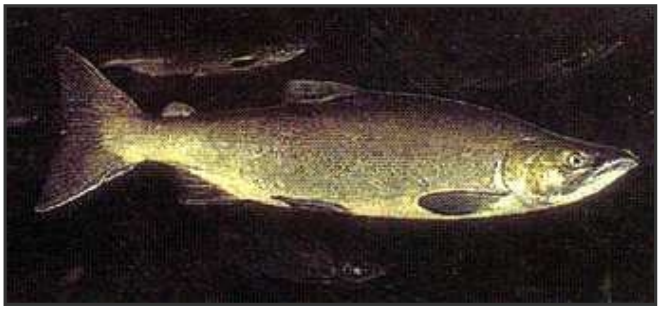
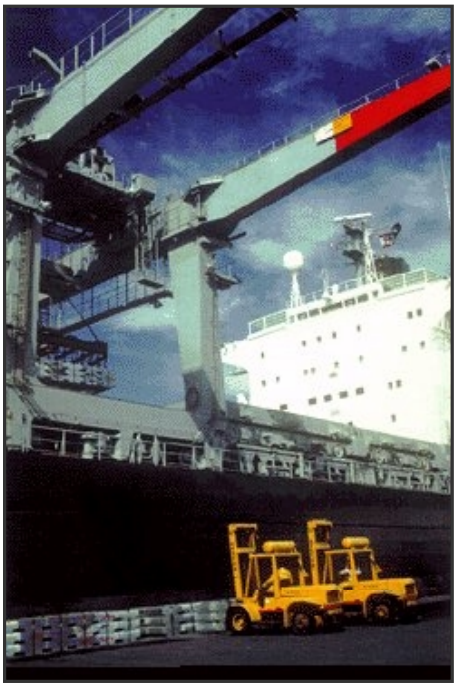
SECTION 905(b) ANALYSIS

GENERAL INVESTIGATION RECONNAISSANCE STUDY

Bellingham Bay, Washington





May 2000

PORT OF BELLINGHAM
Washington State

US Army Corps of Engineers®
Seattle District

1. STUDY AUTHORITY. The Bellingham Bay Project was initiated as a Corps of Engineers – Civil, Title I general investigation study under Public Law 106-60, dated September 29, 1999. This authority states: "The following appropriations shall be expended under the direction of the Secretary of Army and the supervision of the Chief of Engineers for authorized civil functions of the Department of Army pertaining to rivers and harbors, flood control, beach erosion, and related purposes."

General Investigation funds are used for the collection and study of basic information pertaining to rivers and harbors, flood control, shore protection and related projects, restudy of authorized projects, miscellaneous investigations, and, when authorized by laws, surveys and detailed studies and plans and specifications of projects prior to construction.

In fiscal year 2000, $100,000 was provided to complete a 905(b) Report and Project Study Plan.

2. STUDY PURPOSE. This report is a preliminary analysis, performed in accordance with the guidelines of Section 905(b) of the Water Resources Development Act (WRDA) of 1986, to determine if there is a federal (Corps) interest in pursuing a feasibility study related to ecosystem restoration and/or navigation improvements in Bellingham Bay.

3. LOCATION AND DESCRIPTION OF STUDY, PROJECT SPONSOR AND CONGRESSIONAL DISTRICT. The study area is Bellingham Bay, located in northwestern Washington, Whatcom County at the city of Bellingham, Washington (see Figure 1). Bellingham is located about 90 miles north of Seattle, Washington, and 20 miles south of the Canadian border. The Bay is approximately 12 miles long and 3 miles wide and encompasses 25 miles of shoreline.

This study, using existing Corps authorities and policy, will evaluate federal interest in the clean up of contaminated sediments from Bellingham Bay as well as identify other environmental restoration measures to improve fish habitat and ecosystem in the bay and associated tributaries. The study will also evaluate potential navigation improvement (i.e. channel deepening) to an existing federal navigation channel within Bellingham Bay. The Port of Bellingham is the local sponsor and the project is located in the 2nd Congressional District.

