1 Water and Shoreline Resources

5.1.1 Wetlands

<u>Pier Replacement Alternative 1—No Action</u>
There would be no change in wetlands if the pier were not repaired or replaced, beyond the existing impacts from the presence of the pier. Subtidal wetlands would remain as they currently exist under the pier, and the intertidal environment would remain degraded from the historic mudflat-and-marsh delta habitat.

<u>Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction</u>
The pier area proposed for replacement is about 34,000 square feet; somewhat less area of intertidal and subtidal mud substrate would be directly affected by piling removal and replacement. Removal of wood pilings, and replacement with a smaller number of concrete pilings would not have a significant or negative effect. There may be minor resuspension and settling of sediment when pilings are removed, but they would be loosened first so they did not dislodge large blocks of sediment when removed. See Sec. 3.5.2 for other conservation measures to protect substrate quality. Removal of treated wood pilings would be a net benefit since they are a source of contamination for surrounding sediments. If temporary bridges are used during demolition and reconstruction of the pier, the barges or pontoons would be secured and held in the planned position by spud piles or anchor lines, as required to safely stabilize the access bridge. No spud piles or anchoring would be allowed in the Pier 24 remediation area that has been capped. That would not change wetland character significantly; impacts would be

short-term. There would be no change of the intertidal wetland character which has been altered from the historic condition.

Sediment Remediation Alternative 1—No Action

There would be no change from the present condition of wetlands at the project site under the No-Action Alternative. Contaminated sediments would remain in place and exposed in the marine deepwater and intertidal wetland area. Intertidal degradation from the historic delta condition would continue.

Sediment Remediation Alternative 2—Capping

This would affect about 58,000 square feet of intertidal and subtidal mud substrate. Surface character and function of the subtidal and intertidal wetland would change under this alternative. With the placement of armor rock, some of the substrate would change, but it would be topped with material similar to the native sediment that exists at the site. The contaminants would remain in place, although buried. Long-term monitoring would be needed to ensure proper containment against further exposure from propeller wash and wind waves. Over a long period of time, some siltation would occur from transport of fine material from the mouth of the Puyallup River, but it would not cover the rock for many decades at least. However, if this alternative did include vertical containment (sheetpile enclosure under the pier), the alteration of the natural substrate would be more pronounced, and the long-term siltation might take even longer to the extent that the enclosure extended above the existing grade.

Sediment Remediation Alternative 3—Dredging and (Upland) Disposal

This alternative would affect about 58,000 square feet of intertidal and subtidal mud substrate. It would benefit this substrate by removing contaminated material, and replacing it with uncontaminated sediment. Removal of contaminated sediments around the pier would improve quality of the local estuarine environment over the long term. In the short term, there would be effects on intertidal and subtidal substrate that would be directly related to dredging of sediments as part of the remediation. In general, those would include suspension and settling of sediments for short distances in the immediate vicinity of any dredging activity. The dredge is likely to stir up sediments on contact with the substrate, and as it picks up sediments and carries them to the surface. However, since tidal currents are only weak and variable in the project location (NOAA 2008[?]), it is not anticipated that sediments would be carried beyond the immediate vicinity of the dredging activity. Also, because a debris sweep would be done prior to dredging, at least some of the objects which might impede closure of the dredge bucket would be removed, which would assist in ensuring clean operation of the dredge and a more complete cleanup operation. Character of the intertidal wetlands at the site would still be noticeably altered from the historic river delta condition.

Sediment Remediation Alternative 4—Partial Dredging With Capping

Impacts from this treatment would be similar to the capping alternative, and would affect about 58,000 square feet of substrate. Over the long term, this alternative would remove some contaminants, and isolate the remaining contaminants from the wetland environment, but there would be some risk of reexposure, especially in the future event of maintenance dredging. It would thus not have the same long-term benefits as complete dredging of contaminated sediments. Short-term impacts could include partial exposure of higher-level contaminants of

concern prior to capping. There would be effects on intertidal and subtidal substrate that would be directly related to dredging of sediments as part of the remediation. In general, those would include suspension and settling of sediments for short distances in the immediate vicinity of any dredging activity. The dredge is likely to stir up sediments on contact with the substrate, and as it picks up sediments and carries them to the surface. However, since tidal currents are only weak and variable in the project location (NOAA 2008[?]), it is not anticipated that sediments would be carried beyond the immediate vicinity of the dredging activity. Also, because a debris sweep would be done prior to dredging, at least some of the objects which might impede closure of the dredge bucket would be removed, which would assist in ensuring clean operation of the dredge. Character of the intertidal wetlands at the site would still be noticeably altered from the historic river delta condition.

Slag Treatment Alternative 1—No Action
Slag accumulation would remain, posing a continued environmental risk from leaching of contaminants to the wetland area. The substrate would remain as it is, a hardened mass of oxidized metallic material and other debris, rather than a functioning intertidal wetland substrate.

Slag Treatment Alternative 2—Slag Removal
This alternative would affect about 2,000 square feet of intertidal area. With this alternative, the intertidal wetland would be able to return to something more properly functional and closer to natural shoreline wetlands. However, restoration would include placement of riprap in addition to other habitat material. Although the fine-sediment character of the shoreline might be altered in the short term, there would probably be some redistribution of sediment to the toe of the rock as a result of wave action. To the extent that siltation and vegetation could naturally occur following completion of construction, then wetland processes might more easily reeestablish themselves, but overall transport of silt to the project site would be a slow process given the weak currents at the project site. Character of the intertidal wetlands at the site would still be noticeably altered from the historic river delta condition.

5.1.2 Shoreline Condition

None of the alternatives addressed below would alter the character of the project site's upland area, which is a product of filling and development over several decades in what had been an intertidal marsh-and-mudflat delta of the Puyallup River. Pavement, buildings, and related infrastructure would remain in place. Native vegetation planted following construction of the new facilities would remain, as would some nonnative vegetation such as Scots broom.

Pier Replacement Alternative 1—No Action
The condition of the shoreline would remain as it is with this alternative, altered and impaired from historic river delta wetland conditions. The shoreline would continue to feature the pier in its deteriorated condition. The effect of the pier on the shoreline would still include facilities and supporting infrastructure. No other changes would occur.

Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction
In general, this alternative would not change the character of the shoreline from its present altered condition, since it concerns the structure of the pier itself, although the effect of the pier on the shoreline is a longstanding one that includes facilities and supporting infrastructure.

Sediment Remediation Alternative 1—No Action
The character of the intertidal area and shoreline would not be altered from its present degraded condition under this alternative. There would continue to be contaminated sediments in the intertidal zone, along with various debris that would not be removed.

Sediment Remediation Alternative 2—Capping
This alternative would alter the shoreline through the placement of capping materials and possibly sheetpile containment walls under the pier. It would not change the developed and degraded nature of the shoreline as it otherwise exists.

Sediment Remediation Alternative 3—Dredging and (Upland) Disposal
The shoreline condition would be improved from its present condition by removal of contaminated sediments in the intertidal zone. Intertidal substrate where contaminated sediments are removed would be topped with uncontaminated sediment which to the extent possible would be similar in character to that which exists there now. That would allow some natural resumption of shoreline processes in the intertidal area, including revegetation and colonization by invertebrates each spring following construction. However, the shoreline would remain altered from its historic river delta condition.

Sediment Remediation Alternative 4—Partial Dredging With Capping
Impacts to the shoreline from this alternative would be similar to those from dredging and disposal, except that there would be some chance of re-exposure of contaminants in capped sediments, especially with future maintenance dredging. It would thus not be as beneficial in the long run as with complete removal of contaminated sediments. The shoreline would remain altered from its historic condition that consisted of marsh and mudflat river delta.

Slag Treatment Alternative 1—No Action
The contaminated slag would continue to characterize the intertidal shoreline under and adjacent to Pier 23, dropping off from the upland paved area. *Fucus* would continue to grow on the slag, but intertidal values would be altered and the shoreline would continue to represent an artificially degraded habitat.

Slag Treatment Alternative 2—Slag Removal
The character of the shoreline would benefit from slag removal, from the standpoint that contaminants would be removed, and also due to the fact that an artificial mass of metals and debris would be replaced by rock and finer sediment, as well as possibly woody debris and vegetation which is likely to establish. However, nonnative species may recruit on their own, and management would be needed to ensure that native species more beneficial to the environment would take hold. The shoreline would continue to be altered from its historic river delta characteristics.

5.1.3 Bathymetry and Substrate

Pier Replacement Alternative 1—No Action
This alternative would have no effect on bathymetry or substrate.

Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction
This alternative would have no effect on bathymetry or substrate, except for the limited suspension and settling of sediments that would result from pile removal. Due to limited currents in the area, transport and settling of any suspended sediments are expected to remain very localized, and the net change in bathymetry would be very minor. No change in the character of the substrate would be expected from this alternative.

Sediment Remediation Alternative 1—No Action
This alternative would have no effect on bathymetry or substrate.

Sediment Remediation Alternative 2—Capping
Sediment capping would raise the substrate by several feet with rock armoring, overlain by a layer of finer sediments similar to what is there now. It would thus change bathymetry under and adjacent to the pier within 200 feet of the shore, making it shallower by about seven feet. It would permanently change the character of the substrate from generally fine sediment to large rock, overlain by fine sediment, over an approximately 58,000-square-foot area, under the pier and adjacent to it, within 200 feet of shore. It might also include sheetpile containment walls under the pier, potentially raising the substrate elevation there by several feet.

Sediment Remediation Alternative 3—Dredging and (Upland) Disposal
There would be a short-term excavation of the substrate within 200 feet of shore, under and adjacent to Pier 23. Excavation depths could be as much as 12 feet below grade, which below the pier is about two feet higher than surrounding grade. However, the dredged area would be backfilled with clean material consisting of uncontaminated sediments which to the extent possible would be similar to that which is now in the area.

Sediment Remediation Alternative 4—Partial Dredging With Capping
This alternative would alter substrate surface from fine sediment to rock. It would change the bottom elevation in places, but that would not be substantially shallower than existing conditions.

Slag Treatment Alternative 1—No Action
This alternative would have no effect on substrate or bathymetry.

Slag Treatment Alternative 2—Slag Removal
Substrate in the intertidal portion of the Pier 23 property would change from consolidated slag material to rock, sediment similar to existing intertidal substrate and possibly large woody debris. The bathymetry would be altered slightly with fill of sediment in a shallower grade where a steep solid bank now exists.

5.1.4 Tides and Currents

None of the alternatives for pier replacement, sediment remediation or slag removal would affect tides or tidal currents, or river currents. Those currents would remain weak and variable. Vessel-generated currents during normal operation of the pier would not change. USAR vessels would be kept away from the construction area, to minimize potential for avoidable propeller-generated disturbance to sediments being dredged or where pilings are being removed. The only

effects on current would be from the use of construction vessels involved in pile removal, pile placement, and sediment dredging and transport. This would be a temporary and overall minor effect.

5.1.5 Water Quality

Pier Replacement Alternative 1—No Action

Water quality would be unchanged if no action were taken to replace the shoreward half of the pier, with some impairments as listed by WDE (2007).

Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction

Insignificant suspension of contaminants is expected from removal of old pilings. Contaminants are not expected to exceed maximum criteria. Suspension of sediment would increase turbidity locally, but tidal currents would provide some dilution. Dissolved oxygen demand might locally increase with suspension of anaerobic sediments. Vibratory pile removal, and possible cutting of piles instead of pulling them, would minimize suspension of sediment. Previous monitoring efforts during construction of a large pier in Puget Sound indicated that turbidity associated with pile driving was generally less than 1 Nephelometric Turbidity Unit (NTU) higher than control stations (Roni and Weitkamp 1996). Care must be taken to avoid suspending sediments as a result of propeller wash during construction, including those sediments used in capping adjacent to Pier 24.

See the discussion of Hart Crowser's (2004) analysis of the potential for causing water quality maximum criteria to be exceeded, below under Sediment Remediation Alternative 3—Dredging and (Upland) Disposal. Given the small amount of sediment resuspension expected to occur during piling removal and driving (as compared to dredging), it is anticipated that the chronic criteria would be met at the mixing zone boundary (B. Bachman, HTRW technical specialist, Corps of Engineers, pers. comm. 2004).

Long-term effects of removal of treated wood pilings would be positive for water quality. There would be some leaching of material from concrete pilings that are used for this alternative; this could make pH levels slightly more basic in the immediate vicinity of the pilings. There are minor components of the pier decking that would consist of concrete cast in place. They would be contained and not directly exposed to the water in the bay; however, if it rained during or within a few days of placement, there might be runoff-related changes in pH toward basic values in the water under the pier. Seawater provides a buffering effect on pH changes, so effects of decking runoff and of precast piling placement would be reduced.

During construction activities, accidental release of fuel, oil, and other contaminants may occur. The contractor would be required to provide a spill prevention control and countermeasures (SPCC) plan prior to the commencement of any construction activities. The SPCC plan would identify and recognize potential spill sources at the site, outline best management practices, delineate responsive actions in the event of a spill or release, and identify notification and reporting procedures. Implementation of the SPCC plan would minimize the effect of construction activities on the quality of surrounding waters.

Overall, pier repair effects on water quality are expected to be short-term and not significant.

Sediment Remediation Alternative 1—No Action

This alternative would not change water quality from its existing condition. There would be little or no measurable effect on water quality in calm conditions. There might be some intermittent effects from sediment suspension due to vessel propeller wash in the immediate vicinity of the pier, and high wind conditions could also temporarily suspend sediments due to wave action. Effects from these circumstances could include temporarily increased turbidity, as well as minor redistribution of contaminated material.

Sediment Remediation Alternative 2—Capping

Construction of a sediment cap would entail placement of fine material, rock and a sand/gravel mix. Placement of the fines and sand would increase suspension of solid material and turbidity temporarily in the immediate project vicinity, but these materials would be clean, so biochemical oxygen demand would not be of concern. Conversely, because no dredging is involved, there would be no suspension of contaminated sediments with this alternative.

During construction activities, accidental release of fuel, oil, and other contaminants may occur. The contractor would be required to submit a spill prevention control and countermeasures (SPCC) plan prior to the commencement of any construction activities. The SPCC plan would identify and recognize potential spill sources at the site, outline best management practices, delineate responsive actions in the event of a spill or release, and identify notification and reporting procedures. Implementation of the SPCC plan would minimize the effect of construction activities on the quality of surrounding waters.

Monitoring of turbidity would take place, and controls would be used to ensure that any water quality effects would be localized to the immediate work area. Effects overall are expected to be temporary and insignificant.

Sediment Remediation Alternative 3—Dredging and (Upland) Disposal

The dredging operation would suspend some sediments, even with the use of a positive-sealing "environmental bucket." Although local currents are considered weak and variable, water quality and the potential for contaminated sediments to move outside the mixing zone boundary during dredging may be of concern. There is a potential for suspension of anaerobic sediments, leading to elevated biochemical oxygen demand (BOD). However, good mixing and cool water temperatures, especially in late fall and winter when biological productivity is low anyway, can help reduce such an impact.

Hart Crowser (2004) estimated the potential for exceedences of ambient water quality criteria (AWQC) at this site through application of a dredging elutriate test (DRET). The DRET predicts the release of sediment-bound and dissolved contaminants at the point of dredging (or suspension during pile removal and driving). DRET analyses were performed on a composite sediment sample from locations adjacent to the pier having the highest constituent concentrations to provide a conservative estimate of potential dredging impacts on water quality. Elutriate samples were submitted for chemical analysis of total suspended solids and dissolved total metals (arsenic, copper, lead, mercury, silver, and zinc). A sample of the ambient site surface water was also submitted for analysis. Laboratory results were compared against applicable

Washington State AWQC (WAC Chapter 173-201A). Separate chronic and acute AWQC are established for long-term and short-term protection, respectively. For dredging projects, Water Quality Certifications issued under Section 401 of the Clean Water Act generally require compliance with marine acute criteria at the point of dredging, and marine chronic criteria at the boundary of a surface water mixing zone established in the certification.

DRET results met marine acute and chronic AWQC compliance criteria with the exception of total mercury, which exceeded the chronic criteria. The total mercury concentration was 0.0748 μg/l compared to the chronic AWQC of 0.025 μg/l. The mercury appears to be associated with suspended particulate since the concentration of dissolved mercury was only 0.0003 μg/l. However, this result for mercury does not take into account expected dilution between the point of sediment disturbance and the mixing zone boundary.

During construction activities, accidental release of fuel, oil, and other contaminants may occur. The contractor would be required to provide a spill prevention control and countermeasures (SPCC) plan prior to the commencement of any construction activities. The SPCC plan would identify and recognize potential spill sources at the site, outline best management practices, delineate responsive actions in the event of a spill or release, and identify notification and reporting procedures. Implementation of the SPCC plan would minimize the effect of construction activities on the quality of surrounding waters.

Water quality monitoring for turbidity, and possibly dissolved chemicals and dissolved oxygen, would occur. Turbidity would be used as a surrogate for laboratory measured total dissolved solids. To avoid water quality values outside of mandated limits, dredgers would change construction methods in the field, or stop work. With proper conservation measures and monitoring, effects overall are expected to be temporary and insignificant.

Sediment Remediation Alternative 4—Partial Dredging With Capping

Water quality effects for this alternative would be similar to those for the dredging and disposal alternative, and would include suspension of solids (including contaminated sediments), turbidity, and possibly elevated BOD. Quantities to be dredged would be less than with full removal, however. Capping would include placement of fines, rock, and uncontaminated sediment which to the extent possible would be similar to what exists on the site. Turbidity and suspension of these materials would be a likely consequence of placement for capping. However, the materials would be clean, and effects temporary. For all activities associated with this alternative, monitoring and conservation measures would be used, and impacts to water quality overall are expected to be temporary and insignificant.

Slag Treatment Alternative 1—No Action

There would be no measurable effect on water quality with no action concerning slag.

Slag Treatment Alternative 2—Slag Removal

This alternative would result in temporary increases in turbidity and suspended solids, including contaminants, on a localized basis. The consolidation of the material, which is evident in surface layers, would also reduce suspension effects. Any underlying soft material that must be removed would be addressed by dredging, and similar effects might be expected as for sediment dredging,

discussed above. Monitoring for turbidity, suspended solids and dissolved oxygen would provide information during the operation that would allow suspension or modification of procedure so that water quality values remain within mandated levels. With proper monitoring and controls, the effects of this alternative on water quality are expected to be temporary and insignificant.

5.1.6 Sediment Quality

Pier Replacement Alternative 1—No Action

Taking no action to repair the pier would result in continued chronic contamination of sediments from the existing wooden pilings. Accumulation of polycyclic aromatic hydrocarbons (PAH) in sediments on the Pier 23 property may be attributable to diffusion from creosote-treated wood supporting the pier. PAHs in creosote-treated wood continues to migrate from structures for decades. Sediment accumulations of PAHs are greatest at and immediately adjacent to the structure, though PAH contamination can be patchy and relatively mobile (Poston 2001). PAH contamination has been linked to carcinogenesis, as well as developmental, nervous system, and hormone regulation impacts in marine organisms (Poston 2001).

Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction

Removal of creosote-treated pilings would benefit the sediment quality around the pier in the long term by eliminating a source of PAHs. Placement of precast concrete pilings would create a source of material that would leach out at low levels and create slightly more basic pH conditions in the sediment around the bases of the pilings. The limited circulation of water through the sediments would limit seawater buffering of this effect, but curing of the concrete would reduce the effect over the long term. Care must be taken to avoid suspending cap materials adjacent to Pier 24 as a result of propeller wash.

Sediment Remediation Alternative 1—No Action

Contaminants would remain in place and would represent a contaminated condition that would continue. This alternative would not address the environmental part of the purpose and need.

Sediment Remediation Alternative 2—Capping

Contaminants would remain in place under a soil and rock armor cap at the project site. The armoring is intended to prevent propeller scour. However, the potential exists for capping to fail or become less effective over time as a result of scour or wave action. The intention is to eliminate bioavailability of the contaminants by covering them and protecting the sediment layer from disturbance. Long-term monitoring would be required to ensure contaminant bioavailability issues remain addressed.

Sediment Remediation Alternative 3—Dredging and (Upland) Disposal

This alternative is intended to remove contaminated sediments and achieve SQOs at the project site. Dredging would be done to elevations required to remove contaminants of concern in order to meet the SQOs. Testing would be done to ensure that is the case, and that Sediment Quality Objectives are met before the action is completed. The contaminant values would at least meet (be less than) the following criteria:

Contaminant	*SQO (mg/kg)*
copper	390

mercury	0.59
zinc	410
phenanthrene	1,500
fluoranthene	2,500
pyrene	3,300
benzo(a)pyrene	1,600
indeno(1,2,3-c,d)pyrene	690
dibenzo(a,h)anthracene	230
benzo(g,h,i)perylene	720
total HPAH	17,000
total PCBs	300

Sediment Remediation Alternative 4—Partial Dredging With Capping
Some contaminants would remain in place under a soil and rock armor cap at the project site. The armoring is intended to prevent propeller scour. However, the potential exists for capping to fail or become less effective over time as a result of scour or wave action. The intention is to eliminate bioavailability of the contaminants by covering them and protecting the sediment layer from disturbance. Long-term monitoring would be required to ensure contaminant bioavailability issues remain addressed.

Slag Treatment Alternative 1—No Action
To the extent that leaching from the slag material is occurring, sediment contamination would also occur. Organic compounds suspected to be in the sediment underlying the slag would also remain in place and represent a long-term contaminant issue.

Slag Treatment Alternative 2—Slag Removal
This alternative would result in removal of the following contaminants from the shoreline environment waterward of the new sheetpile wall, to meet sediment quality objectives as listed.

Contaminant	*SQO (mg/kg)*
arsenic	57
copper	390
lead	450
zinc	410

Removal of the contaminated slag and underlying sediments, along with placement of clean backfill, would address long-term bioavailability issues for these contaminants of concern. In addition, underlying sediments would be removed if they do contain contaminants such as organic compounds. Backfill with clean material would help ensure that any remaining contaminants are not available to the biological environment.

5.2 Biological Resources

5.2.1 Marine Resources

A diversity of fish, invertebrates, mammals and birds, exist near the project area. Temporary effects due to noise, vibration, lighting, sediment suspension, and contaminant exposure are likely from the preferred alternative. Pile driving causes noise and disturbance for fish that may

not be avoidable, but observation for distressed, injured or dead fish will be made continually, and work will be halted for any needed corrective action if any are observed. Some fish would be able to avoid much of the activity, although small bottom-dwelling fish might in some cases be captured or smothered in the immediate locality of a dredge. As a result of the sediment remediation, suspension of solids would cause removal or smothering of benthic organisms, but recolonization would occur for most within a year. Continued shading of the nearshore environment as a result of the existence of the pier would negatively impact primary productivity, with indirect effects on secondary and higher productivity. The net removal of nearly 800 pilings would provide some benefit to benthic communities. Best management practices would be used to minimize effects. The approved in-water work window for protection of salmon and bull trout runs from August 16 to Feb. 14 (USACE undated). This is the most conservative window; other windows apply for surf smelt, sandlance and herring. It is possible that least surf smelt and sandlance are in the Blair and Hylebos waterways, but their spawning areas are away from the project site (EPA 2002). All in-water activities, including piling removal, sediment and slag remediation, and new piling installation, would be timed for the July 15 or August 16 to February 14 period.

Structural habitat for attached invertebrates and algae would be temporarily removed, but would be replaced with similar, though cleaner, habitat. Mussels, barnacles, anemones, bryozoans, tunicates and various algae would begin to colonize the new pilings by the first spring following construction, and further settling would occur in subsequent spring seasons.

Construction activities in the intertidal habitat may temporarily displace Dungeness crab, juvenile English sole, Pacific staghorn sculpin, and starry flounder. There may be some initial mortality to some of these species at the onset of dredging, but the continual disturbance would displace the mobile individuals.

Work in the subtidal area to – 30 ft MLLW would displace fish species such as starry flounder, Pacific sculpin, and shiner perch, and possibly birds (cormorants, coots and goldeneye for example) and mammals such as harbor seals.

Pier Replacement Alternative 1—No Action

Under this alternative, creosote-treated pilings would remain in place. PAH contamination has been linked to carcinogenesis, as well as to developmental, nervous system, and hormone regulation impacts in marine organisms (Poston 2001). This would remain a potential impact of the presence of the pilings, especially to those organisms living on or in close association with them. There would be ongoing effects of shading on the productivity of the benthic environment under the pier.

Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction

Temporary effects due to noise, vibration, lighting, sediment suspension, and contaminant exposure are likely from this alternative. the primary mechanisms for potential impacts to bull trout and other salmonids are: (1) temporary reduction in water quality associated with piling removal and placement; (2) increased noise disturbance associated with piling removal and placement; (3) temporary loss of benthic organisms and other prey due to substrate disturbance; and (4) potential exposure to contaminated sediments. The avoidance of pile driving and

removal, dredging, and slag removal during February 15 to August 15 will greatly reduce the likelihood for harm to salmon, steelhead and bull trout. Since construction will occur during a time of the year when those fish are least likely to be present in the action area, it is unlikely that water quality degradation, increased noise, or reduction in prey abundance would affect them. Piledriving may have deleterious effects on fish, especially driving of steel piles (Hawkins 2006). There may be injury (possibly to the extent of swim bladder burst), loss of hearing, or death. Steel piles create a more percussive, loud sound wave, compared to concrete or wood. Feist et al (1992) observed behavioral effects among juvenile pink and chum salmon; no effects on distribution were apparent, but their schooling behavior was influenced. The authors were unable to determine an overall impact. The project will likely involve concrete pilings. There could be effects from sediment suspension resulting from piling removal, including gill trauma, and effects on osmoregulation, blood chemistry, growth and reproduction. Other, behavioral effects might include feeding disruption, gill flaring and curtailment of territorial defense. Sediment suspension might increase biochemical oxygen demand and reduce levels of dissolved oxygen. It could shield prey fish from predators. Lighting of the construction area at night, while minimized, could aid predators in locating prey fish.

Sediment Remediation Alternative 1—No Action

Species using fine sediment habitat in Commencement Bay, such as Dungeness crab, juvenile English sole, Pacific staghorn sculpin, starry flounder, chum salmon, shiner perch, crustaceans (harpacticoid copepods, dungeness crabs, ostracods, shore crabs, coonstripe shrimp, and sand shrimps), polychaete worms, nematodes, oligochaete worms, and sea urchins, would continue to live under and around Pier 23, though contaminants would degrade habitat quality.

Sediment Remediation Alternative 2—Capping

Change of substrate under the pier to somewhat coarser material than the fine sediment currently found there would mean some alteration of benthic communities from mud-dwelling organisms (crustaceans [harpacticoid copepods, dungeness crabs, ostracods, shore crabs, coonstripe shrimp, and sand shrimps], polychaete worms, nematodes, oligochaete worms, and sea urchins) to those preferring sand, possibly including sea pens, crabs, copepods, shrimp and bivalves. Fish such as sold and flounder may also use sand substrate. However, gradual covering of the sand substrate with finer silts would occur over time, and benthic communities would change accordingly.

Sediment Remediation Alternative 3—Dredging and (Upland) Disposal

Effects of dredging on salmonid and other fish can include physiological and behavioral responses to suspended sediments (Newcombe and MacDonald 1991). Physiological effects can include gill trauma (Servizi and Martens 1987; Noggle 1978; Redding and Schreck 1987; McLeay et al. 1987, cited in Servizi 1988), and effects on osmoregulation, blood chemistry (Redding et al. 1987, cited in Sigler 1988), growth, and reproduction. Behavioral responses include feeding disruption from olfactory and visual impairment (Kim et al. 1986, cited in Sigler 1988); gill flaring; and curtailment of territorial defense (Berg and Northcote 1985, cited in LaSalle 1988). Conversely, some protection against predation may be afforded salmonids in areas of suspended sediment (Gregory 1988). Suspension of sediments can increase biochemical oxygen demand (BOD), and reduce dissolved oxygen levels in the water. Juvenile salmonids may be naturally exposed to some elevation in suspended sediment levels in estuaries and in streams carrying heavy loads of glacial silt (Gregory and Northcote 1993); the Puyallup and its

tributary the White are examples of glacially-fed rivers. Therefore it is not inevitable that juvenile salmonids would suffer major impacts from such levels of turbidity, but ideal conditions tend more toward lower turbidity levels. Larger, more mobile life stages and species (adult salmonids, steelhead smolts) will more easily avoid any activities if they are present at all. Change of substrate under the pier to somewhat coarser material than the fine sediment currently found there would mean some alteration of benthic communities from mud-dwelling organisms (crustaceans [harpacticoid copepods, dungeness crabs, ostracods, shore crabs, coonstripe shrimp, and sand shrimps], polychaete worms, nematodes, oligochaete worms, and sea urchins) to those preferring sand, possibly including sea pens, crabs, copepods, shrimp and bivalves. Fish such as sole and flounders would also use sand substrate. However, gradual covering of the sand with finer silts would occur over time, and benthic communities would change accordingly.

Sediment Remediation Alternative 4—Partial Dredging With Capping

Change of substrate under the pier to somewhat coarser material than the fine sediment currently found there would mean some alteration of benthic communities from mud-dwelling organisms (crustaceans [harpacticoid copepods, dungeness crabs, ostracods, shore crabs, coonstripe shrimp, and sand shrimps], polychaete worms, nematodes, oligochaete worms, and sea urchins) to those preferring sand, possibly including sea pens, crabs, copepods, shrimp and bivalves. Fish such as sole and flounders would also use sand substrate. However, gradual covering of the sand with finer silts would occur over time, and benthic communities would change accordingly.

Slag Treatment Alternative 1—No Action

The slag surface along the shoreline would continue to be occupied by *Fucus* and green algae. It would remain degraded habitat, and leaching of contaminants would probably be an inhibitor toward full colonization by a variety of marine intertidal species.

Slag Treatment Alternative 2—Slag Removal

Removal of contaminated slag and replacement of it by clean sand and rock would alter the shoreline community. *Fucus* and other algae would be removed, but would recolonize solid surfaces in the first spring following construction, and in subsequent years. That would also be the case for barnacles and other sessile intertidal invertebrates, as well as possibly sea stars. Crabs, copepods, shrimp, polychaete worms, and other invertebrates would colonize new sand substrate.

5.2.2 Sensitive, Threatened and Endangered Species

An earlier Biological Evaluation (BE) (USACE 2004b) concluded that the piling removal and replacement is not likely to adversely affect the bald eagle (no longer listed but protected under the Bald and Golden Eagle Protection Act), Coastal/Puget Sound bull trout, Puget Sound Chinook salmon, or Steller sea lion. Concurrences were provided to the USAR for these assessments.

A biological evaluation is being prepared concurrent with this EA and is being coordinated with the National Marine Fisheries Service and the US Fish and Wildlife Service under Sec. 7(a)(2) of the ESA. The BE was transmitted to the Services via letters dated February 9, 2009. The USAR has concluded that the proposed actions (Preferred Alternative) for piling removal and replacement, sediment removal and slag cleanup may affect, but is not likely to adversely affect

Puget Sound/Coastal bull trout, marbled murrelet, Puget Sound Chinook salmon, Puget Sound steelhead, Southern Resident killer whale, Steller sea lion, or humpback whale. The proposed actions are not likely to adversely affect designated critical habitat for Coastal/Puget Sound bull trout. The proposed actions would have no effect on leatherback sea turtle. The proposed actions would have no effect on designated critical habitat for marbled murrelet, Puget Sound Chinook salmon, Southern Resident killer whale, Steller sea lion or leatherback sea turtle. These determinations are detailed as follows:

Coastal/Puget Sound Bull Trout

The primary mechanisms for potential impacts to bull trout and other salmonids are: (1) temporary reduction in water quality associated with piling removal and placement; (2) increased noise disturbance associated with piling removal and placement; (3) temporary loss of benthic organisms and other prey due to substrate disturbance; and (4) potential exposure to contaminated sediments. The avoidance of pile driving and removal, dredging, and slag removal during February 15 to August 15 would greatly reduce the likelihood for harm to bull trout. Since construction would occur during a time of the year when bull trout are least likely to be present in the action area, it is unlikely that water quality degradation, increased noise, or reduction in prey abundance would affect bull trout. Piledriving may have deleterious effects on fish, especially driving of steel piles (Hawkins 2006). There may be injury (possibly to the extent of swim bladder burst), loss of hearing, or death. Steel piles create a more percussive, loud sound wave, compared to concrete or wood. Feist et al (1992) observed behavioral effects among juvenile pink and chum salmon; no effects on distribution were apparent, but their schooling behavior was influenced. The authors were unable to determine an overall impact. The project would likely involve concrete pilings. However, it is likely that few, if any bull trout would be in the area during the construction. Effects of dredging on salmonids include physiological and behavioral responses to suspended sediments (Newcombe and MacDonald 1991). Physiological effects can include gill trauma (Servizi and Martens 1987; Noggle 1978; Redding and Schreck 1987; McLeay et al. 1987, cited in Servizi 1988), and effects on osmoregulation, blood chemistry (Redding et al. 1987, cited in Sigler 1988), growth, and reproduction. Behavioral responses include feeding disruption from olfactory and visual impairment (Kim et al. 1986, cited in Sigler 1988); gill flaring; and curtailment of territorial defense (Berg and Northcote 1985, cited in LaSalle 1988). Conversely, some protection against predation may be afforded salmonids in areas of suspended sediment (Gregory 1988). Suspension of sediments can increase biochemical oxygen demand (BOD), and reduce dissolved oxygen levels in the water. Juvenile salmonids may be naturally exposed to some elevation in suspended sediment levels in estuaries and in streams carrying heavy loads of glacial silt (Gregory and Northcote 1993); the Puyallup and its tributary the White are examples of glacially-fed rivers. Therefore it is not inevitable that juvenile salmonids would suffer major impacts from such levels of turbidity, but ideal conditions tend more toward lower turbidity levels. The marine location of the project also reduces the potential for harm. The bull trout life history stages requiring the lowest suspended sediment concentration—spawning, incubation, and fry rearing—do not occur in project action area. If any bull trout were in the project area during construction, they would be large fish mobile enough to avoid the immediate construction zone without significant injury. The area of disturbance would be highly localized and temporary. There is a potential for exposure of bull trout prey to contaminated sediments attributable to leaching of contaminants from treated pilings, and from suspension of sediments

from dredging. Removal of contaminated sediments would reduce exposure of bull trout to contaminants in the bay through prey consumption or suspension of contaminants, and thus provide long-term benefit.

Conditions that have existed and would still exist with the pier in place include shading of substrate during the day (inhibits primary and secondary production and therefore impacts food resources for salmonids and other fish; affects migratory behavior); lighting of the water at night from operations and security illumination (may facilitate predators on salmonids but also possibly the salmonids' predation on other organisms). It is not clear that any means to address these conditions is available. Any light transmission through the pier by day must also address load requirements and keep contaminants from entering the water. Construction lighting would be kept to the minimum necessary. However, USAR operations require some lighting of the water for vessel activity, and security lighting must reach out over the water to some extent.

Primary constituent elements of bull trout critical habitat in the nearshore marine environment would be met as follows (italics):

- Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72 °F (0 to 22 °C) but are found more frequently in temperatures ranging from 36 to 59 °F (2 to 15 °C). These temperature ranges may vary depending on bull trout lifehistory stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence. Stream reaches with temperatures that preclude bull trout use are specifically excluded from designation: *Puget Sound temperatures vary between the 40's and 50's Fahrenheit year-round; the proposed action would not alter temperatures.*
- Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows: *There would be no physical, biological or water quality barriers created by the proposed action, given the timing of in-water work and the low likelihood of bull trout presence during that period.*
- An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish: *The proposed action would have minimal impact on any forage base for bull trout. Recolonization of marine food organisms would occur in the first spring after the work, and thus should be available for bull trout if and when they enter the project area from freshwater.*
- Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited. *The project area is marine and not subject to water availability limitations. There are also no likely limitations on reproduction, growth and survival in the project area. The proposed action would have only minor and temporary effects on water quality (sediment suspension and possible limited contaminant exposure), but bull trout occurrence in the project area does not appear to be great, and timing of the action would limit bull trout exposure; the long-term effect of contaminant cleanup would be beneficial.*

<u>Bald Eagle</u>

Construction work at the site would occur during the bald eagle wintering season. Noise disturbance would be the primary mechanism for impacts to the bald eagle. Pile driving would

likely be the activity that generates the most noise during construction. USFWS guidance suggests that noise associated with pile driving may disturb eagles up to a mile away (USFWS 1999). The closest documented area of regular eagle occurrence (a breeding area) in the Wildlife Heritage database is over two miles from the site. Foraging bald eagles may be temporarily displaced by the noise of heavy equipment, but the availability of prey is not expected to be significantly disrupted by project construction. Eagles tend to tolerate more disturbance at feeding sites than in roosting areas (Steenhof 1978).

Marbled Murrelet

Construction activities would have no effect on murrelet nests or nesting habitat, as none occur in the vicinity of the project. However, construction activities would occur in and adjacent to potential foraging habitat. The noise associated with operation of heavy equipment could disrupt foraging activities and cause murrelets to temporarily avoid the area. The effects of human disturbance on murrelets at sea are not well documented, but murrelets apparently habituate to heavy levels of boat traffic (Strachan et al. 1995). USFWS guidance suggests that noise above ambient levels is considered to potentially disturb marbled murrelets when it occurs within 0.25 mile of suitable foraging habitat (USFWS 1996). Construction activities would occur adjacent to suitable foraging habitat, but substantial human activity on both the waterward and landward sides of the shoreline is common and construction noise would be in highly localized with respect to this species' foraging range. Marbled murrelets are relatively opportunistic foragers; they have a flexibility in prey choice which likely enables them to respond to changes in prey abundance and location (USFWS 1996). This indicates that if murrelets are present in the immediate vicinity of construction activities, and if disturbed while foraging, they would likely move without significant injury. Therefore, the effect of noise disturbance associated with the proposed project is expected to be insignificant. The project is not expected to result in a long-term reduction in the abundance or distribution of murrelet prey items. The proposed project would not increase boat traffic in the action area.

Puget Sound Chinook Salmon

See discussion above concerning effects of piledriving and dredging on bull trout. Since construction would occur during a time of the year when juvenile Chinook are least likely to be present in the action area, it is unlikely that water quality degradation, increased noise, or reduction in prey abundance would affect Chinook. The Chinook life history stages requiring the lowest suspended sediment concentration—spawning, incubation, and fry rearing—do not occur in project action area. It is likely that any Chinook present in Commencement Bay during summer to early winter would be adult spawners moving toward the Puyallup River mouth, and possibly larger juveniles feeding in waters deeper than the immediate project area. The area of disturbance would be localized and temporary, so Chinook would not be affected significantly. There is a potential for exposure of Chinook prey to contaminated sediments attributable to leaching of contaminants from treated pilings, and from suspension of sediments from dredging. Removal of contaminants, and thus reduction in exposure of Chinook juveniles to them through feeding or sediment exposure, would be a benefit over the long term.

See also the discussion above concerning effects of shading and lighting on bull trout; the same applies to Chinook.

Puget Sound Steelhead

See discussion above concerning effects of piledriving and dredging on bull trout. Steelhead smolts are larger and more mobile than other salmon smolts, and they are transitory in nearshore areas upon outmigration. They are very unlikely to be in the action area during the in-water work. Adult steelhead may pass through the area during the in-water work, but would be quite mobile and able to avoid stressful situations. They are also migrating through the area on their way to entering the Puyallup River, and even if they might be exposed to stressful levels of environmentally deleterious circumstances, they would have relatively brief exposure and could avoid the area. There would be a long-term benefit to steelhead from removal of contaminants from the project area.

See also the discussion above concerning effects of shading and lighting on bull trout; the same applies to steelhead.

Southern Resident Killer Whale

There is some possibility of killer whales being present in the Commencement Bay area during the in-water project work, especially as they forage for salmon in late summer and fall. It is probably likely that both killer whales and their salmonid prey would avoid the construction activity. Killer whales would not be close enough to be exposed to any sediments that may be suspended in the water column from dredging or piling removal, and weak tidal currents probably make it unlikely they would be exposed to suspended contaminated sediments even if they were somewhere nearby. A long-term benefit from sediment and slag cleanup would result from reduced exposure of salmon to contaminants, and that would reduce to some extent the exposure of killer whales to those contaminants through feeding. No increase in vessel traffic in the project area would be created by the proposed action.

Steller Sea Lion

The lack of rookery and major haulout areas in southern Puget Sound makes it likely that any Steller sea lions that may be seen in the action area are on foraging expeditions. Construction activities would have no effect on breeding habitat or behavior, and are unlikely to affect the Steller sea lion prey base. Construction activities would occur in an area with substantial human activity on both the waterward and landward sides of the shoreline. Additional noise from the on-water operation of heavy equipment and piledriving may have an effect on foraging opportunities. Short-term impacts of any sound disturbance related to construction activities would likely result in displacement of animals rather than injury. The potential for long-term or indirect impacts of the proposed project to Steller sea lions is minimal. The proposed work would not increase vessel traffic in the area, and construction activities would not degrade water quality on a long-term basis or over a wide-spread area.

Humpback Whale

There is some possibility of one or more humpback whales being in the Commencement Bay area during construction. However, since sightings of humpbacks in southern Puget Sound in recent years are not common, and have not occurred during the August 16-February 14 in-water work window, it is considered unlikely they would be in the project vicinity when work is occurring. Humpbacks are highly mobile, and could exit the area if they found noise levels uncomfortable or interfering with their activities. Because of the general level of human activity

and disturbance in the project locality, humpbacks probably would not be close enough to be exposed to any sediments that may be suspended in the water column from dredging or piling removal, and weak tidal currents probably make it unlikely they would be exposed to suspended contaminated sediments even if they were somewhere nearby.

Leatherback Sea Turtle

The rarity of leatherback sea turtle occurrence in the region and the lack of breeding areas on the U.S. west coast mean that it is highly unlikely that this species would be in the project vicinity. Therefore, no effect of the project is expected on leatherback sea turtles. Designated critical habitat for this species is not located at or near the project site.

5.3 Cultural Resources.

In order to comply with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), the USAR and the Corps conducted a two phase cultural resource investigation. During coordination with the Washington State Historic Preservation Officer (SHPO) for the project, the USAR determined that no historic properties included or eligible for inclusion in the NRHP would be affected by the then proposed upland portion of the project during phase one. The USAR also determined that 540-foot long wooden section of the pier constructed prior to World War II and scheduled for demolition during phase two of the project was not eligible for the NRHP. The SHPO concurred with both USAR determinations (letter dated January 12, 1998, in Appendix C).

Phase two Corps studies conducted in August of 2003 by a staff archeologist included a search of the Washington Department of Archaeology and Historic Preservation (DAHP) electronic historic site database, other background research, a professional archaeological pedestrian survey, and completion of a report. Corps studies produced no evidence for the presence of historic properties listed in or eligible for listing in the National Register of Historic Places (NRHP) within or close to the project APE. No sites listed in the state electronic database were shown at or close to the project APE in 2003. A recent search (12 February 2009) of the updated database showed that the nearest recorded cultural resource to the project area was the National Register and Washington Heritage Register listed 1929 Fire Station Number 5 (NR Listing 86000961; 45-PI-650), which is located 4,000 feet to the southeast. The project has no potential to affect the fire station. For phase two of the project, the Corps reached a determination of no historic properties affected and SHPO concurred in a letter dated April 23, 2004 (letter in Appendix C). No archaeological monitoring was recommended.

To further identify historic properties, Section 106 (at 36 CFR 800.4[a][3]), requires Federal agencies to seek information from tribes likely to have knowledge of, or concerns with historic properties within the project's APE. In 2003 the Corps sent letters requesting specific assistance in identifying properties that may be of religious or cultural significance and may be eligible for the NRHP to the Puyallup Tribe, the Muckleshoot Tribe, and the Yakima Nation. No comments of concern or knowledge of the project area were received from these Tribes at that time. The Corps' cultural resource survey report was sent to these three Tribes at the same time it was sent to to the SHPO. More recently, in emails dated September 11, 2008, representatives of the Suquamish Tribe (Dennis Lewarch) and the Squaxin Island Tribe (Margaret Henry) indicated they had no cultural resources concerns with the proposed project.