4. DISCUSSION OF PRIOR STUDIES, REPORTS AND EXISTING WATER PROJECTS. There are four existing federal (Corps) water projects located in Bellingham Bay (see figure 2). They are all navigation projects and consist of:

- Whatcom Creek Waterway (commercial navigation)
- Squalicum Creek Waterway (commercial navigation)
- I&J Street Waterway (commercial navigation)
- Squalicum Small Boat Harbor (commercial and recreational marina)

A. Whatcom Creek Waterway. This waterway was initially authorized in 1910 with construction completed in 1913. It was further deepened via a 1958 authorization with construction completed in 1961. This waterway currently has an authorized depth of -30 feet MLLW which extends from deep water in the Bay to within 750 feet of the inner channel. The inner 750 feet of channel has an authorized depth of -18 feet MLLW. The Whatcom Creek Waterway Navigation Improvement Study Reconnaissance Report was completed in 1987 and the Whatcom Creek Waterway Initial Appraisal Report was completed in 1991. These reports examined further deepening of the 30 foot channel but neither report showed a justified project. Because this waterway contains contaminated sediments, the last maintenance dredging performed by the Corps of this waterway was in 1969. Sediments dredged in 1969 were also disposed of at the Starr Rock disposal site in Bellingham Bay. This waterway is designated for clean-up by the Washington Department of Ecology under the state of Washington Model Toxic Control Act (MTCA) with oversight by the Washington Department of Ecology as lead regulatory agency.

B. Squalicum Creek Waterway. This waterway was initially authorized in 1930 and constructed in 1931. It has an authorized width and depth of 200 feet by -26 feet MLLW respectively. It was last dredged by the Corps of Engineers in Sept 1995-Jan 1996. This waterway is scheduled for maintenance dredging in September 2000 with 150,000 cubic yards (cy) expected to be dredged. Sediments previously dredged from this waterway were generally found to be suitable for open water disposal. Subject to the dredge material management plan (DMMP) evaluation currently in progress, the dredged sediments may be suitable for use as capping material.

C. I&J Street Waterway. This waterway was authorized in May 1965 and constructed in 1966. The authorization provides for a channel with a width of 100 feet and a depth of -18 feet MLLW. A detailed project report (DPR) on this project was completed in November 1964. The Corps last dredged portions of this project in 1992. Future maintenance is not scheduled. Most of the characterized sediments from this waterway were suitable for open water disposal and may be suitable for use as capping material.

D. Squalicum Small Boat Harbor. This small boat marina was authorized in September 1954 and construction completed in 1958. A General Design Memorandum (GDM) titled “Breakwater for Small Boat Basin” was completed in December 1956. A subsequent expansion of the marina was presented in the Squalicum Harbor DPR on “Small Boat Harbor Expansion” dated June 1975. There was also a final Corps of Engineers Environmental Impact Statement (EIS) titled “Small Boat Harbor Expansion”, dated 1975. The expansion consisted of 1,500 feet of additional rubble-mound breakwater plus dredging the entrance channel, turning basin and access channel to -12 feet MLLW. The expansion was completed in 1980-81. The Corps, as part of the

expanded harbor, last dredged this project in 1980-81. Future maintenance dredging is not scheduled. Subject to the DMMP/SMS evaluation, sediments dredged from the entrance channel to this project may be suitable for open water disposal and may be suitable for use as capping material. Sediments located in the inner harbor area however, contain elevated levels of anti-fouling paint compounds (TBT) and have been designated for clean-up action under the state MTCA with oversight by the Washington Department of Ecology as lead regulatory agency.

E. Other Prior Studies and Reports. Studies and reports related to the clean up of Bellingham Bay consist of:

- **Bellingham Bay Comprehensive Strategy – Draft EIS.** In 1996, Bellingham Bay was selected by local, state and federal agencies as the site of a demonstration pilot project to develop a comprehensive strategy for contaminated sediment cleanup and habitat restoration. A draft EIS has been published under the State Environmental Policy Act (SEPA) by the Department of Ecology. None of the contaminated sediments in Bellingham Bay have been designed by EPA as a CERCLA site. The State of Washington however, has listed Whatcom Creek Waterway as a Model Toxic Cleanup Act (MTCA) site and has officially named a Principle Liable Party (PLP). The Bellingham Bay Demonstration Pilot Project has brought together a cooperative partnership of state and federal agencies, Port of Bellingham, Whatcom County, private industry and tribes, all with a stake in restoring and maintaining a clean and productive bay. The result of the pilot project efforts was a comprehensive plan for coordinated sediment remediation and habitat restoration that is detailed in the draft EIS referenced above, dated July 1999. Pilot Team members include:

    - Port of Bellingham
    - City of Bellingham
    - Whatcom County Health Department
    - Lummi Indian Nation
    - Nooksack Tribe
    - Georgia-Pacific West (G-P)
    - Washington State Department of Ecology (Ecology)
    - Washington State Department of Fish and Wildlife (WDFW)
    - Washington State Department of Natural Resources (WDNR)
    - Washington State Department of Transportation (WDOT)
    - Puget Sound Water Quality Action Team
    - National Marine Fisheries Service (NMFS)
    - U.S. Army Corps of Engineers
    - U.S. Environmental Protection Agency (EPA)
    - U.S. Fish and Wildlife Service (USFWS)

As part of the Comprehensive Strategy Study the following reports were initiated and completed. These reports provide background information and evaluation of existing conditions, using criteria developed by the Pilot Team:

- **Data Compilation and Analysis Report.** The first step in the Pilot process, gathering existing data, describing what was known about baseline environmental conditions and land use.