5.4 Air Quality and Climate.

5.4.1 Air Quality

None of the action (construction) alternatives is expected to result in significant air quality degradation. During construction, there would be temporary and localized reduction in air quality due to emissions from heavy machinery conducting pile removal, dredging, slag removal, backfilling, new pile installation, and placement of new pier decking. Construction vehicles and heavy equipment would generate gasoline and diesel exhaust fumes, carbon dioxide (CO_2), carbon monoxide, nitrogen and sulfur oxides, hydrocarbons, unburned carbon particles and dust on roadways.

The evaluation below is for the action alternatives, in comparison with the no-action alternatives, because it is difficult to quantitatively differentiate among them. The No-Action Alternative would generate no construction-related air emissions. The action alternatives are assumed similar to the Preferred Alternative (timber pier demolition and reconstruction; sediment dredging and upland disposal; and slag removal (with upland disposal), because it is not known exactly how many of each type of equipment may be used.

Table 5 details total estimated project emissions for specific pollutants as derived from an average of maximum hourly emission rates for each engine size (not types of equipment) as found in the Sacramento Metropolitan Air Quality Management District (2008) roadway construction emissions spreadsheet model. Calculations assumed full time operation (10 hrs per day, 6 days per week) of ten 50-horsepower engines, ten 500-horsepower engines, and five 1000-horsepower engines over the 10-month project. In reality, operations may not be continual for all engines.

Table 5. Estimated air emissions from preferred alternative for Pier 23 construction.

horsepower	pieces	tons CO	tons ROG	tons CO_2	tons NO_x	tons SO_x	tons PM
50	10	4.1	1.8	162.8	1.8	0.020	0.2
500	10	4.5	2.7	1533.3	15.7	0.000	0.6
1000	5	19.2	4.7	1565.2	20.5	0.000	0.7
total emissions		27.8	9.1	3261.3	38.0	0.020	1.4

CO: carbon monoxide
ROG: reactive organic gases (= VOC: volatile organic compounds), an ozone precursor
CO_2: carbon dioxide
NO_x: nitrogen oxides, an ozone precursor
SO_x: sulfur oxides
PM: particulate matter

In addition, about 160 tons of CO_2 are expected to be generated from construction workers' personal vehicles using gasoline (based on 19.4 pounds CO_2 generated per gallon burned [USEPA 2008], and assuming 30 vehicles getting 20 miles per gallon and making six 40-mile round trips to the site each week for 10 months).

It is expected that air quality would meet standards set forth by the Washington Department of Ecology and would not be permanently affected by the construction of the project. Estimates using the Sacramento Metropolitan Air Quality Management District (2008) roadway construction emissions spreadsheet model indicate that no alternative would exceed the Environmental Protection Agency's (EPA) *de minimis* threshold levels (100 tons/year for carbon monoxide, 100 tons/year for NOx, and 50 tons/year for ROG/VOCs) (40 CFR 93.153). This project should not affect the implementation of Washington's Clean Air Act implementation plan.

Pier demolition would occur in conformance with the USAR's Asbestos Management Plan (USACE 2007).

5.4.2 Climate

Exacerbation of effects of CO_2 emissions on global climate change would be anticipated for any alternatives other than the no-action alternatives. The CO_2 emissions outlined above may seem insignificant compared to the thousands of metric tons emitted per year globally (Raupach et. al., 2007). Nevertheless, diesel fuel consumption by heavy machinery required for construction is a part of world-wide cumulative contributions to change in climate by way of increases in greenhouse gas emission. Furthermore, climate change models in the Pacific Northwest are predicting warmer, wetter winters and dryer summers which may trigger more flooding and frequent maintenance and repair of levees (UW CIG, 2008). However, given the minuscule contribution of CO_2 emissions resulting from this project to overall global emissions, impacts of any alternative are considered to be insignificant.

5.5 Land Use

None of the alternatives would alter, or have any significant effect on, land uses. The USAR would still use the Pier 23 facilities, and local businesses would not change as a result of any alternative. The overall industrial/commercial character of the project area would remain the same as it currently is.

5.6 Socioeconomics

The No-Action Alternatives would have no effect on socioeconomic profiles of Tacoma or Pierce County It is not expected that any alternative would have a measurable or significant effect on those profiles. Income from construction work would remain to some extent local with the likelihood that local labor and other resources would be used. However, overall income and occupation patterns are not expected to change measurably as a result of any alternative.

5.7 Transportation

5.7.1 Vehicle Traffic

None of the alternatives would result in a change in long-term operation-related traffic, as the pier repair and sediment and slag removal are intended only to maintain existing service in a cleaner and safer environment. Reservists would continue to utilize the site primarily on weekends.

The No-Action Alternative would result in no change to existing traffic patterns.

Construction-related traffic from the Preferred Alternative (pier demolition and reconstruction, sediment dredging and upland disposal, slag removal), as well as other action alternatives, would cause temporary increases to, and possible minor disruption of, local traffic. However, there is a pattern of large trucks and industrial and commercial traffic in the project area. Project construction activities resulting from the Preferred Alternative would not be significantly outside that pattern. Several dozen truck trips per day are possible, in addition to commute trips in personal vehicles driven by construction personnel. There is ample staging area at Pier 23, which is also at the terminus of Alexander Avenue, so trucks entering and exiting the project site would generally not interfere with other traffic, and should require no special traffic control action most of the time. The only exception might be on monthly drill weekends, when special arrangements (carpooling or busing from another site such as a Park and Ride lot) may be needed to reduce parking requirements for reservists using Pier 23 or Pier 24. Efforts would be made to minimize disturbances to traffic patterns during construction.

5.7.2 Vessel Traffic and Navigation

All of the action alternatives are expected to cause some very localized disruption to vessel traffic, but that disruption applies primarily, if not solely, to Pier 23 activities.

Pier Replacement Alternative 1—No Action

No disruption to vessel traffic would occur unless the wooden, inshore section of pier were declared at some point to be unusable, in which case USAR operations would need to be relocated. It is possible there would be a direct or indirect effect on other vessel use at an alternative facility, but that cannot be predicted at this time.

Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction

USAR vessels would need to readjust their use patterns on Pier 23 during construction, while the 606-ft section of pier inshore was removed and replaced. One option would have them moving to a different location in Puget Sound. That location has not been determined, but there may be direct or indirect effects on USAR vessel training activities, as well as on other vessels at any new location. That impact is not considered significant.

If Pier 24 is leased by the USAR, Trident Seafoods would tie some of their vessels up at a different Trident location, already used for the same purpose. It is possible that some vessels not being used could be moored along the outer half of Pier 23.

Sediment Remediation Alternative 1—No Action

The No-Action Alternative for sediment remediation would not result in any change to vessel traffic patterns or navigation.

Sediment Remediation Alternative 2—Capping

This alternative may impact navigation by reducing depth by as much as seven feet in the capped area. The design vessel used for analysis of propeller wash effects in Kemron (2008), Appendix B, had a loaded draft of 16 feet, 10 inches. At MLLW, the depth of the cap surface on the northeastern side of the pier would be about 17 feet at a rough distance of 60 feet from shore, and

would be 20 feet at roughly 90 feet from shore, versus 30 and 40 feet from shore, respectively, without capping (Kemron 2008, Fig. 3-2). Deeper-draft vessels may use the pier, but in general, depth may be more restrictive under this alternative. That would be more pronounced at times of year with minus tides.

There would be disruptions in use of the pier by USAR vessels during construction under this alternative, but those would be temporary, minor, and not significant.

Sediment Remediation Alternative 3—Dredging and (Upland) Disposal
Due to activity of dredging vessels and barges, there would be disruptions in use of the pier by USAR vessels during construction under this alternative, but those would be temporary, minor, and not significant.

Sediment Remediation Alternative 4—Partial Dredging With Capping
Due to activity of dredging vessels and barges, there would be disruptions in use of the pier by USAR vessels during construction under this alternative, but those would be temporary, minor, and not significant.

Slag Treatment Alternative 1—No Action
The No-Action Alternative for slag treatment would not result in any change to vessel traffic patterns or navigation.

Slag Treatment Alternative 2—Slag Removal
Use of waterborne equipment for removal of underlying sediments along the shoreline, if not for slag and sheetpile removal as well, would create temporary, minor and insignificant disruptions to navigation by USAR vessels using Pier 23.

5.8 Noise

There would be no increases existing in noise levels for the No-Action Alternatives, because no construction would be involved.

Construction activities associated with the Preferred Alternative (pier demolition and reconstruction, sediment dredging and upland disposal, slag removal) and other action alternatives would increase ambient noise conditions in the project area. However, these impacts would be short term; construction activities would occur over a six-month time frame. No restriction is required between 7 am and 10 pm on weekdays. No sensitive human noise receptors are located in close proximity to the project. Sites in flat-lying areas, such as the Pier 23 site, experience construction noise attenuation at a rate of 6 dBA for each doubling for distance between the source and the receptor (EPA 1978). For the sake of comparison, the range of human speech is between 50 and 70 dBA at one meter (U.S. Department of Housing and Urban Development 1985).

Peak construction noise emissions would be associated with pile driving. Peak noise levels 50 feet from pile driving would be as high as 105 dBA (EPA 1978). During pile driving, the residences lying approximately 0.5 mile to the north of Pier 23 would therefore experience peak level noise of approximately 70 dBA. Based on similar construction activities, operation of other

heavy equipment at the site would likely generate noise (at 50 feet) between 80 and 90 dBA (EPA 1978). Under the normal operating conditions at the site, areas 0.5 mile from the Pier 23 property would experience noise between 45 and 55 dBA. However, the anticipated noise increase would be minimized through the use of a vibratory extractor. These estimates are likely high, as the formula used to calculate them assumes no intervening obstructions (line-of-sight). Impacts would not be significant.

5.9 Aesthetics

None of the alternatives is expected to significantly alter aesthetics. Inner Commencement Bay peninsulas are heavily industrialized and commercialized. Construction activities would be mainly out of sight of the general public; the exceptions would be those living at higher elevations overlooking the bay, especially between Brown's Point and the upper end of the Hylebos Waterway. However, the work would not be out of character with the view they currently experience. The pier replacement alternative, and any shoreline habitat restoration following slag removal, may be of slightly higher aesthetic value than the other alternatives. No alternative would have a significant effect.

5.10 Cumulative Effects.

Commencement Bay has been heavily developed and industrialized. Near Pier 23, other redevelopment and nearshore restoration plans are underway. Notably, the Port of Tacoma plans a several-acre container shipping facility immediately adjacent and to the southwest of the Pier 23 property. This project would include dredging and filling in the nearshore area.

The historic estuarine habitats of Commencement Bay have been altered by previous dredging, filling, sewage and industrial discharges, and other anthropogenic activities over the past 100 years. A portion of Commencement Bay was designated as a Superfund site in 1981. Toxic chemicals and heavy metals introduced into the bay from a number of industrial activities continue to have adverse effects on the aquatic environment including benthic organisms, fish, marine mammals, and marine birds. In 1993, the effects of these changes were assessed in the Commencement Bay Cumulative Impacts Study (USACE 1993).

Estuaries are critically important to productivity and health of marine ecosystems. Specific impacts of loss of intertidal fine-grained habitat due to the filling and development of the Puyallup River delta include loss of primary and secondary productivity, since sediments, organics and nutrients are no longer deposited in the formerly extensive intertidal environment. Marsh vegetation has disappeared, plankton and invertebrate production has been impacted, and rearing and feeding areas for fish, including salmonids (some of which are listed under ESA) have largely disappeared, in a pattern similar to other areas around Puget Sound. This has contributed to major declines in a number of resources.

Declines in salmon, and contaminants in the ecosystem, have also impacted apex predators such as killer whales.

There are large-scale programs aimed at protecting and restoring natural values in Puget Sound; for example the Puget Sound Partnership (http://www.psp.wa.gov/) and the Puget Sound

Nearshore Partnership (http://www.pugetsoundnearshore.org/). There are also sediment cleanups underway; one was completed in recent years between Piers 23 and 24.

While the Preferred Alternative at Pier 23 does not alter the current developed character of the area, some positive effect is anticipated as a result of sediment and slag removal and cleanup, in addition to previous action taken at this site to remove contaminated sediments on the shoreline.

Climate impacts are an ongoing, worldwide issue as a result of combustion of fossil and other carbon-based fuels. Use of internal-combustion engines for this project is one contributor to the global trend of increasing greenhouse gas emissions.

5.11 Mitigation

No mitigation is proposed because the project action incorporates restoration components as well as BMPs that are protective of natural resources. The project would adhere to conditions imposed through ESA coordination and in permits received.

5.12 Unavoidable Adverse Impacts

The Preferred Alternative would result in potential short-term impacts including degradation of water quality (turbidity and contaminant resuspension) during construction, potential pH effects from concrete pilings (may shift water quality toward basic in the immediate local area), and increase in ambient noise levels and air emissions during construction. There would be potential negative impacts from shock waves during piledriving. These impacts would generally be localized in nature, short in duration, and minor in scope, and would be offset to the extent possible using best management practices. None of these impacts would be significant either individually or cumulatively.

5.13 Irreversible and Irretrievable Commitments of Resources

Resource commitments for the Preferred Alternative, once a decision is made and a contract(s) awarded, would include construction labor and equipment use, fuel, concrete, steel, other structural materials, and fill materials.

5.14 Relationship Between Short-Term Uses and Long-Term Productivity

The choice of the Preferred Alternative not only provides a chance for continued use of the pier in the short and long term, but also benefits to the aquatic community through removal of contaminants. This in turn provides a more healthy, productive aquatic environment, in an incremental sense given the overall developed and impacted nature of Commencement Bay. There would be short-term, construction-related impacts (see 6.11), but the long-term benefits to the public and the environment would outweigh those.

5.15 Environmental Justice

Executive Order 12898 on environmental justice directs Federal agencies to identify and address disproportionately high and adverse impacts of their action to low income or minority populations.

The area affected by the project includes African American, American Indian/Alaska native, Asian, Hispanic, Pacific islander and "other" (U.S. Census Bureau 2008). There is no known disproportionately high or adverse effect anticipated from the Preferred Alternative or any alternative on minority or low-income populations. Local hiring for the construction work may benefit these populations; there should be no net economic loss. Public health should not be affected.

6.0 COMPLIANCE WITH OTHER LAWS AND REGULATIONS

6.1 National Environmental Policy Act

This Environmental Assessment (EA) has been prepared pursuant to Sec. 102(C) of the National Environmental Policy Act (NEPA). It is being provided as a draft for review by the interested public, and all comments will be directly accounted for in the final EA.

6.2 Endangered Species Act

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, Federally funded, constructed, permitted, or licensed projects must take into consideration impacts to Federally listed or proposed threatened or endangered species.

Pursuant with Section 7 of the ESA, potential impacts of the proposed project on protected species are being evaluated in a separate Biological Evaluation (BE) submitted to USFWS and NMFS in letters dated February 9, 2009. The BE concluded that the proposed action is not likely to adversely affect any species protected under the Act, or the designated critical habitat of any of those species. The proposed work is not anticipated to reduce the quality or quantity of Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act, or to have an adverse effect.

Copies of correspondence with USFWS and NMFS are included as Appendix A.

6.3 Clean Water Act

Under Section 404 of the Clean Water Act (CWA), a permit is required for discharges of dredged or fill material into water of the United States. The USAR is applying for a Corps of Engineers permit under Sec. 404.

Under Section 401 of the CWA, a certification ensuring that a discharge will comply with State water quality standards is required. The USAR is applying to the Washington Dept. of Ecology for a water quality certification under Sec. 401, for all applicable activities in this project.

The sediment and slag removal is being conducted under CERCLA Sec. 121 and thus is considered exempt from permit requirements, but permitting evaluation will be needed by the Corps under Sec. 404.

The USAR has a current NPDES permit (WAR05A56F, dated April 4, 2001) that addresses stormwater that flows through an oil-water separator before discharging through the outfall

located under the pier. The facility also has a Vessel Oil Spill Response Plan for vessel units located at the 88th Regional Support Command facility, and includes any oil transport and transfer conducted aboard unit vessels. The contractor would be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) and file a notice of intent for construction prior to commencing construction, and would also be required to obtain a NPDES permit for treatment of dredged materials.

6.4 Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 prohibits the unauthorized obstruction or alteration of any navigable water of the United States. Activities that involve the construction of dams, bridges, dikes etc. across any navigable water, or placing obstructions to navigation outside established Federal lines and excavating from or depositing material in such waters, require permits from the Corps. The Corps conducts public interest reviews to ensure that proposed projects comply with Section 10, and as part of these reviews coordinates with other Federal, State, and local agencies.

The removal and replacement of the inshore 606 feet of pier is considered beyond normal maintenance, and therefore requires an individual permit under Sec. 10. The USAR is accordingly applying to the Corps of Engineers for a Sec. 10 permit for this activity.

6.5 Coastal Zone Management Act

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner that is consistent to the maximum extent practicable with the enforceable policies of a state's approved Coastal Zone Management (CZM) Program. The Shoreline Management Act of 1972 (RCW 90.58) is the core of authority of Washington's CZM Program. Primary responsibility for the implementation of the SMA is assigned to local government. The City of Tacoma implemented the SMA through the preparation of a Shoreline Master Program, codified in Chapter 13.10 of the Tacoma Municipal Code, which has been approved by the Department of Ecology.

Section 173-27-040(b) of the Washington Administrative Code exempts normal maintenance of existing structures from substantial development permit requirements. The proposed action would simply restore the pier to a state comparable to its original condition before damage by the elements occurred. Work would not extend beyond the footprint of the original project, and would not cause substantial adverse effects to shore resources or the environment. Section 13.10.005 of the Tacoma Municipal Code adopts the WAC 173-27-040 exemption of normal maintenance activities. The Army Reserve therefore considers the pier repair proposal to be consistent to the maximum extent practicable with the State of Washington Shoreline Management Program.

Additionally, the pier repair is considered consistent with the Tacoma Shoreline Management Master Program, Sec. 13.10.005, and cleanup of contaminated sediment and slag is consistent with Sec. 13.10.130, based on the designation of the project area as Port Industrial.

A coastal zone consistency statement (Appendix B) has been sent to the Washington Department of Ecology in conjunction with an application for a Sec. 401 Water Quality Certification under the Clean Water Act. Pursuant to Federal Coastal Management Consistency Regulations, a Federal agency may presume State agency concurrence if a State's response in not received within 60 days from receipt of the Federal agency's consistency determination [15 CFR 930.41(a)].

6.6 Native American Graves and Protection Act

The Native American Graves Protection and Repatriation Act (NAGPRA; 25 USC 3001) addresses processes and requirements for Federal agencies regarding the discovery, identification, treatment, and repatriation of Native American and Native Hawaiian human remains and cultural items (associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony). Consistent with procedures set forth in applicable Federal laws, regulations and polices, the USAR will proactively work to preserve and protect natural and cultural resources, and establish NAGPRA protocols and procedures.

No evidence of Native American graves, human remains or associated cultural items is known or anticipated in the project area.

6.7 National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA; 16 USC 470), requires that Federal agencies identify, evaluate and assess the effects of undertakings on sites, buildings, structures, or objects listed in or eligible for listing in the National Register of Historic Places (NRHP). Eligible properties must generally be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria for significance. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the environmental review process required by NEPA and with other statutes. Recently-amended Washington State laws also apply on non-Federal lands, including the Archaeological Sites and Resources Act (RCW 27.53), Indian Graves and Records Act (27.44 RCW) and the Abandoned and Historic Cemeteries and Historic Graves Act (68.60 RCW).

In order to comply with Section 106 of the NHPA, the USAR and the Corps conducted a two phase cultural resource investigation, coordinated with the potentially affected tribes, and received SHPO concurrence with determinations of no historic properties affected for both phases of the project.

If, during construction activities, the Contractor observes items that might have historical or archeological value, such observations shall be reported immediately to the Contracting Officer, or, if present, the Corps' construction supervisor so that the appropriate authorities may be notified and a determination can be made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in the destruction of these resources and shall prevent his employees from trespassing on, removing, or otherwise damaging such resources.

6.8 Magnuson Fishery Conservation and Management Act

The Magnuson Fishery Conservation and Management Act requires Federal agencies to consult with the National Marine Fisheries Service (NMFS) regarding actions that may affect Essential Fish Habitat (EFH) for Pacific coast ground fish, coastal pelagic species, and Pacific salmon. The Act defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Descriptions of EFH are provided in Fishery Management Plans produced by the Pacific Fisheries Management Council.

The project area is designated as EFH for various life stages of 17 species of groundfish, 5 coastal pelagic species, and three species of Pacific salmon. An evaluation of the proposed action's effects on EFH is included in the Biological Evaluation being submitted to NMFS as part of the ESA Section 7 consultation. This evaluation concluded that the proposed action would not reduce the quality and/or quantity of EFH. No adverse effects to EFH are expected to result from the proposed action.

6.9 Clean Air Act

The Clean Air Act required states to develop plans, called State implementation plans (SIP), for eliminating or reducing the severity and number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS. The Act also requires Federal actions to conform to the appropriate SIP. An action that conforms with a SIP is defined as an action that would not: (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The project area is not located in a non-attainment area (though it is proposed by WDE as a nonattainment area for $PM_{2.5}$), and any adverse impacts to air quality associated with the project would be temporary and localized, so the project should not cause or contribute to any new violation of any standard in the project area.

As part of the design activities, a hazardous building materials survey was performed by certified inspectors (Asbestos Hazard Emergency Response Act [AHERA]) on the timber portion of Pier 23 that would be demolished. The asbestos abatement and light tube and ballast removal and disposal recommendations in the survey report would be implemented prior to the demolition of the wooden portion of Pier 23. Technical specifications and drawings are required to implement the survey report recommendations related to hazardous materials present and would be included in the demolition portion of the design package for the project.

6.10 Executive Order 12898 - Environmental Justice and Child Protection

Executive Order 12898 requires all Federal agencies to seek to achieve environmental justice by "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Generally, the environmental justice assessment effort seeks to identify any minority or low-income communities affected by a proposed action, the health and safety

risks associated with a proposed action, and the availability of information to affected communities regarding a proposed action and its potential effects.

Pier 23 is located in the Port of Tacoma Industrial yard within the City of Tacoma. This area is highly industrial in nature and no residential communities (including minority or low-income communities) are located within the area. The nearest residential area is a neighborhood of single-family homes approximately 0.5 mile north of the proposed site. This neighborhood is separated from the proposed site by Hylebos Waterway. Moreover, no children live in the general vicinity of the proposed action. The site is largely inaccessible, and no facilities or activities in the area involve or attract children.

The proposed action does not involve the siting of a facility that will discharge pollutants or contaminants, so no human health effects would occur. Pier maintenance would not negatively affect property values in the area, or socially stigmatize local residents or businesses in any way. No interference with Native American Nations' treaty rights would result from the proposed project. The proposed action would not have any disproportional adverse impacts on minority or low-income communities, or have significant adverse impact on children's health and safety.

6.11 Executive Order 13175 - Consultation and Coordination With Indian Tribal Governments

Executive Order 13175 requires all Federal agencies to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

The proposed action would not have substantial direct effects on one or more Indian tribes. The USAR and Corps consulted with the Puyallup Tribe, which has treaty fishing rights in the project area. No tribe has raised any concerns about the proposed action. In emails both dated September 11, 2008, representatives of the Suquamish Tribe (Dennis Lewarch) and the Squaxin Island Tribe (Margaret Henry) indicated they had no cultural resources concerns with the proposed project.

7.0 CONCLUSION

Based on the above analysis, this project is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an environmental impact statement. This conclusion will be documented via a Finding of No Significant Impact.

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Environmental Assessment
Signature Sheet

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APPENDIX A. Endangered Species Act Correspondence

DEPARTMENT OF THE ARMY
HEADQUARTERS, 88TH REGIONAL SUPPORT COMMAND
60 SOUTH O STREET
FORT MCCOY, WISCONSIN 54656

REPLY TO
ATTENTION OF

9 February 2009

Directorate of Public Works

SUBJECT: US Army Reserve Pier 23 Replacement BE

Mr. Ken Berg, Manager
Western Washington Fish and Wildlife Office
U.S. Fish and Wildlife Service
510 Desmond Dr., Suite 102
Lacey, Washington 98503-1273

Dear Mr. Berg:

The U.S. Army Reserve (USAR) is proposing to remove and replace part of Pier 23, between the Hylebos and Blair waterways on Commencement Bay in Tacoma, Washington (T21N, R03E, Section 27). In conjunction, the Army Environmental Command (AEC) proposes to dredge contaminated sediments within 200 feet of the shoreline under and adjacent to Pier 23, and to remove contaminated slag on the shoreline under and adjacent to Pier 23. Work would begin in summer 2009. The Army Reserve is the federal lead for consultation and conference responsibilities regarding this action, including Corps permitting. However, the U.S. Army Corps of Engineers (Corps), Seattle District Environmental Resources Section, has provided assistance in writing our BE.

Pursuant to Section 7 of the Endangered Species Act, as amended, a Biological Evaluation is enclosed. The determination is that the proposed actions are not likely to adversely affect listed species or critical habitat which may be found in the project area. Individual determinations for species under USFWS jurisdiction, in brief, are as follows.

- The proposed action **may affect, but is not likely to adversely affect bull trout *Salvelinus confluentus*, and not likely to adversely affect designated critical habitat of Coastal/Puget Sound bull trout**. This determination is based upon the localized geographic scope of the project, and the low likelihood that bull trout would be present in the action area during the period when potential effects would be most likely to occur. It is also based on the expected maintenance of PCEs for bull trout critical habitat.

- The impacts to bald eagle from the proposed project are discountable, and the project **is unlikely to disturb bald eagles *Halieaeetus leucocephalus*; therefore, no permit under the BGEPA is required**. Noise associated with construction activities has the potential to temporarily disrupt feeding opportunities in a localized area, but the proposed action will not alter the long-term food base.

- Construction activities will have no effect on marbled murrelet *Brachyramphus marmoratus* nesting habitat, and limited effects on their food base. Construction noise, including that from piledriving, may cause temporary displacement if murrelets are disturbed, but is not likely to result in injury or long-term behavioral disruption. This is based in part on the use of concrete instead of steel piles, and in part on the relatively low occurrence of marbled murrelets in Commencement Bay surveys.

Marbled murrelet presence and behavior will be monitored for signs of disturbance or distress during pile driving. If disturbance or distress are noted, work will stop until corrective measures are determined and implemented. Therefore, effects of any noise disturbance during construction are expected to be insignificant. The proposed action **may affect, but is not likely to adversely affect the marbled murrelet**. The proposed action will have **no effect on designated critical habitat** for this species.

The same BE is also being provided to the National Marine Fisheries Service, with a request for their concurrence on effects determinations for species under their jurisdiction.

Please respond to this office with your concurrence or nonconcurrence on these effects determinations within 30 days of the date of this letter. Mr. Jeff Laufle is the Corps' environmental coordinator in the Environmental Resources Section, and may be contacted at (206) 764-6578, or jeffrey.c.laufle@usace.army.mil. Mr. Ken Brunner is the Corps' ESA coordinator and may be reached at (206) 764-3479, or kenneth.r.brunner@usace.army.mil. Please contact either Mr. Laufle or Mr. Brunner if you have questions concerning the ESA determinations. You may also contact the USAR or AEC for other questions concerning the proposed work. The USAR representative for this project is Ms. Meline Skeldon, at (206) 301-2177, or email meline.skeldon@us.army.mil. AEC's representative is Mr. Rich Mendoza, 309-782-1871, or richard.r.mendoza@us.army.mil.

DAVID L. MOORE
Chief, Environmental Division

DISTRIBUTION
David Moore 88th RSC
Meline Skeldon, USAR
Rich Mendoza, AEC
Andrea Naccarato, USAR
Deborah Johnston, USACE, Seattle District ERS
Jeff Laufle, USACE, Seattle District ERS
Olivia Romano, USACE, Seattle District Regulatory Branch

DEPARTMENT OF THE ARMY
HEADQUARTERS, 88TH REGIONAL SUPPORT COMMAND
60 SOUTH O STREET
FORT MCCOY, WISCONSIN 54656

REPLY TO
ATTENTION OF

9 February 2009

Directorate of Public Works

SUBJECT: US Army Reserve Pier 23 Replacement BE

Mr. Steve Landino, Director
Washington State Habitat Office
National Marine Fisheries Service
510 Desmond Drive SE, Suite 103
Lacey, Washington 98503

Dear Mr. Landino:

The U.S. Army Reserve (USAR) is proposing to remove and replace part of Pier 23, between the Hylebos and Blair waterways on Commencement Bay in Tacoma, Washington (T21N, R03E, Section 27). In conjunction, the Army Environmental Command (AEC) proposes to dredge contaminated sediments within 200 feet of the shoreline under and adjacent to Pier 23, and to remove contaminated slag on the shoreline under and adjacent to Pier 23. Work would begin in summer 2009. The Army Reserve is the federal lead for consultation and conference responsibilities regarding this action, including Corps permitting. However, the U.S. Army Corps of Engineers (Corps), Seattle District Environmental Resources Section, has provided assistance in writing our BE.

Pursuant to Section 7 of the Endangered Species Act, as amended, a Biological Evaluation is enclosed. The determination is that the proposed actions are not likely to adversely affect listed species which may be found in the project area. Individual determinations for species under NMFS jurisdiction, in brief, are as follows.

- The proposed action **may affect, but is not likely to adversely affect Puget Sound Chinook salmon *Oncorhynchus tshawytscha*, and will have no effect on designated critical habitat for Puget Sound Chinook salmon**. This determination is based upon the localized geographic scope of the project, and the low likelihood that vulnerable life stages of Chinook would be present in the action area during the period when potential effects would be most likely to occur. It is also based on the exclusion of Pier 23 from Chinook critical habitat.

- Because of their high mobility and transient presence in the action area, and because of the timing of juvenile passage outside the in-water work window, the proposed action **may affect, but is not likely to adversely affect Puget Sound steelhead *O. mykiss*.**

- Because of the likelihood that killer whales *Orcinus orca* and their salmonid prey could avoid the project area, and because of the long-term positive effects of contaminant removal, the proposed action **may affect, but is not likely to adversely affect Southern Resident killer whales, and will have no effect on designated critical habitat for Southern Resident killer whales.**

- The proposed action is **not likely to adversely affect the Steller sea lion *Eumetopias jubatus*,** since the potential for significant sound disturbance or impacts to water quality and prey abundance is very low. The proposed action will have **no effect on designated critical habitat** for this species.

- Because of the low likelihood of presence of humpback whales *Megaptera novaeangliae* near the project during construction and their high mobility, as well as the long-term beneficial effect to the aquatic environment from sediment and slag cleanup, the project **may affect, but is not likely to adversely affect humpback whales**.

- In addition to the above determinations, the USAR and AEC believe that the proposed action will have **no effect on leatherback sea turtles *Dermochelys coriacia***, and **no effect on leatherback sea turtle critical habitat** due to the rarity of this species in the Puget Sound area and the lack of breeding habitat on the U.S. west coast.

The USAR requests that the in-water work window commence on July 16, rather than August 16 as published on the Corps' Regulatory Branch website: *(http://www.nws.usace.army.mil/publicmenu/DOCUMENTS/REG/work_windows_-_all_marine_&_estuarine2.pdf).* This is because of the large amount of work needed in the water and the desirability of achieving it within one in-water work window. Conservation measures are outlined in the BE to protect salmonids and other resources. Verbal coordination has occurred with your organization on this matter (Pam Sargent [project design contractor Tetratech], conversation with Shandra O'Haleck, Jan 9, 2009).

The same BE is being provided to the U.S. Fish and Wildlife Service, with a request for their concurrence on effects determinations for species under their jurisdiction.

Please respond to this office with your concurrence or nonconcurrence on these effects determinations, as well as on the request to extend the in-water work window, within 30 days of the date of this letter. Mr. Jeff Laufle is the Corps' environmental coordinator in the Environmental Resources Section, and may be contacted at (206) 764-6578, or jeffrey.c.laufle@usace.army.mil. Mr. Ken Brunner is the Corps' ESA coordinator and may be reached at (206) 764-3479, or kenneth.r.brunner@usace.army.mil. Please contact either Mr. Laufle or Mr. Brunner if you have questions concerning the ESA determinations. You may also contact the USAR or AEC for other questions concerning the proposed work. The USAR representative for this project is Ms. Meline Skeldon, at (206) 301-2177, or email meline.skeldon@us.army.mil. AEC's representative is Mr. Rich Mendoza, 309-782-1871, or richard.r.mendoza@us.army.mil.

DAVID L. MOORE
Chief, Environmental Division

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APPENDIX B. Coastal Zone Consistency Determination

Pier 23 Repair
Sediment Remediation,
and Slag Removal

Tacoma, Washington

Coastal Zone Management Act Consistency Determination

The U.S. Army Corps of Engineers, Seattle District (Corps) is assisting the U.S. Army Reserve (USAR) concerning needed work at Pier 23, on Commencement Bay at Tacoma, Pierce County, Washington. Work is proposed to include the demolition of the first 606 feet of timber pier beginning at the shoreline, the remediation of sediment under and around the demolished portion of the pier, the removal of slag material adjacent on the shoreline adjacent to the foot of the pier, and the reconstruction of a new concrete section of the pier.

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State Coastal Zone Management Programs (CZMP). The Shoreline Management Act of 1972 (RCW 90.58) is the core of authority of Washington's CZMP. Primary responsibility for the implementation of the SMA is assigned to local government. The pier repair, sediment remediation and slag removal actions are activities undertaken by a Federal agency; the following constitutes a federal consistency determination with the enforceable provisions of the Washington Coastal Zone Management Program.

The determination of this project's consistency with the Coastal Zone Management Act is based upon review of the Washington's CZMP, *Managing Washington's Coast: Washington State's Coastal Zone Management Program* (Ecology Publication 00-06-029, February 2001); the Washington Administrative Code (WAC) Shoreline Management Act Titles; and the adopted City of Tacoma Shoreline Management Master Program (SMP).

1. PROJECT DESCRIPTION

The proposed action is considered at this time to be the preferred alternative for NEPA purposes. That consists of demolition and reconstruction of the shoreward 606 feet (roughly half) of the pier, sediment dredging and upland disposal, and slag removal and upland disposal. Figure 1 provides a site diagram for the project area, which includes the pier and the immediately surrounding area to be dredged (within 200 feet of shore), as well as the slag area along the shoreline of the property.

The most widespread effect of the proposed action will likely be the increase in ambient noise levels associated with pile driving. The action area for the proposed in-water work is therefore defined as all areas within a one-mile radius of the project site. This would include the immediate project site under and adjacent to the pier, southwest to the Blair Waterway and northeast to the Hylebos waterway, along with the nearshore waters of Commencement Bay.

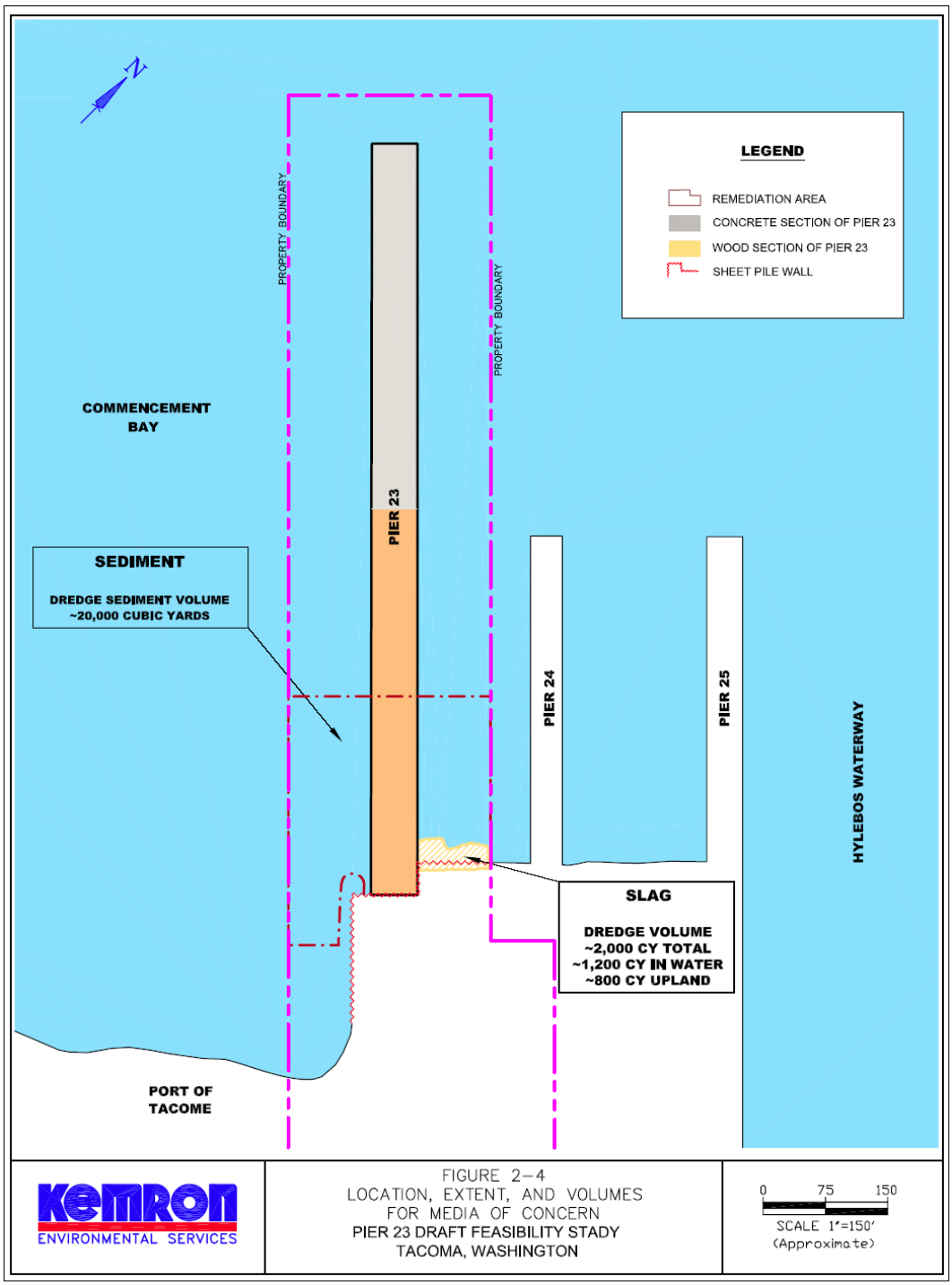


Figure 1. Site diagram showing areas of proposed action (from Kemron 2008).

<u>Pier Replacement—Timber Pier Demolition and Reconstruction</u>

This action consists of demolishing the shoreward, wooden 606 feet of the pier and replacing it with a new concrete-surfaced pier on concrete pilings. Approximately 1,100 creosote-treated timber piles (structural and fender) will be removed from the wooden section of the pier. These pilings will be replaced with 308 pre-cast concrete piles. Utilities running beneath the pier will

also be replaced. All new utilities (fire suppression water, potable water, electric, communications, stormwater, compressed air) will be above deck. The deck is planned to be pre-cast, shipped in and then lifted into place. The deck joints will be grouted and forms will fully contain grout mix. The bents ("pile caps," or long rectangular sections on top of piles that the pre-cast deck will rest on) will be cast in place, as this is the only practical way to account for piles not being in perfect alignment after driving. Like the grouting however, the forms will fully contain the concrete mix used to form the pile caps.

There will be security lighting at night that will illuminate the pier and nearby surrounding water during pier operation. During the day, the pier will shade the substrate immediately underneath it, unless a means can be found to admit effective amounts of light without compromising the ability of the pier to support heavy loads and to simultaneously keep contaminants from vehicles and equipment from falling into the water.

There are two options for timber pier demolition and reconstruction, in order to accommodate continued operation of the pier, and to aid sediment remediation. Any in-water work for these options will occur during the approved work window.

- The preferred and anticipated temporary arrangement for the Army Reserve vessels during the Pier 23 Replacement construction is for all of the Army Reserve vessels to be relocated to Pier 24. Currently Trident Seafood Co. uses Pier 24 for its operations. Trident's vessels would be relocated to another existing facility for the duration of the construction at Pier 23.
- As a backup (contingency) plan in the event that the adjacent pier cannot be used by the Army Reserves during construction and it is necessary to maintain access and operations for the existing outer pier section, a temporary floating pier would be installed to connect the uplands to the existing outer pier section. The temporary floating pier would consist of a series of floating deck barges or floating pontoons connected together and extending from shore to the existing concrete portion of Pier 23 approximately 600 feet from shore. The barges or pontoons in the resulting access bridge would be secured and held in the planned position by spud piles or anchor lines, as required to safely stabilize the access bridge. No spud piles or anchoring would be allowed in the Pier 24 remediation area that has been capped. Measures would be included in contract documents such that the capped area adjacent to Pier 24 would be not be disturbed.

<u>Sediment Remediation—Dredging and Upland Disposal</u>

This action consists of dredging about 20,000 cubic yards (Kemron 2008) adjacent to the shoreward 200 feet of pier, backfilling with clean (uncontaminated) material which to the extent possible would be similar to what exists on the site. The area to be dredged would be about 58,000 square feet, and possibly 12 feet in depth in some places. Sediment to be removed does not pose a human health risk, allowing some flexibility in handling and disposal.

Prior to the start of dredging, a debris sweep of the dredge area would be performed with the intent of removing debris that would interfere with the dredging operations. Debris would be placed on a barge, transferred to an upland transfer site (location to be determined), resized and sorted as necessary for recycling or disposal, and transferred by truck and/or train to a permitted facility for recycling (if possible) or for disposal.

After the debris sweep is completed, dredging would commence using a mechanical dredge with a closed, environmental bucket wherever possible. A heavier digging bucket may be necessary in certain areas. Dredge material would be placed in a haul barge. Dredge material would be dewatered as necessary to meet the disposal facility's acceptance criteria. Decanted water would be treated (filtered at minimum) and discharged in accordance with the project's water quality certification and National Pollutant Discharge Elimination System permit.

The dredged area would be backfilled to surrounding grade with uncontaminated material and would include at least a surface layer of material similar to that which currently exists there, deeper than the bioturbation zone.

Dredged material would be taken by barge to be offloaded at an upland site (location to be determined), then shipped by truck and/or train to a permitted landfill for disposal.

Slag Removal

Slag removal will entail mechanical cutting back into the bank to a depth of approximately 3 feet below water surface. Volume to be removed is estimated at about 1,200 cubic yards in the water, and about 800 cubic yards upland. Removal will entail use of an excavator and/or dredge mounted on a barge for the in-water portion, and possibly for the upland portion as well, due to limited upland working space. A digging bucket may be used, or a hoe-ram if the slag is too hard. Underlying soft slag material will be dredged. A temporary construction sheet pile wall near the existing machine shop will first be installed and the existing sheet pile walls to remain will be stabilized by new soil tie-backs before the dredging of the slag and contaminated sediment starts. With the temporary sheet pile wall in place, the existing sheet pile wall in the vicinity of the slag remediation will be removed. Following the slag removal and backfill with clean material, a new permanent sheet pile wall will be installed in the same location as the sheet pile wall that was removed. A geotechnical investigation is currently in progress, and this will assist in determining the sheet pile wall installation methods. The contractor will be encouraged to use vibratory drivers whenever possible. The position of the temporary construction sheet pile wall near the existing machine shop is approximately at the edge of the slag excavation limits as shown in Kemron (2008). This position is also practically as close as it can be placed to the existing machine shop without causing significant constructability issues and impacting the structural integrity of the recently constructed upland structure (machine shop). The existing pile caps at the machine shop must be avoided with the sheet pile wall. The contractor could drive the sheet piles from shore or from a barge. The new steel sheet pile wall in the final position near the existing machine shop will be designed with a corrosion allowance (additional sheet thickness or a coating) to ensure the design life of the bulkhead wall is achieved. Slag will be disposed of at an approved upland site.