- **Sediment Sites and Source Control Documentation Report.** Applied Ecology Sediment Management Standards (SMS) to identify known and potential contaminated sediment sites. Sites of potential concern were subsequently investigated under the Pilot.

- **Disposal Siting Documentation Report.** Generated a comprehensive list of approximately 70 potential disposal sites (upland, nearshore, CAD), applied a combination of exclusionary (e.g., avoid impact to pristine habitat) and preference (e.g., meet multiple objectives) criteria to identify a short list of high priority sites.

- **Habitat Restoration Documentation Report.** Applied evaluation criteria developed by habitat subcommittee (tribes, WDNR, WDFW, USFWS, NMFS) to identify overall habitat restoration goals and identified 38 specific sites around Bellingham Bay for restoration.

- **Aquatic Land Use Documentation Report.** Described federal (channels), state (harbor areas), local (Shoreline Master Program designations, Port) and tribal (Usual and Accustomed Fishing Areas) land use jurisdictions and goals to develop an integrated planning guide for the entire bay.

- **Comprehensive Strategy Documentation Report.** Describes the process agreed to and implemented by the Pilot Team for developing the bay-wide plan, including 9 subarea strategies for discrete sections of the shoreline.

Remedial Investigation/ Feasibility Studies (RI/FS) conducted pursuant to the Washington Model Toxics Control Act (MTCA) define the nature and extent of contamination at a site and evaluate alternative cleanup alternatives. MTCA is the main state of Washington law which says how cleanup decisions will be made. Similar to a RI/FS conducted under CERCLA, the purpose of a MTCA RI/FS is to collect, develop, and evaluate sufficient information regarding a site to enable the selection of a cleanup action. The cleanup action must protect human health and the environment, meet environmental standards in other laws which apply and provide for monitoring to confirm compliance. The MTCA cleanup solution needs to eliminate the toxic nature of the contamination or block the pathways that can expose people and the environment to harm. The goal is to develop a cleanup approach that will lead to a healthy environment in the long term, and not just a temporary control of pollution. Based on sediment standards (i.e. how much of certain chemicals can be in sediments), the cleanup plan generally needs to bring the chemicals below these levels or isolate the sediments from exposure to people and ecosystem. The following are reports that were generated as part of the MTCA cleanup authorities but specific to Bellingham Bay**.** These studies provide a wealth of information that would be relevant during the feasibility phase of a Corps investigation.

- **Whatcom Waterway Remedial Investigation/Feasibility Study.** This August 1999 report presents a full characterization of sediment problems throughout the central waterfront and a broad range of alternatives under both MTCA and the Ecology Sediment Management Standards (SMS).

- **Cornwall Avenue Landfill Remedial Investigation/Feasibility Study.** This is an August 1999 report which recommended containment as a preferred alternative.

- **Harris Avenue Shipyard Sediments Investigation.** This August 1999 initial sediments investigation confirmed status as contaminated sediment site. A detailed RI/FS is currently in progress under a work plan reviewed and accepted by State Department of Natural Resources (WDNR).

- **Weldcraft Steel & Marine Sediment Investigation.** Initial investigation of upland soils and marine sediments confirmed status as a MTCA site with potential sediment contamination. Additional investigation and cleanup by the Port is pending.

- **Olivine Property RI/FS Work Plan.** Based on Whatcom Waterway RI/FS data, a full RI/FS of upland and sediment contamination near the I&J Waterway is in progress.

- **Squalicum Shipyard Sediment Investigation.** Initial sediment investigation (1998) at historic Squalicum shipyard indicated that surface conditions currently pass SMS. Ecology has raised concerns about potential wood waste problems.

- **Taylor Avenue Oil Dock Sediment Investigation.** Initial sediment investigation (completed June 1999) confirmed status as a site with contaminated sediments. City of Bellingham is in negotiation with Ecology and WDNR regarding the next steps.