General Sequence

The construction sequence will be essentially as follows: removal of pier decking, removal of pier pilings, removal of contaminated sediment and shoreline slag, backfilling excavated areas and placement of new sheetpile, placement of new concrete piles, and pier deck replacement.

2. CONSISTENCY DETERMINATIONS

The USAR has determined that the proposed actions are consistent with applicable coastal zone and shoreline management regulations as shown in italics below.

Washington Shoreline Management Act

Section 173-27-040(2)(b) of the Washington Administrative Code exempts normal maintenance and repair (including replacement) of existing structures from substantial development permit requirements:

"Normal maintenance or repair of existing structures or developments, including damage by accident, fire or elements. "Normal maintenance" includes those usual acts to prevent a decline, lapse, or cessation from a lawfully established condition. "Normal repair" means to restore a development to a state comparable to its original condition, including but not limited to its size, shape, configuration, location and external appearance, within a reasonable period after decay or partial destruction, except where repair causes substantial adverse effects to shoreline resource or environment. Replacement of a structure or development may be authorized as repair where such replacement is the common method of repair for the type of structure or development and the replacement structure or development is comparable to the original structure or development including but not limited to its size, shape, configuration, location and external appearance and the replacement does not cause substantial adverse effects to shoreline resources or environment;"

The proposed replacement of the inshore half of Pier 23 will simply restore the pier to a state comparable to its original condition before damage by the elements occurred. Work will not extend beyond the footprint of the original project, and will not cause substantial adverse effects to shoreline resources or the environment.

Pursuant to WAC 173-24-40(2)(b), the USAR considers that repair of Pier 23 is consistent to the maximum extent practicable with the State of Washington Shoreline Management Program.

City of Tacoma Shoreline Management Master Program

The City of Tacoma Shoreline Management program, adopted in December 1995 and revised in June 2003, is codified in Chapter 13.10 of the Tacoma Municipal Code. This chapter designates the Pier 23 property as Shoreline District 10, Port Industrial, and an Urban environment.

Section 13.10.005 of the Tacoma Municipal Code adopts the WAC 173-27-040 exemption of normal maintenance and repair activities.

"The City of Tacoma hereby adopts by reference the following sections or subsections of Chapter 173-27 of the Washington Administrative Code ("WAC") [including] 173-27-040 Developments exempt from substantial development permit requirement."

Repair of Pier 23 is considered by the USAR to be an allowable activity consistent to the maximum extent practicable with the local shoreline plan.

The City of Tacoma allows remedial dredging in the S-10 Shoreline District-Port Industrial as follows:

13.10.130 S-10 Shoreline District – Port Industrial.
D. Substantial Development/Permitted Uses and Development Activities. The following uses and development activities shall be permitted, subject to the issuance of a Substantial Development Permit, if required:

5. Dredging; except in the Puyallup River, where dredging shall be allowed for environmental remediation and habitat improvement projects.

The USAR considers the Pier 23 repair, and dredging for sediment and slag cleanup, to be consistent with these provisions. As a Federal agency, the USAR does not require a substantial development permit. Other applicable Federal law prohibits application of the permit system to Federal agencies. The Federal government cannot be regulated or required to obtain a permit by a State or local government unless the Federal government has waived its sovereign immunity (reference Supremacy Clause of the U.S. Constitution, Article VI, paragraph 2). The Coastal Zone Management Act does not contain such a waiver.

3. OTHER WASHINGTON CZMP ENFORCEABLE POLICIES

State Environmental Policy Act
The Army is preparing an Environmental Assessment pursuant to the National Environmental Policy Act. A preliminary determination has been made that the proposed action will not have a significant adverse impact on the natural or human environment.

Ocean Resources Management Act
Not applicable.

Clean Water Act
The Army Reserve is applying to the Corps of Engineers for a Section 404 permit and to the Department of Ecology for a 401 Water Quality Certification.

Clean Air Act
The proposed project does not involve a new regulated source requiring an air operating permit.

Washington State Energy Facility Site Evaluation Council
Not applicable.

APPENDIX C. Washington SHPO Concurrence Letters

STATE OF WASHINGTON

DEPARTMENT OF COMMUNITY, TRADE AND ECONOMIC DEVELOPMENT

Office of Archaeology and Historic Preservation

420 Golf Club Road SE, Suite 201, Lacey • PO Box 48343 • Olympia, Washington 98504-8343 • (360) 407-0752
Fax Number (360) 407-6217

January 12, 1998

Colonel William R. Herb
Department of the Army
Headquarters 70th Regional Support Command
Fort Lawton, Washington 98199

In future correspondence please refer to:
Log: 010998-04-DOA
Re: Pier 23, Port of Tacoma Industrial Yard, 321 E. Alexander Avenue, Tacoma

Dear Colonel Herb:

Thank you for contacting the Washington State Office of Archaeology and Historic Preservation (OAHP) regarding the above referenced property. I understand the U.S. Army Reserve proposes to replace and add onto Pier 23 at the Port of Tacoma Industrial Yard in Tacoma.

In response, I concur with your determination that Pier 23 is not eligible for listing in the National Register of Historic Places. Based upon your information and photographs, the pier does not exhibit significant historical associations and design/engineering characteristics that meet National Register criteria. In addition, the pier has been significantly changed over the past 50 years. As a result of this concurrence, further contact with OAHP on this matter is not necessary.

Again, thank you for the opportunity to review and comment. Should you have any questions, please feel free to contact me at (360) 407-0766.

Sincerely,

Greg Griffith

Gregory Griffith
Comprehensive Planning Specialist

GAG

STATE OF WASHINGTON

Office of Archaeology and Historic Preservation

1063 S. Capitol Way, Suite 106 • PO Box 48343 • Olympia, Washington 98504-8343 • (360) 586-3065
Fax Number (360) 586-3067 • http:www.oahp.wa.gov

April 23, 2004

Mr. Mark Ziminske
Environmental Resources
Seattle District, Corps of Engineers
PO Box 3755
Seattle, Washington 98124-3755

Re: US Army Reserve Pier 23 Project
Log No: 042304-01-COE-S

Dear Mr. Ziminske:

Thank you for contacting our office and providing the professional cultural resources survey by Ronald Kent for the proposed US Army Reserve Pier 23 Project in Tacoma, Pierce County, Washington. We concur with his recommendations and your finding of No Historic Properties Affected.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised.

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity should be discontinued, the area secured, and the concerned tribes and this office notified. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: robw@cted.wa.gov

cc: J. Wright

ADMINISTERED BY THE DEPARTMENT OF COMMUNITY, TRADE & ECONOMIC DEVELOPMENT

APPENDIX D. Clean Water Act Sec. 404 Analysis

Clean Water Act Section 404 Analysis

Pier 23 Repair
Sediment Remediation,
and Slag Removal
Tacoma, Washington

Clean Water Act
Rivers and Harbors Act

February 2009

1. Introduction

The purpose of this document is to record the U.S. Army Reserve (USAR) compliance evaluation of proposed repair of Pier 23, and dredging and slag removal for environmental remediation under and adjacent to Pier 23, Tacoma, Washington, pursuant to the Clean Water Act (CWA) and the General Regulatory Policies of USACE. Specifically, Section 404 of the CWA requires an evaluation of impacts for work involving dredging or discharge of fill material into the waters of the U.S., and evaluation guidance can be found in the CWA 404(b)(1) Guidelines [40 CFR §230.12(a)]. Section 10 of the Rivers and Harbors Act [33 USC §403] prohibits modification to or creation of an obstruction within a navigable water of the U.S. unless recommended by the Secretary of the Army and authorized by the Chief of Engineers. The General Regulatory Policies of the Corps of Engineers [33 CFR §320.4(a)] provide measures for evaluating permit applications for activities undertaken in navigable waters.

The main body of this document summarizes the information presented in Attachment A and includes relevant information from the Environmental Assessment for the project that was collected pursuant to the National Environmental Policy Act (NEPA) of 1969 [42 USC §4321 et seq.]. Attachment A provides the specific USACE analysis of compliance with the CWA 404(b)(1) and the General Regulatory Policy requirements.

2. Project Background

The U.S. Army Corps of Engineers, Seattle District (Corps) is assisting the U.S. Army Reserve, (USAR), and the Army Environmental Command (AEC) concerning needed work at Pier 23, on Commencement Bay at Tacoma, Pierce County, Washington. Work is proposed to include the demolition of the first 606 feet of timber pier beginning at the shoreline, the remediation of sediment under and around the demolished portion of the pier, the potential removal of slag material adjacent on the shoreline adjacent to the foot of the pier, and the reconstruction of a new concrete section of the pier.

The Pier 23 property is located on the northwest end of the Port of Tacoma Industrial Yard, between the Hylebos and Blair Waterways along the Commencement Bay shoreline (T21N, R03E, Section 27). See Figures 1 and 2.

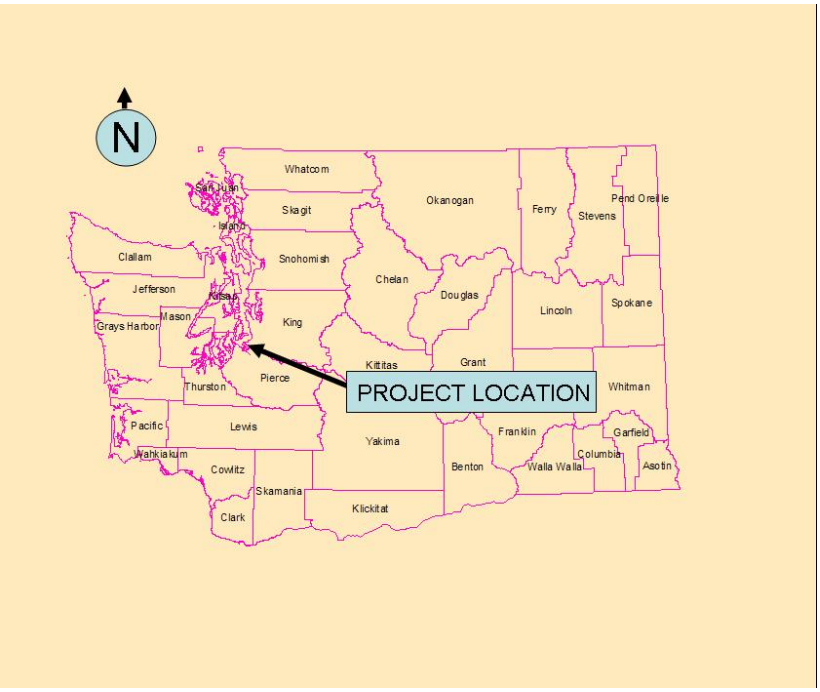


Figure 1. Project location in Pierce County, Washington.

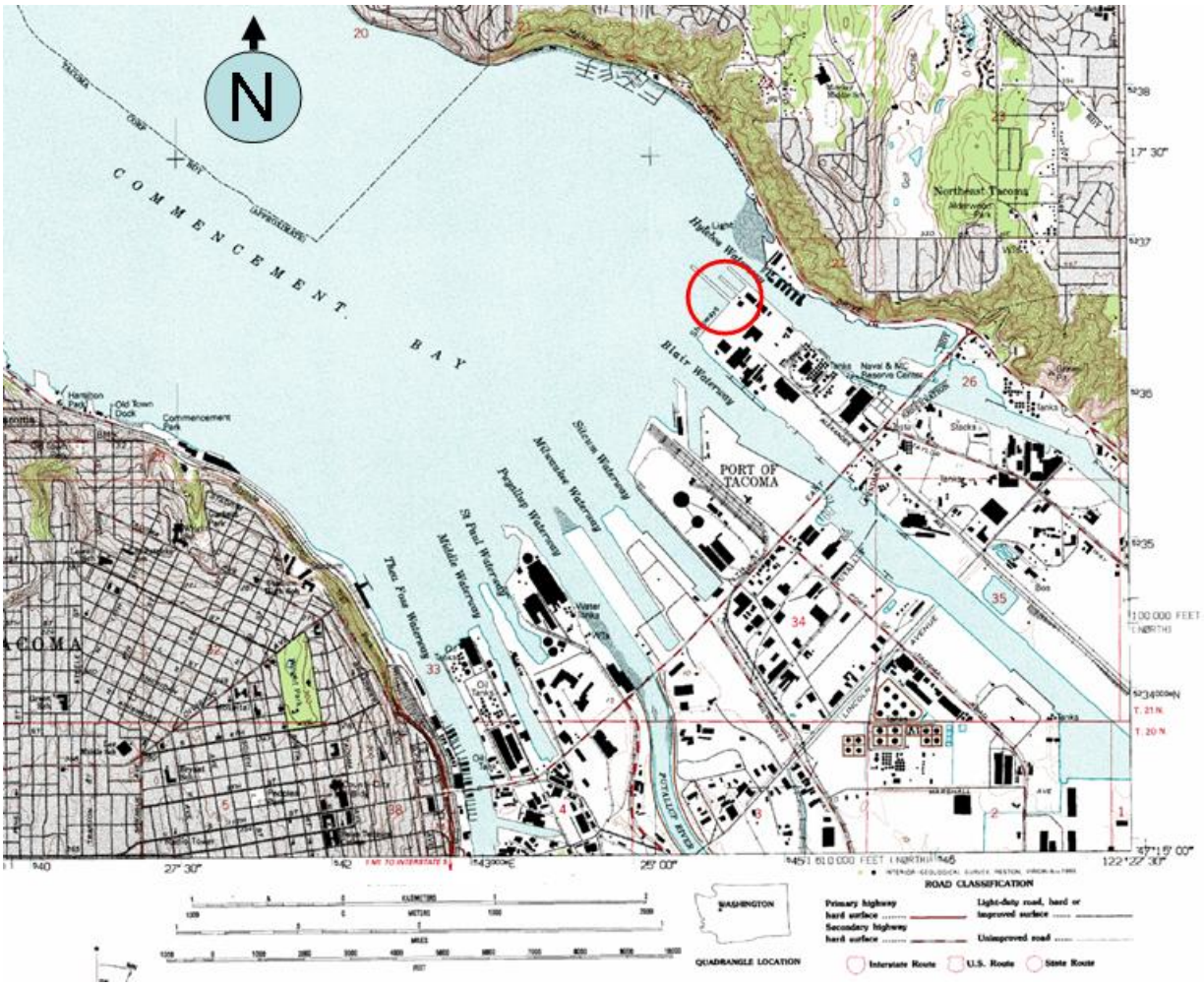


Figure 2. Project location (red circle) in Commencement Bay at Tacoma, Washington.

The Pier 23 property is operated and maintained by the U.S. Army Reserve, which leases the 7.4 acres of submerged lands and 3 acres of uplands from the Port of Tacoma. The Army Reserve owns, controls, and has command of the pier structure, all facilities on the pier, and all structures and improvements on the upland property. Pier 23 and its associated facilities are required for use of Army watercraft maintenance and for the training of reserve soldiers. At full operational capacity, up to 400 reservists will utilize the Pier 23 facilities.

3. Project Need

The USAR acquired the pier and a former warehouse from the National Guard in 1996, and a new upland facility was constructed in December 2005. The pier was constructed prior to World War II. The outboard 610 feet were replaced with concrete in 1946. Repairs were made in 2005 to extend the useful life of the pier for 10 years. The inboard 606 feet of timber pier is in a deteriorated condition; it does not meet operational requirements, and is unsafe for USAR personnel. Decking boards fail under load, so the timber trestle is load-limited, requiring extra vehicle trips on the pier to accomplish service functions. Fender piles have broken, requiring periodic replacement. Energy absorption of the fender piles is inadequate (CH2M 2007).

The deterioration of the pier structure has affected the Army Reserve's use of the facilities at this site. Loads on the pier are limited by the timber deck (requiring truck weight limits), and mooring loads are limited by the deterioration of the piles supporting the bollard bases. Approximately 530 pilings were replaced in 2006.

In addition to deterioration of the pier, contaminated sediment and metal slag exists around and under the pier. Tests for contaminants in the sediment and slag revealed hydrocarbons (including PAHs, PCBs), arsenic, copper, lead, mercury and zinc. Although testing results were not uniformly outside of criteria for all locations, the USAR wishes to ensure the biological integrity of the submerged lands at the same time as the pier deterioration is addressed.

4. Project Purpose The purpose of the proposed project is to allow the U.S. Army Reserve to continue mooring and maintaining Army Reserve vessels at Pier 23, and to protect human health and the environment for long-term mission operations at the project site.

5. Proposed Action and Alternatives

Multiple alternatives were considered as follows, grouped into pier replacement, sediment remediation, and slag treatment. The Preferred Alternative consists of a combination of preferred actions from these categories: timber pier demolition and reconstruction; sediment dredging and upland disposal; and slag removal.

<u>Pier Replacement</u>

Pier Replacement Alternative 1—No Action

Under Alternative 1, the Army Reserve would not replace Pier 23. The deterioration of the pier structure would continue to affect the USAR's usage of the facilities at this site. As a result of the 2001 structural analysis, loads on the pier have been limited by the damaged timber deck (requiring truck weight limits), and mooring loads have been limited by the deterioration of the piles supporting the bollard bases. These limitations affect the USAR's ability to safely moor watercraft, and carry out vessel maintenance and training activities. The damaged structure and outdated utilities are becoming increasingly unsafe for USAR personnel.

Pier Replacement Alternative 2—Timber Pier Demolition and Reconstruction (Preferred Alternative)

This action is part of the overall Preferred Alternative, and would consist of demolishing the shoreward, wooden 606 feet of the pier and replacing it with a new concrete-surfaced pier on concrete pilings. Approximately 1,100 creosote-treated timber piles (structural and fender) would be removed from the wooden section of the pier. These pilings would be replaced with 308 pre-cast concrete piles. Utilities running beneath the pier would also be replaced. All new utilities (fire suppression water, potable water, electric, communications, stormwater, compressed air) would be above deck. The deck is planned to be pre-cast, shipped in and then lifted into place. The deck joints would be grouted and forms would fully contain grout mix. The bents ("pile caps," or long rectangular sections on top of piles that the pre-cast deck would rest on) would be cast in place, as this is the only practical way to account for piles not being in perfect alignment after driving. Like the grouting however, the forms would fully contain the concrete mix used to form the pile caps.

There would be security lighting at night that would illuminate the pier and nearby surrounding water during pier operation. During the day, the pier would shade the substrate immediately underneath it, unless a means can be found to admit effective amounts of light without compromising the ability of the pier to support heavy loads and to simultaneously keep contaminants from vehicles and equipment from falling into the water.

There are two options for timber pier demolition and reconstruction, in order to accommodate continued operation of the pier, and to aid sediment remediation. Any in-water work for these options would occur during the approved work window.

- The preferred and anticipated temporary arrangement for the Army Reserve vessels during the Pier 23 Replacement construction is for all of the Army Reserve vessels to be relocated to Pier 24. Currently Trident Seafood Co. uses Pier 24 for its operations. Trident's vessels would be relocated to another existing facility for the duration of the construction at Pier 23.
- As a backup (contingency) plan in the event that the adjacent pier cannot be used by the Army Reserves during construction and it is necessary to maintain access and operations for the existing outer pier section, a temporary floating pier would be installed to connect the uplands to the existing outer pier section. The temporary floating pier would consist of a series of floating deck barges or floating pontoons connected together and extending from shore to the existing concrete portion of Pier 23 approximately 600 feet from shore. The barges or pontoons in the resulting access bridge would be secured and held in the planned position by spud piles or anchor lines, as required to safely stabilize the access bridge. No spud piles or anchoring would be allowed in the Pier 24 remediation area that has been capped. Measures would be included in contract documents such that the capped area adjacent to Pier 24 would be not be disturbed.

<u>Sediment Remediation</u>

In addition to the pier replacement alternatives, there were four alternatives formulated for sediment remediation by Kemron (2008). This reference detailed results of contaminant studies they performed on the sediment and slag, and presented a feasibility study for addressing contaminated sediment and slag.

Sediment Remediation Alternative 1—No Action

No work would be done to remove or cap contaminated sediments under the No-Action Alternative. Contaminated sediment would be allowed to remain in place. Natural recovery processes (sedimentation, bioturbation, resuspension and lateral transport of sediments, and biodegradation of total petroleum hydrocarbons [TPH]) would be relied on, though those cannot address metals contamination.

Sediment Remediation Alternative 2—Capping

The intent of capping is to isolate contaminated sediment from aquatic receptors. Under this alternative, an engineered cap would incorporate multiple materials: about three feet of sand for contaminant containment; armoring with four feet of rock up to 24 inches in diameter to resist erosion from propeller wash and wind waves, and a surface layer of uncontaminated sediment, which to the extent possible would be similar to that existing on the site. Substrate depth would be reduced by up to seven feet. Kemron (2008) states:

> "The USEPA issued ROD [Record of Decision] for the CB/NT [Superfund site] requires that caps be a minimum of three feet thick unless proven otherwise. The cap material [would] be transported to the site by barge. For the open-water areas of the Pier 23 site, the cap could be placed using a clamshell bucket deployed from a derrick, large excavator on a barge or by use of an articulated conveyor deployed from a barge. If placed by clamshell, the clamshell is used to take material from the barge and distribute the material evenly over the area to be capped. The material is placed based upon a predetermined pattern using bucket capacity to determine volume placed per area to create desired thickness. The placement must be guided by computer based navigation system using the differential global positioning system (DGPS) to assure accurate placement. Any armoring required to prevent erosion is then placed on top of the three foot thick cap, increasing the total thickness of the cap."

The cap would be placed after placement of new pier pilings, to avoid the need to drive pilings through the cap.

This alternative would require long-term monitoring, and presents liability issues in the event of cap failure. Future maintenance dredging would require removal of the cap as well as the contaminated sediments if deeper depth is required.

Under the pier, this alternative could be used in conjunction with a surrounding sheetpile wall to contain sediments.

Sediment Remediation Alternative 3—Dredging and Disposal (Preferred Alternative)
This action is considered one component of the Preferred Alternative. It consists of dredging about 20,000 cubic yards (Kemron 2008) adjacent to the shoreward 200 feet of pier, backfilling with clean (uncontaminated) material. The area to be dredged would be about 58,000 square feet, and possibly 12 feet in depth in some places. Sediment to be removed does not pose a human health risk, allowing some flexibility in handling and disposal.

Prior to the start of dredging, a debris sweep of the dredge area would be performed with the intent of removing debris that would interfere with the dredging operations. Debris would be placed on a barge, transferred to an upland transfer site (location to be determined), resized and sorted as necessary for recycling or disposal, and transferred by truck and/or train to a permitted facility for recycling (if possible) or for disposal.

After the debris sweep is completed, dredging would commence using a mechanical dredge with a closed, environmental bucket wherever possible. A heavier digging bucket may be necessary in certain areas. Dredged material would be placed in a haul barge. Dredged material would be dewatered as necessary to meet the disposal facility's acceptance criteria. Decanted water would be treated (filtered at minimum) and discharged in accordance with the project's water quality certification and National Pollutant Discharge Elimination System permit.

The dredged area would be backfilled to surrounding grade with uncontaminated sediment which to the extent possible would include material similar to sediments existing at the site.

Dredged material would be taken by barge to be offloaded at an upland site (location to be determined), then shipped by truck and/or train to a permitted landfill for disposal.

Three options were considered for disposal as follows, but only the upland disposal option is considered feasible.

Confined Near-shore Disposal
Confined near-shore disposal would entail placement of sediments into a sheet-pile enclosure 62 feet wide and 140 feet long, and 15 feet high (above substrate), adjacent to the pier with its base below MLLW. The sheetpile would be driven to a depth of 45 feet below the substrate. Sediment placed in the enclosure would be capped with one foot of clean fill, 0.5 foot of topsoil and a vegetative cover, leaving 13.5 vertical feet of room for sediment disposal. There would be a polyethylene sheet lining the sheetpile walls, and a geotextile drainage lining of the bottom of the enclosure. However, according to Kemron (2008), there are currently no available nearshore disposal areas, and development of a new one is not considered feasible for the amount of sediment to be removed from Pier 23, due to schedule constraints for permitting, public review and construction. *Thus, this alternative was not evaluated further or carried forward into remedial design.*

Confined Aquatic Disposal
Confined aquatic disposal would use a disposal site in Commencement Bay; the recommendation is to use the Port of Tacoma's Blair Slip One in the Hylebos Waterway. Dredged material would be transported to the site and discharged from a split-hulled barge or through a vertical pipeline diffuser. Capping material would be placed on top of the dredged material. But as with nearshore disposal, there is no available aquatic disposal site, and creation of such a site has unacceptable procedural constraints. *Thus, this alternative was not evaluated further or carried forward into remedial design.*

Upland Disposal (Preferred)
Upland disposal would involve dewatering of dredged material, and transportation to an approved landfill.

Sediment Remediation Alternative 4—Partial Dredging With Capping
In this alternative, removal of soft sediments would occur, in a lesser amount than that described for dredging, above, with capping over sub-sediments that are considered more stable. Methods would be similar to those described above for dredging and capping. Advantages would include avoiding concern from displacement of soft sediments in placing cap materials; navigational depth could also be maintained. Disadvantages would include the need for long-term monitoring; possible impedence of long-term maintenance activities; the possible need for operational restrictions; and the possibility of exposure of higher concentrations of contaminants of concern during dredging, and thus a more contaminated surface for cap installation. See Sections discussion above for disposal options for material that is dredged.

<u>Slag Treatment</u>

Slag Treatment Alternative 1—No Action

Slag would be left in place along the north shoreline adjacent to and behind the existing sheetpile wall.

Slag Treatment Alternative 2—Slag Removal
Slag removal would entail mechanical cutting back into the bank to a depth of approximately 3 feet below water surface. Volume to be removed is estimated at about 1,200 cubic yards in the water, and about 800 cubic yards upland. Removal would entail use of an excavator and/or dredge mounted on a barge for the in-water portion, and possibly for the upland portion as well, due to limited upland working space. A digging bucket may be used, or a hoe-ram if the slag is too hard. Underlying soft slag material would be dredged. A temporary construction sheet pile wall near the existing machine shop would first be installed and the existing sheet pile walls to remain would be stabilized by new soil tie-backs before the dredging of the slag and contaminated sediment starts. With the temporary sheet pile wall in place, the existing sheet pile wall in the vicinity of the slag remediation would be removed. Following the slag removal and backfill with clean material, a new permanent sheet pile wall would be installed in the same location as the sheet pile wall that was removed. A geotechnical investigation is currently in progress, and this would assist in determining the sheet pile wall installation methods. The contractor would be encouraged to use vibratory drivers whenever possible. The position of the temporary construction sheet pile wall near the existing machine shop is approximately at the edge of the slag excavation limits as shown in Kemron (2008). This position is also practically as close as it can be placed to the existing machine shop without causing significant constructability issues and impacting the structural integrity of the recently constructed upland structure (machine shop). The existing pile caps at the machine shop must be avoided with the sheet pile wall. The contractor could drive the sheet piles from shore or from a barge. The new steel sheet pile wall in the final position near the existing machine shop would be designed with a corrosion allowance (additional sheet thickness) or a coating to ensure the design life of the bulkhead wall is achieved. Slag would be disposed of at an approved upland site.

<u>Other Alternatives Considered But Rejected</u>

Institutional Controls
Institutional controls (IC) would involve "informational devices, deed restrictions and government restrictions[. This would] entail process options of fish advisories, land use restrictions, and waterway use restrictions respectively. IC included in this alternative would include posting "FISHING ADVISORY" signs and publishing advisories warning of the risks associated with ingesting marine life from the area" (Kemron 2008). The immediate project area is generally not accessible to the public, and such controls are not considered completely effective (Kemron 2008). Also, vessel use restrictions may be necessary, which poses issues for Pier 23 use. This alternative does not address contaminant levels and therefore would not address the project purpose and need. *Institutional controls are therefore not considered further in this evaluation.*

Natural Recovery of Sediment with Monitoring
Monitored natural recovery is similar to the No-Action Alternative, and would rely on natural recovery processes to reduce contaminant levels below minimum cleanup levels within 10 years.

However, this alternative would add annual sediment sampling for 10 years, or until contaminant (TPH) levels are verified to be below minimum cleanup levels (SQO's). Again, this would not address metals contamination. This alternative does not meet EPA standards since, according to Kemron (2008), the contaminated sediments near shore may be disturbed by prop wash and waves; there would be an ongoing need for replacement of fender piles, which does not promote stability of the sediment bed; and PCBs are a bioaccumulator. *Monitored natural recovery is thus not considered further in this analysis.*

Sediment Treatment in Place
This alternative would entail some method to render site sediment quality acceptable without removing it or capping it, or to reduce the mobility, concentrations, bioavailability or toxicity of the contaminants. Treatment methods can include electricity, chemicals, microbes, or use of plants for uptake. *In-place treatment is not considered further here because these technologies have not been shown to be effective.*

Other Forms of Containment for Sediment or Slag
Options other than described above for containment of contaminated sediments include thin-layer capping, concrete and reactive capping (Kemron 2008). Concrete (shotcrete) would be used for placement over the slag. There is also vertical containment, entailing installation of a sheetpile wall to contain sediment (under the pier) or slag; this would be used to complement other containment technologies. These technologies, however, are not considered further because they do not address wave action or propeller scour (thin-layer capping), would require long-term monitoring and inspections (concrete) or are not proven (reactive capping) and would require considerable modeling with intensive long-term monitoring. *These options are therefore not considered further.*

<u>Preferred Alternative</u>
The Preferred Alternative consists of partial pier demolition and replacement, complete removal of contaminated sediment with upland disposal, and slag removal with upland disposal. Figure 3 provides a site diagram showing the (wood) section of the pier to be removed, and the areas of slag and contaminated sediment that would be removed. The construction sequence would be essentially as follows: removal of pier decking, removal of pier pilings, removal of contaminated sediment and shoreline slag, backfilling excavated areas and placement of new sheetpile, placement of new concrete piles, and pier deck replacement.

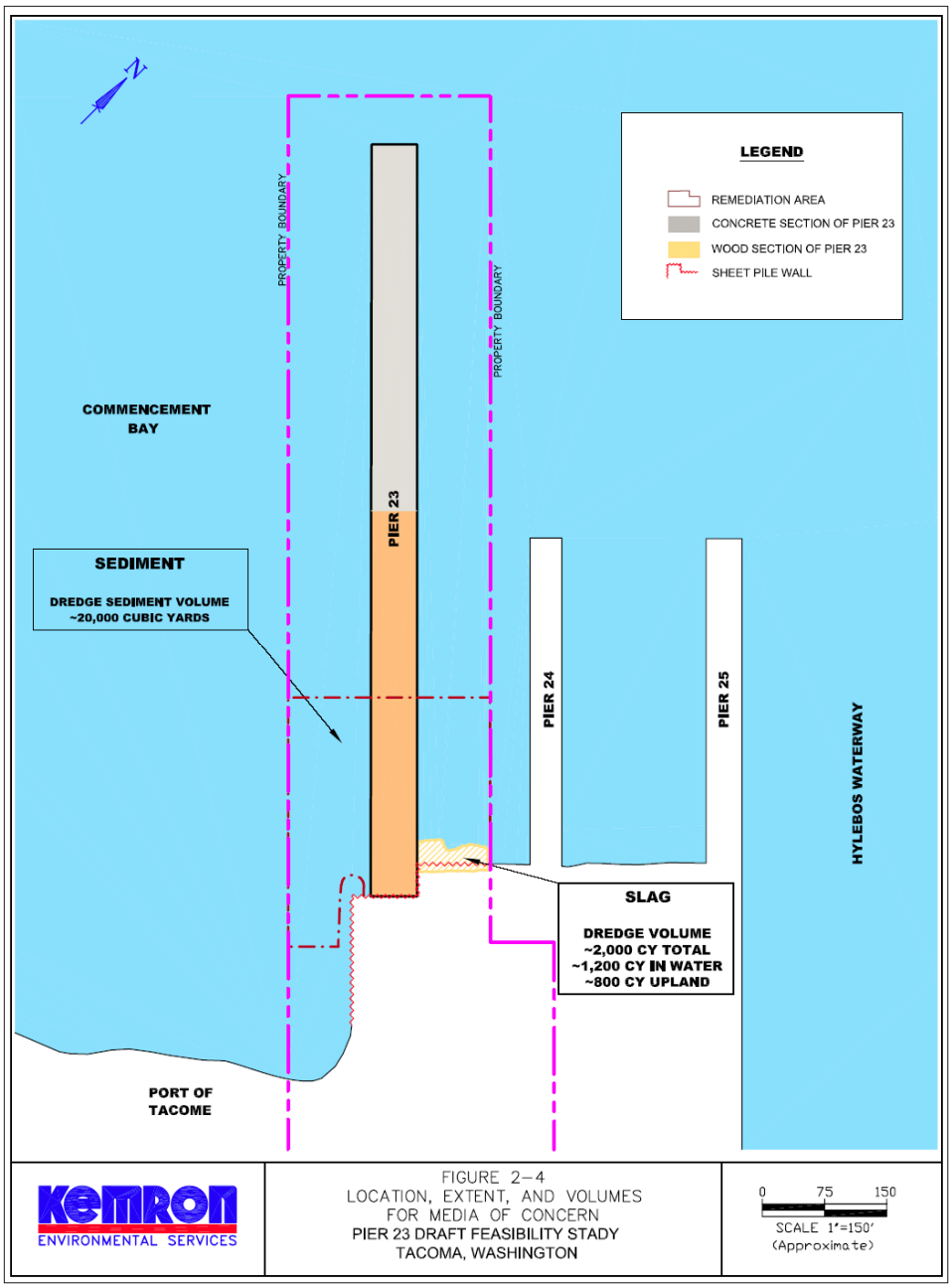


Figure 3. Site diagram showing areas of Preferred Alternative (from Kemron 2008).

6. Potentially Adverse Effects (Individually or Cumulatively) on the Aquatic Environment

a. Effects on Physical, Chemical, or Biological Characteristics of the Aquatic Ecosystem

All of the following activities would be localized and temporary.

Pier demolition and replacement would create

- short-term and localized suspension of sediments from pile removal
- underwater noise from piledriving
- disruption of structural habitat used by invertebrates and associated fish communities

- permanent removal of treated wood pilings, replacing them with precast concrete pilings
- continued shading of nearshore habitat by presence of the pier
- continued vessel operations with associated propeller wash and shading
- continued lighting of the water surface at night with security and operational lighting

Sediment removal and backfilling would create

- temporary loss of benthic habitat
- short-term (one season or more) disruption of the benthic community, and potential longer-term replacement of a mud-based community with a sand-based community until finer sediments from Puyallup River discharge create a new mud substrate surface
- short-term excavation below grade with backfilling of uncontaminated material to grade
- temporary and localized suspension of sediment during dredging and backfilling
- permanent removal of any debris in the sediment cleanup area

Slag removal and backfilling would create

- replacement of shoreline slag surface with sheetpile bulkheading
- backfill of uncontaminated material where slag is excavated, both behind and in front of bulkhead

b. Effects on Recreational, Aesthetic, Historical, and Economic Values

No recreational used of the area currently occurs or would be expected with the new construction and sediment/slag removal. Aesthetics would not be altered from the current industrial/commercial character of the area. No historic properties would be affected (concurrences on earlier evaluations received from SHPO dated January 11, 1998, and April 23, 2004). In emails both dated September 11, 2008, representatives of the Suquamish Tribe (Dennis Lewarch) and the Squaxin Island Tribe (Margaret Henry) indicated they had no cultural resources concerns with the proposed project. Economics would be affected in that jobs and local revenue may be created or at least supported through construction contracting. Trident Seafood operations may be affected, with a leasing arrangement for Pier 24; such an effect is not considered negative.

c. Findings

There will be no significant adverse impacts to aquatic ecosystem functions and values.

7. All Appropriate and Practicable Measures To Minimize Potential Harm to the Aquatic Ecosystem

a. Impact Avoidance Measures

- In-water work activities (pile removal/replacement, dredging/backfill and dredge material dewatering, slag removal/backfill, and habitat mix placement) will occur during the August 16 to February 14 in-water work window to reduce the likelihood of impacts to migrating juvenile salmon and bull trout. Note that because of the extensive nature of the project, and the need to maximize time for in-water work, an extension of the work window is being requested, to start on July 15 instead of August 16. This is based on evaluation of salmonid movements and use of the project area, and on communications with NMFS and WDFW staff.

- Barges will not be allowed to ground out in the intertidal zone.
- Precautions will be taken to prevent the discharge of petroleum products, chemicals, or other material into Commencement Bay. Equipment and work vehicles will be stored on-site during construction; however, refueling will occur away from the water. No breakdown maintenance on engines will occur near the water. Fuel spill kits with absorbent pads will be onsite at all times.
- Debris, removed piles and pile stubs will be contained on a barge for transportation from the site to an upland staging facility for resizing and subsequent disposal or recycling if possible. No creosote-treated piling will be recycled. Such piling will be resized as necessary into maximum 4-foot lengths and disposed of at a permitted upland facility.
- Upon removal from substrate, a pulled pile will be moved expeditiously from the water onto the barge. The pile will not be shaken, hosed off, left hanging to drip or any other action taken that is intended to clean or remove adhering material from the pile.
- Sediments removed from the water with removed piles will be contained and disposed appropriately.
- Any water discharged into Commencement Bay from dredged material will meet water quality standards for turbidity and contaminants. Sediment that cannot be dewatered without meeting water quality standards must be disposed of at an upland site approved for material that includes water.
- Dredging will be avoided within a month of either end of the in-water work window, in order to minimize the chance of impacts to migrating salmonids.

b. Impact Minimization Measures

- All night-time debris removal, demolition, remediation and construction lighting will be kept to the minimum necessary for the intended purpose, for both intensity and area illuminated.
- All floating debris will be confined and collected and will not be allowed to float offsite. The contractor may employ a debris boom, skiff and net for this task.
- A floating oil boom will be deployed to contain surface sheens, if they occur during any activity.
- Contractor will maintain a continual watch for distressed, injured or dead fish. If distressed, injured or dead fish are observed in the project vicinity, work will stop until the cause is determined and appropriate corrective action taken.
- All permit conditions, and conditions provided through ESA coordination/consultattion will be observed. The water quality certification issued by the Washington Department of Ecology (WDE) will be followed and is expected to include requirements such as: (a) background water quality measurements will be taken to establish background water quality conditions in the project area, (b) mixing zone of 200 feet for water quality compliance will be used as established in the Washington Administrative Code (WAC 173-201A-400(7)(b)(i)); (c) twice daily water quality measurements for the first three days of each different type of project operation (pile removal, dredging, dredge material dewatering, backfill and habitat mix placement, and new pile driving); (d) periodic turbidity, temperature, and dissolved oxygen measurements will be required during in-water activities after the first three days and will be reported in the daily construction reports, and a monthly WQM report will be sent to WDE; (e) operational measures (best management practices) to

prevent/minimize WQC exceedances will be employed; and (f) visual monitoring for the presence of oily sheen or distressed, injured or dead fish will be required during construction.

- To minimize turbidity associated with project activities, equipment operators will immediately be requested to stop or change operation as necessary if maximum criteria are exceeded or are expected to be exceeded based on daily water quality measurements. An operational change or stop-work request will be initiated in the field prior to consultation with WDE as described in the water quality certification. Upon consultation with WDE, operations will follow outcome of discussion.
- A floating surface boom surrounding the work area will be used during pile removal to contain and collect any floating debris or sheen. The contractor will retrieve and store any debris generated during construction until it could be disposed of at an appropriate upland facility. Retrieval will occur at slack tide or when current velocity is low.
- If heavy (sinking) debris enters the water during the demolition and removal work, the location of the debris will be documented. When construction is complete a diver (or other suitable means) will retrieve debris that has entered the water and sunk during the demolition and removal work.
- Contractor will be held accountable for verification that structures, piling and debris designated for demolition or removal have been demolished and removed.
- The fact that new decking components will mainly be precast concrete instead of cast-in-place concrete will help ensure water quality integrity. Exceptions will be joints and "bents" (cross-pieces between piling caps) which will be poured and contained in forms.
- Marbled murrelet presence and behavior will be monitored for signs of disturbance or distress during pile driving. If disturbance or distress are noted, work will stop until corrective measures are determined and implemented.
- An environmental bucket will be used to the maximum extent practicable to minimize turbidity and recontamination during dredging operations.
- A debris sweep will be performed prior to dredging, to minimize the chance of debris interfering with dredging operations.
- Backfill of clean material will be used to bring dredged areas back to the surrounding grade.
- All shoreline fill material excavated or placed on the shoreline will be graded in the dry during periods of low tide.

c. Compensatory Mitigation Measures

No mitigation is proposed because the project action incorporates restoration components as well as BMPs that are protective of listed species and their critical habitat. The project will adhere to conditions imposed through ESA coordination and in permits received.

d. Findings

The USAR has determined that all appropriate and practicable measures have been taken to minimize potential harm to the environment.

8. Other Factors in the Public Interest

a. Fish and Wildlife

USAR has coordinated construction activities with local Native American Tribes and state

and Federal resource agencies (including the US Fish and Wildlife Service, and NOAA Fisheries, under the Endangered Species Act). A biological evaluation pursuant to Sec. 7 of the Endangered Species Act has been prepared for consultation with the USFWS and NOAA Fisheries. Impact avoidance and minimization measures (see Sec. 7.b.) have been incorporated into the project plan. Removal of contaminated sediments and slag, as well as treated wood pilings, will benefit fish and wildlife and their habitat.

b. Water Quality. It is the assessment of the USACE that this project is consistent with state water quality standards. However, a Clean Water Act Sec. 401 Water Quality Certification from the Washington Dept. of Ecology will need to be obtained.

c. Historical and Cultural Resources
See 6.b. above.

d. Environmental Benefits.
Removal of contaminated sediments and slag, as well as treated wood pilings, will benefit fish and wildlife and their habitat.

9. Conclusions. I find that this project is within the public's interest and complies with the substantive elements of Section 404 of the Clean Water Act and the Rivers and Harbors Act.

Attachment A

Clean Water Act 404(b)(1) Evaluation [40 CFR §230]
Permit Application Evaluation [33 CFR §320.4]

404(b)(1) Evaluation [40 CFR §230]

Potential Impacts on Physical and Chemical Characteristics [Subpart C]:

1. **Substrate [230.20]**
   Timber pier removal and replacement would have no effect on bathymetry or substrate, except for the limited suspension and settling of sediments that would result from pile removal. Due to limited currents in the area, transport and settling of any suspended sediments are expected to remain very localized, and the net change in bathymetry would be very minor. No change in the character of the substrate would be expected from this alternative. With sediment cleanup, there would be a short-term excavation of the substrate within 200 feet of shore, under and adjacent to Pier 23. Excavation depths could be as much as 12 feet below grade, which below the pier is about two feet higher than surrounding grade. However, the dredged area would be backfilled with clean (uncontaminated) material, which to the extent possible will be similar to material existing on site. Substrate in the intertidal portion of the Pier 23 property would change from consolidated slag material to rock, sand and possibly large woody debris. The bathymetry would be altered slightly with fill of sand and gravel in a shallower grade where a steep solid bank now exists.
2. **Suspended particulates/turbidity [230.21]**
   Suspension of sediment from pile removal would increase turbidity locally, but tidal currents would provide some dilution. Dissolved oxygen demand might locally increase with suspension of anaerobic sediments. Vibratory pile removal, and possible cutting of piles instead of pulling them, would minimize suspension of sediment. Previous monitoring efforts during construction of a large pier in Puget Sound indicated that turbidity associated with pile driving was generally less than 1 Nephelometric Turbidity Unit (NTU) higher than control stations (Roni and Weitkamp 1996). The dredging operation would suspend some sediments, even with the use of a positive-sealing "environmental bucket." Although local currents are considered weak and variable, water quality and the potential for contaminated sediments to move outside the mixing zone boundary during dredging may be of concern. Water quality monitoring for turbidity, and possibly dissolved chemicals and dissolved oxygen, would occur. Turbidity would be used as a surrogate for laboratory measured total dissolved solids. To avoid water quality values outside of mandated limits, dredgers would change construction methods in the field, or stop work. With proper conservation measures and monitoring, effects overall are expected to be temporary and insignificant.
3. **Water [230.22]**
   Removal of treated wood pilings would be a benefit to water quality. Temporary and localized suspension of contaminated sediments could occur during dredging. During construction activities, accidental release of fuel, oil, and other contaminants may occur. The

contractor would be required to provide a spill prevention control and countermeasures (SPCC) plan prior to the commencement of any construction activities. The SPCC plan would identify and recognize potential spill sources at the site, outline best management practices, delineate responsive actions in the event of a spill or release, and identify notification and reporting procedures. Implementation of the SPCC plan would minimize the effect of construction activities on the quality of surrounding waters. The contractor will be required to obtain a National Pollutant Discharge Elimination System permit for discharge of water from handling of dredged material.

4. **Current patterns and water circulation [230.23]**
   No effects are anticipated on current patterns or water circulation, other than ongoing effects of propeller wash from vessel operation.
5. **Normal water fluctuations [230.24].**
   Water fluctuation in the project area is tidally driven, and the project will have no effect on that.
6. **Salinity gradients [230.25]**
   No effect on salinity gradients is anticipated.

Potential Impacts on Biological Characteristics of the Aquatic Ecosystem [Subpart D]:

1. **Threatened and endangered species [230.30]**
   USACE has prepared a Biological Evaluation for submittal to the USFWS and NOAA Fisheries for this project. The proposed action is anticipated to have no effect or is not likely to adversely effect listed species or their critical habitat in the project area, as follows:

Species	**Effect Determination**	**Critical Habitat Determination**
Bull Trout	Not likely to adversely affect	Not likely to adversely affect
Bald Eagle	Not likely to disturb; no BGEPA permit needed	---
Marbled Murrelet	Not likely to adversely affect	No effect
Chinook Salmon	Not likely to adversely affect	No effect
Steelhead	Not likely to adversely affect	---
Killer Whale	Not likely to adversely affect	No effect
Steller Sea Lion	Not likely to adversely affect	No effect
Humpback Whale	Not likely to adversely affect	---
Leatherback Sea Turtle	No effect	No effect

- The proposed action **may affect, but is not likely to adversely affect bull trout, and not likely to adversely affect designated critical habitat of Coastal/Puget Sound bull trout**. This determination is based upon the localized geographic scope of the project, and the low likelihood that bull trout would be present in the action area during the period when potential effects (temporary reduction in water quality associated with piling removal and placement; increased noise disturbance associated with piling removal and placement; temporary loss of benthic organisms and other prey due to substrate disturbance; and potential exposure to contaminated sediments) would be most likely to occur. It is also based on the expected maintenance of PCEs for bull trout critical habitat.

- The impacts to bald eagle from the proposed project are discountable, and the project **is unlikely to disturb bald eagles; therefore, no permit under BGEPA is required**. Noise associated with construction activities has the potential to temporarily disrupt feeding opportunities in a localized area, but the proposed action will not alter the long-term food base.
- Construction activities will have no effect on marbled murrelet nesting habitat, and limited effects on their food base. Construction noise, including that from piledriving, may cause temporary displacement if murrelets are disturbed, but is not likely to result in injury or long-term behavioral disruption. This is based in part on the use of concrete instead of steel piles, and in part on the relatively low occurrence of marbled murrelets in Commencement Bay surveys. Marbled murrelet presence and behavior will be monitored for signs of disturbance or distress during pile driving. If disturbance or distress are noted, work will stop until corrective measures are determined and implemented. Therefore, effects of any noise disturbance during construction are expected to be insignificant. The proposed action **may affect, but is not likely to adversely affect the marbled murrelet**. The proposed action will have **no effect on designated critical habitat** for this species.
- (See list of effects on bull trout, above) The proposed action **may affect, but is not likely to adversely affect Puget Sound Chinook salmon, and will have no effect on designated critical habitat for Puget Sound Chinook salmon**. This determination is based upon the localized geographic scope of the project, and the low likelihood that vulnerable life stages of Chinook would be present in the action area during the period when potential effects would be most likely to occur. It is also based on the exclusion of Pier 23 from Chinook critical habitat.
- (See list of effects on bull trout, above) Because of their high mobility and transient presence in the action area, and because of the timing of juvenile passage outside the in-water work window, the proposed action **may affect, but is not likely to adversely affect Puget Sound steelhead**.
- Because of the likelihood that killer whales and their salmonid prey could avoid the project area, and because of the long-term positive effects of contaminant removal, the proposed action **may affect, but is not likely to adversely affect Southern Resident killer whales, and will have no effect on critical habitat for Southern Resident killer whales.**
- The proposed action is **not likely to adversely affect the Steller sea lion** since the potential for significant sound disturbance or impacts to water quality and prey abundance is very low. The proposed action will have **no effect on designated critical habitat for the Steller sea lion.**
- Because of the low likelihood of presence of humpback whales near the project during construction and their high mobility, as well as the long-term beneficial effect to the aquatic environment from sediment and slag cleanup, the project **may affect, but is not likely to adversely affect humpback whales**.
- Because of their rarity in the project area and the fact that critical area for this species is not located at or near the project site, the proposed action will have **no effect on leatherback sea turtles**, and **no effect on leatherback sea turtle critical habitat**.

2. **Fish, crustaceans, mollusks and other aquatic organisms in the food web [230.31]**
   A diversity of fish, invertebrates, mammals and birds, exist near the project area. Temporary effects due to noise, vibration, lighting, sediment suspension, and contaminant exposure are likely from the preferred alternative. Pile driving causes noise and disturbance for fish that

may not be avoidable, but observation for distressed, injured or dead fish will be made continually, and work will be halted for any needed corrective action if any are observed. Some fish would be able to avoid much of the activity, although small bottom-dwelling fish might in some cases be captured or smothered in the immediate locality of a dredge. As a result of the sediment remediation, suspension of solids would cause removal or smothering of benthic organisms, but recolonization would occur for most within a year. Continued shading of the nearshore environment as a result of the existence of the pier would negatively impact primary productivity, with indirect effects on secondary and higher productivity. The net removal of nearly 800 pilings would provide some benefit to benthic communities. Best management practices would be used to minimize effects. The approved in-water work window for protection of salmon runs from August 16 to Feb. 14 (USACE undated). This is the most conservative window; other windows apply for surf smelt, sandlance and herring. It is possible that least surf smelt and sandlance are in the Blair and Hylebos waterways, but their spawning areas are away from the project site (EPA 2002). All in-water activities, including piling removal, sediment and slag remediation, and new piling installation, would be timed for the August 16-February 14 period; however, because of the extensive nature of the in-water work and the desire to complete it during one in-water work window, a request is being made to begin the work window on July 16. Structural habitat for attached invertebrates and algae would be temporarily removed, but would be replaced with similar, though cleaner, habitat. Mussels, barnacles, anemones, bryozoans, tunicates and various algae would begin to colonize the new pilings by the first spring following construction, and further settling would occur in subsequent spring seasons. Construction activities in the intertidal habitat may temporarily displace Dungeness crab, juvenile English sole, Pacific staghorn sculpin, and starry flounder. There may be some initial mortality to some of these species at the onset of dredging, but the continual disturbance would displace the mobile individuals. Work in the subtidal area to – 30 ft MLLW would displace fish species such as starry flounder, Pacific sculpin, and shiner perch, and possibly birds (cormorants, coots and goldeneye for example) and mammals such as harbor seals.

3. **Other wildlife [230.32]**
   Birds and mammals may be temporarily disturbed by project noise, and are likely to seek other areas to rest and feed. There is some possibility of injury from piledriving to aquatic species, but the use of concrete piles will reduce or minimize that. Marbled murrelet presence and behavior will be monitored for signs of disturbance or distress during pile driving. If disturbance or distress are noted, work will stop until corrective measures are determined and implemented.

Potential Impacts on Special Aquatic Sites [Subpart E]:

1. **Sanctuaries and refuges [230.40]**
   Not applicable.
2. **Wetlands [230.41]**
   The project site consists of subtidal and intertidal wetlands. Temporary impacts will occur from project activities, but cleanup of contaminated sediments and slag, as well as removal of treated wood pilings, will benefit wetland values in the long term.
3. **Mud flats [230.42]**
   The intertidal areas of the project area are mud. Removal of contaminated sediments will be

beneficial. Backfill will consist of similar, uncontaminated material, at least on the surface down to below the bioturbation depth.

4. **Vegetated shallows [230.43]**
   Not applicable.
5. **Coral reefs [230.44**]
   Not applicable.
6. **Riffle and pool complexes [230.45]**
   Not applicable.

Potential Effects on Human Use Characteristics [Subpart F]:

1. **Municipal and private water supplies [230.50]**
   The pier uses piped water supply; that will not change over the long term, but will be temporarily disrupted during construction. There is no water supply reservoir that is affected by the action.
2. **Recreational and commercial fisheries [230.51]**
   There is some potential for disruption to harvestable fish species as stated in D.1 and D.3. Invertebrate species upon which these species depend will also potentially be affected. Effects are expected to be short-term and insignificant, but monitoring will occur during construction for distressed, injured or dying fish, and work will stop pending corrective measures if any are seen. Removal of contaminated sediment and slag will have benefits in the long term.
3. **Water-related recreation [230.53]**
   There is no recreational use of the project area; that will not change.
4. **Aesthetics [230.53]**
   The project will not change the generally commercialized and industrialized use of the area. Views from nearby higher ground will not be materially altered.
5. **Parks, national and historic monuments, national seashores, wilderness areas, research sites and similar preserves [230.54]**
   Not applicable.

Evaluation and Testing [Subpart G]:

1. **General evaluation of dredged or fill material [230.60]**

2. **Chemical, biological, and physical evaluation and testing [230.61]**
   Kemron (2008) has documented testing of sediment and slag on site, and determined that a number of contaminants of concern (do not meet sediment quality objectives) are present, including arsenic, cadmium copper, lead, mercury, zinc, PAHs, and PCBs, as shown below. Testing will occur during dredging to ensure that adequate removal of contaminated sediments is occurring. Removal of contaminated sediment and slag is intended to meet SQOs.

Contaminants of concern in Pier 23 slag mass, with test values in comparison to SQOs (Kemron 2008).

Contaminant	*SQO (mg/kg)*	*range of tested values (mg/kg)*
arsenic	57	120 - 150
cadmium	5.1	5 - 41
copper	390	442 - 884
lead	450	760 - 2820
zinc	410	1100 - 3750

Contaminants of concern in Pier 23 sediments, with test values in comparison to SQOs (Kemron 2008). The value of 19 for organic compounds represents a value below detection limits.

Contaminant	*SQO (mg/kg)*	*range of tested values (mg/kg)*
copper	390	13.4 - 441
mercury	0.59	0.1 - 1.73
zinc	410	22.4 - 565
total HPAH	17,000	19 - 18,470
total PCBs	300	19 - 637

Material to be placed as backfill following removal of contaminated sediments and slag will be from an approved, clean source.

Actions to Minimize Adverse Effects [Subpart H]:

1. **Actions concerning the location of the discharge [230.70]**
   Fill material will be placed where contaminated material has been excavated. No location-specific action is being taken to minimize adverse effects.
2. **Actions concerning the material to be discharged [230.71]**
   Material to be placed as backfill following removal of contaminated sediments and slag will be from an approved, clean source.
3. **Actions controlling the material after discharge [230.72]**
   Material is not expected to be substantially displaced, especially since gravel will be included in the 6-inch “fish mix” covering layer.
4. **Actions affecting the method of dispersion [230.73]**
   The location is one of low current and energy, and placement should allow material to settle quickly into the excavated area.
5. **Actions related to technology [230.74]**
   No specific technological applications are being used other than current best management practices.
6. **Actions affecting plant and animal populations [230.75]**
   Monitoring of effects to fish will occur during construction, and birds (primarily marbled murrelet) will be monitored during piledriving. Observation of injured, distressed or dying

organisms will result in a work stoppage pending determination of cause and implementation of corrective action.

7. **Actions affecting human use [230.76]**
   No specific action is proposed to mitigate any effects on human use. The purpose of the proposed project is to allow the U.S. Army Reserve to continue mooring and maintaining Army Reserve vessels at Pier 23, and to protect human health and the environment for long-term mission operations at the project site.
8. **Other actions [230.77]**
   Several measures and best management practices would be taken to ensure that the effects of the project activities on natural resources would be minimal. They are intended to be performance-based as much as possible, and include the following:

   General

   - In-water work activities (pile removal/replacement, dredging/backfill and dredge material dewatering, slag removal/backfill, and habitat mix placement) will occur during the August 16 to February 14 in-water work window to reduce the likelihood of impacts to migrating juvenile salmon and bull trout. Note that because of the extensive nature of the project, and the need to maximize time for in-water work, an extension of the work window is being requested, to start on July 15 instead of August 16. This is based on evaluation of salmonid movements and use of the project area, and on communications with NMFS and WDFW staff.
   - All night-time debris removal, demolition, remediation and construction lighting will be kept to the minimum necessary for the intended purpose, for both intensity and area illuminated.
   - Barges will not be allowed to ground out in the intertidal zone.
   - All floating debris will be confined and collected and will not be allowed to float offsite. The contractor may employ a debris boom, skiff and net for this task.
   - Precautions will be taken to prevent the discharge of petroleum products, chemicals, or other material into Commencement Bay. Equipment and work vehicles will be stored on-site during construction; however, refueling will occur away from the water. No breakdown maintenance on engines will occur near the water. Fuel spill kits with absorbent pads will be onsite at all times.
   - A floating oil boom will be deployed to contain surface sheens, if they occur during any activity.
   - Contractor will maintain a continual watch for distressed, injured or dead fish. If distressed, injured or dead fish are observed in the project vicinity, work will stop until the cause is determined and appropriate corrective action taken.
   - All permit conditions, and conditions provided through ESA coordination/consultattion will be observed. The water quality certification issued by the Washington Department of Ecology (WDE) will be followed and is expected to include requirements such as: (a) background water quality measurements will be taken to establish background water quality conditions in the project area, (b) mixing zone of 200 feet for water quality compliance will be used as established in the Washington Administrative Code (WAC 173-201A-400(7)(b)(i)); (c) twice daily water quality measurements for the first three days of each different type of project operation (pile removal, dredging, dredge material dewatering, backfill and habitat mix placement, and new pile driving); (d) periodic turbidity, temperature,

and dissolved oxygen measurements will be required during in-water activities after the first three days and will be reported in the daily construction reports, and a monthly WQM report will be sent to WDE; (e) operational measures (best management practices) to prevent/minimize WQC exceedances will be employed; and (f) visual monitoring for the presence of oily sheen or distressed, injured or dead fish will be required during construction.

Pier Repair

- To minimize turbidity associated with project activities, equipment operators will immediately be requested to stop or change operation as necessary if maximum criteria are exceeded or are expected to be exceeded based on daily water quality measurements. An operational change or stop-work request will be initiated in the field prior to consultation with WDE as described in the water quality certification. Upon consultation with WDE, operations will follow outcome of discussion.
- Debris, removed piles and pile stubs will be contained on a barge for transportation from the site to an upland staging facility for resizing and subsequent disposal or recycling if possible. No creosote-treated piling will be recycled. Such piling will be resized as necessary into maximum 4-foot lengths and disposed of at a permitted upland facility.
- Upon removal from substrate, a pulled pile will be moved expeditiously from the water onto the barge. The pile will not be shaken, hosed off, left hanging to drip or any other action taken that is intended to clean or remove adhering material from the pile.
- Sediments removed from the water with removed piles will be contained and disposed appropriately.
- A floating surface boom surrounding the work area will be used during pile removal to contain and collect any floating debris or sheen. The contractor will retrieve and store any debris generated during construction until it could be disposed of at an appropriate upland facility. Retrieval will occur at slack tide or when current velocity is low.
- If heavy (sinking) debris enters the water during the demolition and removal work, the location of the debris will be documented. When construction is complete a diver (or other suitable means) will retrieve debris that has entered the water and sunk during the demolition and removal work.
- Contractor will be held accountable for verification that structures, piling and debris designated for demolition or removal have been demolished and removed.
- The fact that new decking components will mainly be precast concrete instead of cast-in-place concrete will help ensure water quality integrity. Exceptions will be joints and “bents” (cross-pieces between piling caps) which will be poured and contained in forms.
- Marbled murrelet presence and behavior will be monitored for signs of disturbance or distress during pile driving. If disturbance or distress are noted, work will stop until corrective measures are determined and implemented.

Dredging

- An environmental bucket will be used to the maximum extent practicable to minimize turbidity and recontamination during dredging operations.
- A debris sweep will be performed prior to dredging, to minimize the chance of debris interfering with dredging operations.
- Any water discharged into Commencement Bay from dredged material will meet water quality standards for turbidity and contaminants. Sediment that cannot be dewatered without

meeting water quality standards must be disposed of at an upland site approved for material that includes water.

- Dredging will be avoided within a month of either end of the in-water work window, in order to minimize the chance of impacts to migrating salmonids.
- Backfill of clean material will be used to bring dredged areas back to the surrounding grade.

Slag Removal

- All shoreline fill material excavated or placed on the shoreline will be graded in the dry during periods of low tide.

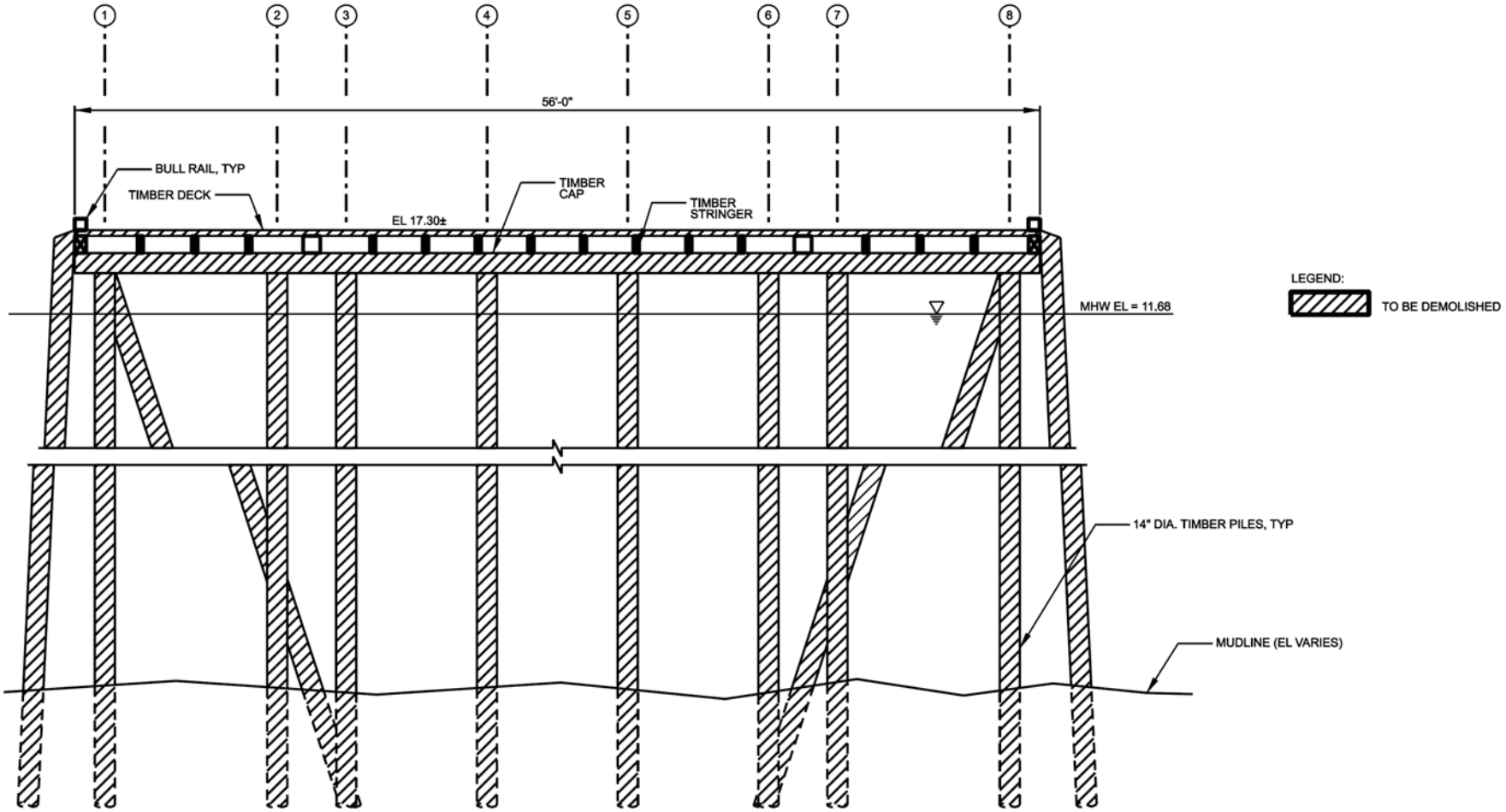
General Policies for Evaluating Permit Applications [33 CFR §320.4]

1. **Public Interest Review [320.4(a)]**
   The USAR finds this action to be in compliance with the 404(b)(1) guidelines and not contrary to public interest.
2. **Effects on wetlands [320.4(b)]**
   See 404(b)(1) evaluation above. No long-term negative impacts to wetlands are expected; benefits will result from removal of contaminants.
3. **Fish and wildlife [320.4(c)]**
   USACE, on behalf of the USAR, is consulting extensively with state and federal resource agencies, tribes and other interested members of the public on this action. Negative impacts have been minimized and are being mitigated.
4. **Water quality [320.4(d)]**
   Best management practices and conservation measures are being used to monitor and minimize effects to water quality, including suspension of contaminated sediments.
5. **Historic, cultural, scenic, and recreational values [320.4(e)]**
   There is anticipated to be no effects to these values.
6. **Effects on limits of the Territorial Sea [320.4(f)]**
   Not applicable.
7. **Consideration of property ownership [320.4(g)]**
   Property ownership has been fully accounted for in planning for this action. The Port of Tacoma owns the property, but the USAR owns the facilities and manages the property under agreement with the Port.
8. **Activities affecting coastal zones [320.4(h)]**
   Snohomish County is considered a coastal county under the Coastal Zone Management Act. A coastal zone consistency determination is being made, for certification by the Washington Dept. of Ecology.
9. **Activities in marine sanctuaries [320.4(i)]**
   Not applicable.
10. **Other federal, state, or local requirements [320.4(j)]**
    The USAR has prepared a biological evaluation for consultation under the Endangered Species Act with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service on effects of the action on listed species. The USAR will apply for a Clean Water Act Section 401 Water Quality Certification from the Washington Dept. of Ecology. They

will apply for Sec. 404 (Clean Water Act) and Sec. 10 (Rivers and Harbors Act) permits from USACE. Concurrence will be sought from the Washington Dept. of Ecology concerning a Coastal Zone Consistency Determination. No other certifications are required.

11. **Safety of impoundment structures [320.(k)]**
    Not applicable.
12. **Water supply and conservation [320.4(m)]**
    The action will not affect water supply.
13. **Energy conservation and development [320.4(n)]**
    Not applicable.
14. **Navigation [320.4(o)]**
    The pier is a navigation-related facility which will be improved following construction, which will have a short-term disruptive effect.
15. **Environmental benefits [320.4(p)]**
    Removal of contaminated sediments and slag, as well as treated wood pilings, will have a long-term beneficial effect on the environment.
16. **Economics [320.4(q)]**
    Economic effects are anticipated mainly through the jobs and revenue that would result from construction contracting.
17. **Mitigation [320.4(r)].**
    No mitigation is proposed because the project action incorporates restoration components as well as BMPs that are protective of natural resources. The project will adhere to conditions imposed through ESA coordination and in permits received.

APPENDIX E
Drawings for Preferred Alternative



SECTION - TIMBER PIER TO BE DEMOLISHED

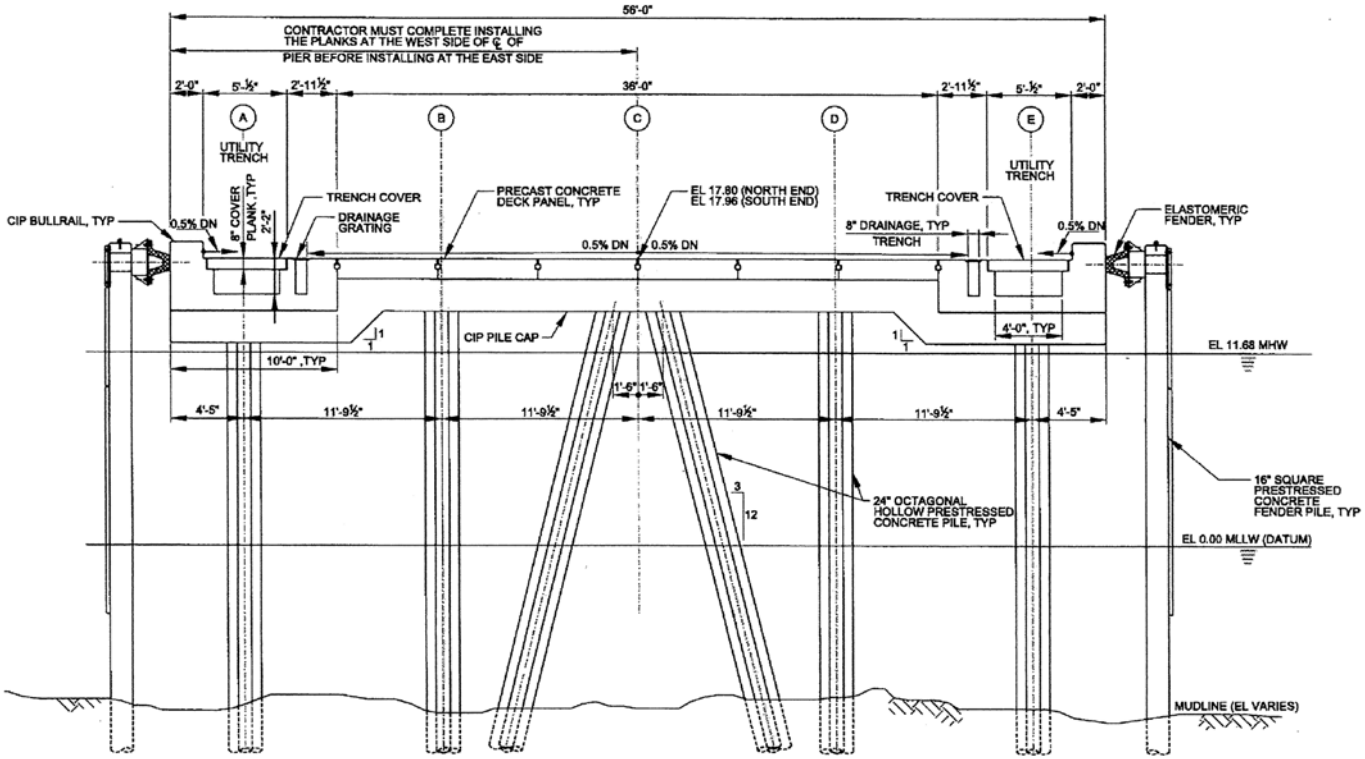
1
D-001

NO SCALE

NOTE:
SEE "RENOVATION OF PIER 23" AS BUILT REFERENCE DRAWINGS DONE BY INCA ENGINEERS, DATED 2005 FOR EXISTING TIMBER PIER DETAILING.

FIGURE - 007
DEMO OF EXISTING TIMBER PIER

ARMY RESERVE
PIER 23 REPLACEMENT PROJECT
TACOMA, WASHINGTON

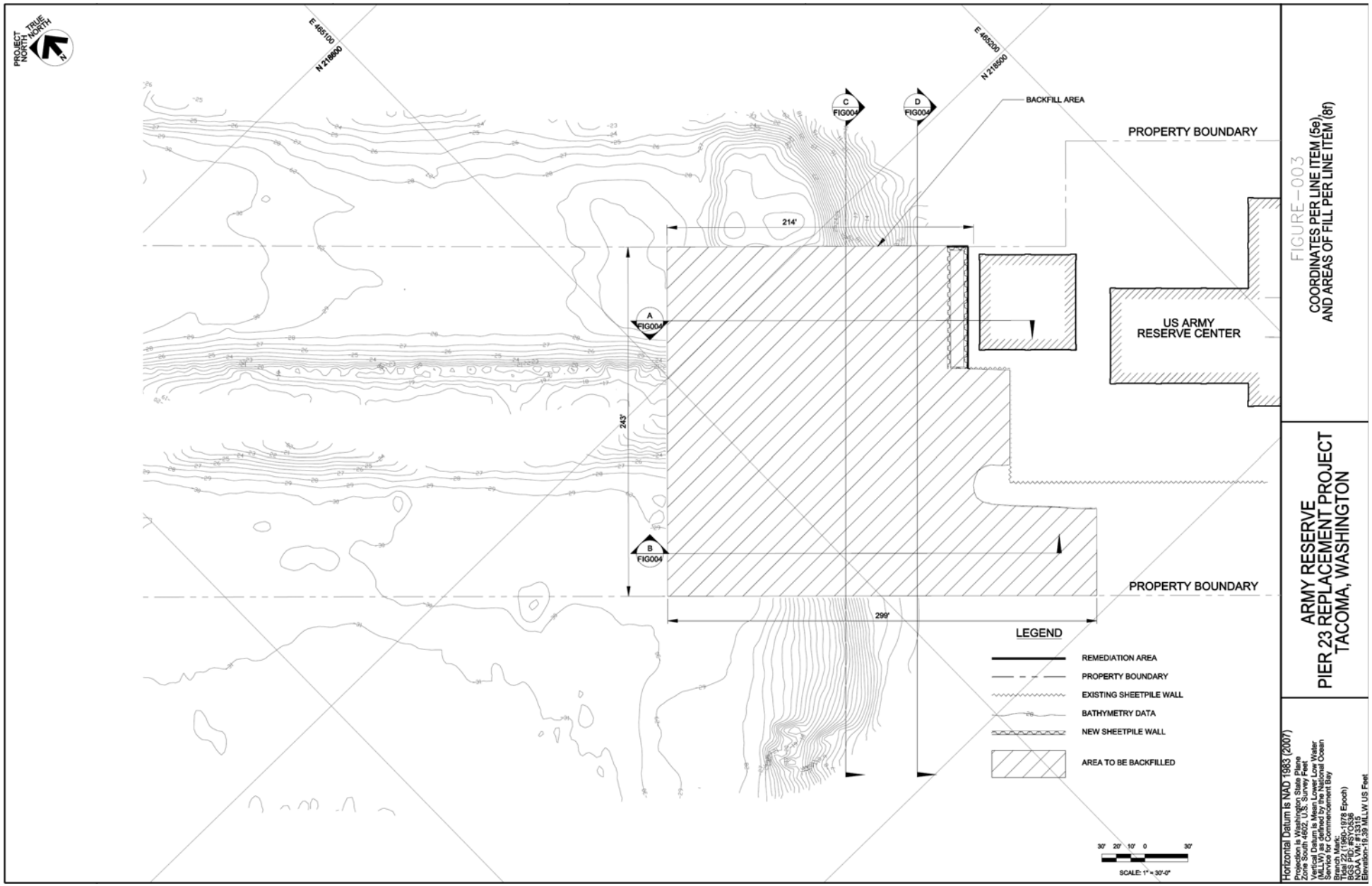


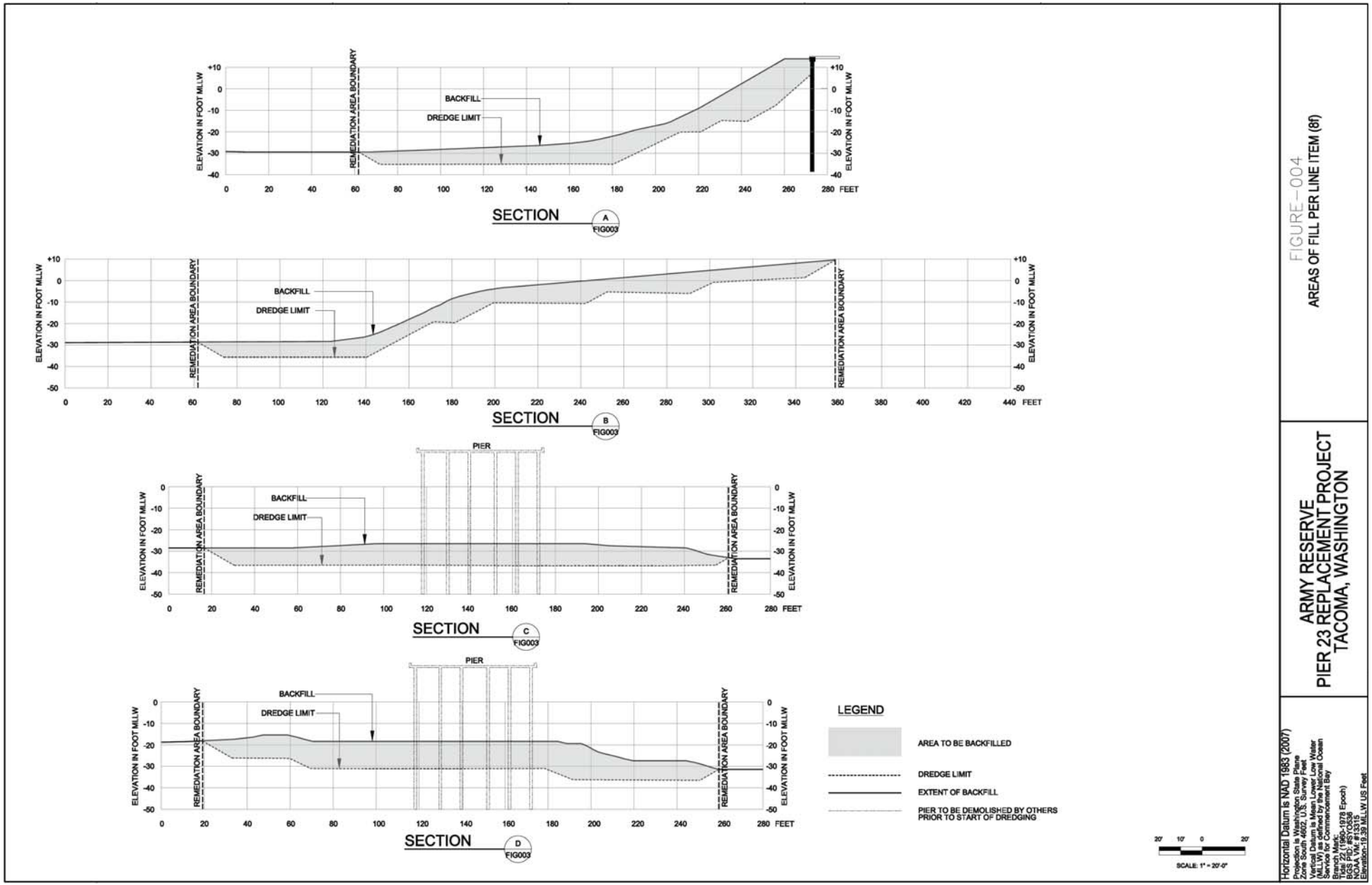
TYPICAL PIER CROSS SECTION (1/S-201) (1/S-202)

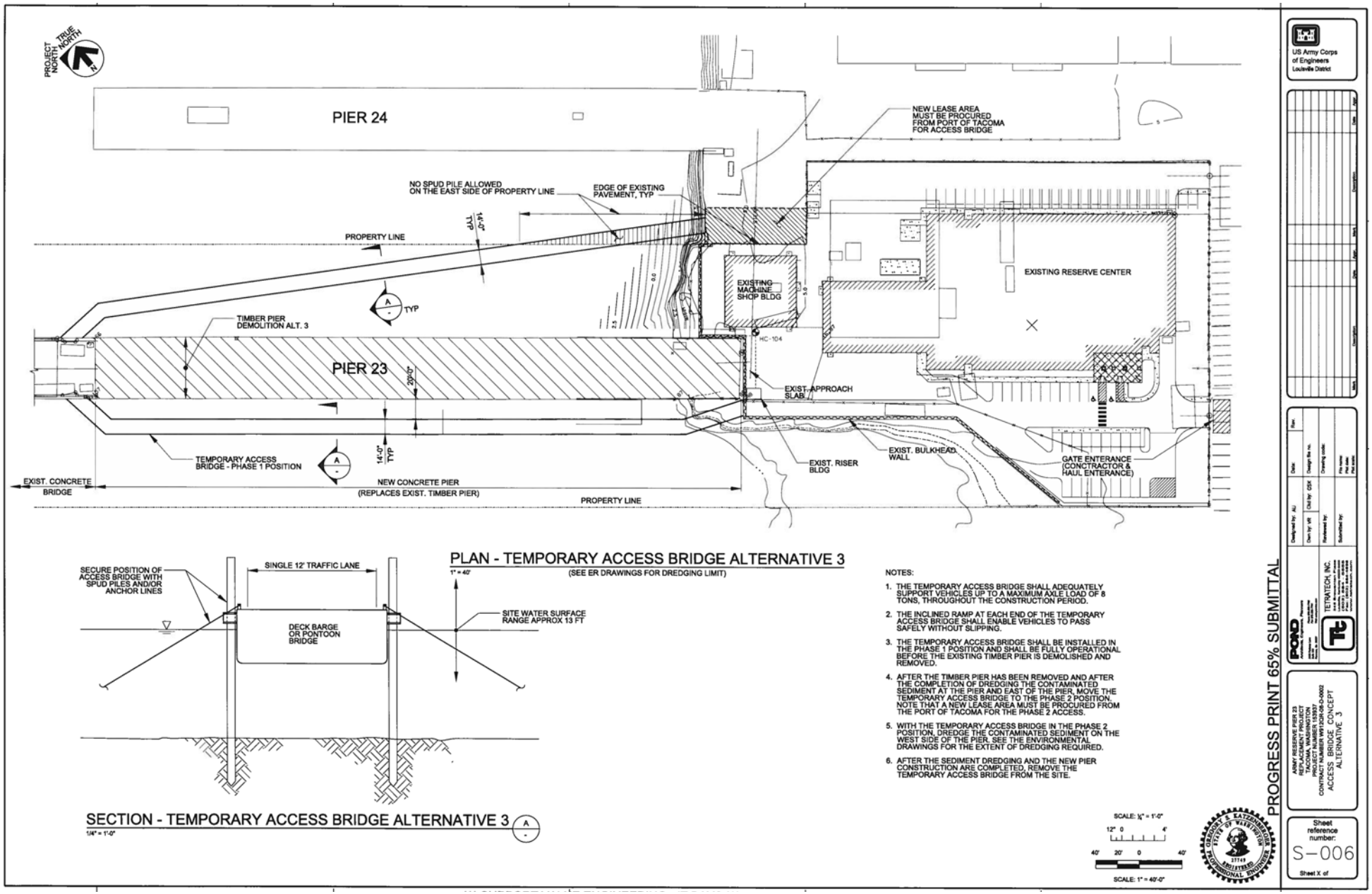
¼" = 1'-0"

FIGURE - 008
NEW CONCRETE PIER

ARMY RESERVE
PIER 23 REPLACEMENT PROJECT
TACOMA, WASHINGTON


PROJECT NORTH
TRUE NORTH
E 465100
N 218600
E 465200
N 218500
C
FIG004
D
FIG004
BACKFILL AREA
PROPERTY BOUNDARY
214'
A
FIG004
US ARMY
RESERVE CENTER
243'
B
FIG004
PROPERTY BOUNDARY
299'
LEGEND
REMEDIATION AREA
PROPERTY BOUNDARY
EXISTING SHEETPILE WALL
BATHYMETRY DATA
NEW SHEETPILE WALL
AREA TO BE BACKFILLED
30' 20' 10' 0 30'
SCALE: 1" = 30'-0"
FIGURE-003
COORDINATES PER LINE ITEM (5e)
AND AREAS OF FILL PER LINE ITEM (8f)
ARMY RESERVE
PIER 23 REPLACEMENT PROJECT
TACOMA, WASHINGTON
Horizontal Datum is NAD 1983 (2007)
Projection is Washington State Plane
Zone South 4602, U.S. Survey Feet
Vertical Datum is Mean Lower Low Water
(MLLW) as defined by the National Ocean
Service for Commencement Bay
Benchmark:
Tidal 22 (1960-1978 Epoch)
BGS PID: #SY0536
NOAA Value: 15.15
Elevation: 15.39 MLLW US Feet


SECTION A FIG003
SECTION B FIG003
SECTION C FIG003
SECTION D FIG003
ELEVATION IN FOOT MLLW
REMEDIATION AREA BOUNDARY
BACKFILL
DREDGE LIMIT
PIER
FEET
LEGEND
AREA TO BE BACKFILLED
DREDGE LIMIT
EXTENT OF BACKFILL
PIER TO BE DEMOLISHED BY OTHERS PRIOR TO START OF DREDGING
SCALE: 1" = 20'-0"
FIGURE-004
AREAS OF FILL PER LINE ITEM (8f)
ARMY RESERVE
PIER 23 REPLACEMENT PROJECT
TACOMA, WASHINGTON
Horizontal Datum is NAD 1983 (2007)
Projection is Washington State Plane Zone South 4602, U.S. Survey Feet
Vertical Datum is Mean Lower Low Water (MLLW) as defined by the National Ocean Service for Commencement Bay
Branch Mark:
Tide 22 (1960-1978 Epoch)
BS5 (1979-2003)
NOAA Vol. #13315
Elevation-19.39 MLLW US Feet



PLAN - TEMPORARY ACCESS BRIDGE ALTERNATIVE 3

1" = 40'

(SEE ER DRAWINGS FOR DREDGING LIMIT)

SECTION - TEMPORARY ACCESS BRIDGE ALTERNATIVE 3 (A)

1/4" = 1'-0"

NOTES:

1. THE TEMPORARY ACCESS BRIDGE SHALL ADEQUATELY SUPPORT VEHICLES UP TO A MAXIMUM AXLE LOAD OF 8 TONS, THROUGHOUT THE CONSTRUCTION PERIOD.
2. THE INCLINED RAMP AT EACH END OF THE TEMPORARY ACCESS BRIDGE SHALL ENABLE VEHICLES TO PASS SAFELY WITHOUT SLIPPING.
3. THE TEMPORARY ACCESS BRIDGE SHALL BE INSTALLED IN THE PHASE 1 POSITION AND SHALL BE FULLY OPERATIONAL BEFORE THE EXISTING TIMBER PIER IS DEMOLISHED AND REMOVED.
4. AFTER THE TIMBER PIER HAS BEEN REMOVED AND AFTER THE COMPLETION OF DREDGING THE CONTAMINATED SEDIMENT AT THE PIER AND EAST OF THE PIER, MOVE THE TEMPORARY ACCESS BRIDGE TO THE PHASE 2 POSITION. NOTE THAT A NEW LEASE AREA MUST BE PROCURED FROM THE PORT OF TACOMA FOR THE PHASE 2 ACCESS.
5. WITH THE TEMPORARY ACCESS BRIDGE IN THE PHASE 2 POSITION, DREDGE THE CONTAMINATED SEDIMENT ON THE WEST SIDE OF THE PIER. SEE THE ENVIRONMENTAL DRAWINGS FOR THE EXTENT OF DREDGING REQUIRED.
6. AFTER THE SEDIMENT DREDGING AND THE NEW PIER CONSTRUCTION ARE COMPLETED, REMOVE THE TEMPORARY ACCESS BRIDGE FROM THE SITE.

SCALE: 1/4" = 1'-0"

SCALE: 1" = 40'-0"