- **Starr Rock/Boulevard Park Sediment Investigation.** Sediment investigation, completed in March 1999, confirmed status as a contaminated sediment site to be addressed under Pilot and Whatcom Waterway RI/FS.

5. PLAN FORMULATION.

A. Identified Problems. The proposed study will evaluate two significant needs in Bellingham Bay:

- ecosystem restoration (including environmental dredging), and
- commercial navigation improvements.

Three types of restoration activities will be considered:

- partial/complete removal and/or capping of contaminated sediments,
- beneficial configuration of Confined Aquatic Disposal (CAD) site and sediment caps to create shallow nearshore habitat and salmonid migratory corridors, and
- physical habitat improvements such as eelgrass meadows, dock/piling removal.
- Since most sediments previously dredged from the Squalicum and I&J Street waterways were found to be suitable for open water disposal they may also be suitable for use as capping material. In addition, sediments dredged from the Squalicum Small Boat Harbor may also be suitable for open water disposal and/or use as capping material, subject to DMMP evaluation. Beneficial uses of this material will be evaluated in the feasibility study.

The proposed habitat creation work would be designed to primarily benefit the eight species of salmonids (chinook, coho, chum, pink, sockeye, bull trout, steelhead trout, and cutthroat trout) that migrate through Bellingham Bay. Chinook will be the main target species, however, since it is the salmonid most dependent on estuarine habitat (along with Chum and Pink salmon) and it was recently listed under the Federal Endangered Species Act. Other important species, such as Dungeness crab, Dolly Varden, shrimp, clams, and groundfish species would also benefit from habitat improvements in the bay.

Navigational improvements would consist of deepening the navigation channel in Whatcom Creek Waterway. Deepening the navigation channel will result in a decrease in transportation costs.

The above work will complement plans and measures developed in the Bellingham Bay Pilot Project.

B. Existing Without Project Conditions.

(1) Ecosystem Restoration – Contaminated Sediments. Currently, there are several areas of contaminated marine sediments located in Bellingham Bay, which include Whatcom Creek Waterway -- a federal commercial navigation channel -- areas adjacent to the navigation channel as well as areas in other parts of the Bay. Contamination has occurred over the last 35 years because of industrial and urban activities. These sediments pose a significant threat to a healthy ecosystem. The state of Washington has designated Whatcom Creek Waterway as a MTCA site and has named Georgia Pacific Corporation as a principal responsible party (PRP) for the site. Other responsible parties have been identified but not named and include the Port of Bellingham, City of Bellingham, Corps of Engineers, and state Department of Natural Resources. While not named a PRP, the Corps of Engineers, as part of the maintenance dredging of Whatcom Creek Waterway, disposed of 130,000 cy of contaminated sediments at the Starr Rock disposal site in Bellingham Bay. This is one of the sites designated by the state of Washington for clean up.

The most extensive areas of surface and subsurface contamination occur in and adjacent to the Whatcom Creek Waterway, a federal commercial navigation channel. All primary contaminant hotspots in Bellingham Bay are shown in Figure 2 and are described below.[1]

Since the 1960s, Georgia-Pacific has owned and operated a pulp and paper mill adjacent to the Whatcom Creek Waterway. Their chlor/alkali plant began operation in 1965 and wastewater discharges from this plant peaked during 1965-71. Since then discharges have been largely minimized by process changes and wastewater treatment controls. The Seattle District used the Starr Rock site in Bellingham Bay for the disposal of approximately 130,000 cy of contaminated sediments dredged from the Whatcom Waterway navigation channel in 1969. The Cornwall Avenue Landfill was used between 1953 and 1965 for the disposal of municipal solid waste, and is actively eroding into Bellingham Bay. This landfill area, located on former tideflats, is being proposed as the Pilot Team's preferred CAD site.

The primary contaminant of concern at the Whatcom Waterway sites is mercury. Mercury is among the most toxic of heavy metals, and may persist for decades following the abatement of its source. Mercury tends to accumulate in the tissues of aquatic plants, invertebrates, fish, and mammals; tissue concentrations often increase with increasing trophic levels, a process called biomagnification. Toxicological effects include neurological damage, reproductive impairment, growth inhibition, developmental abnormalities, and altered behavioral responses.

The Washington State Sediment Quality Standard (SQS) for mercury in Puget Sound is 0.41 ppm. This level corresponds to a sediment quality that produces no acute or chronic adverse effects in biological resources, and poses no significant risk to human health. In and adjacent to the Whatcom Waterway, approximately 200 acres of surface sediments exceed this SQS (see Figure 2). The majority of these exceedances are in the 1-2 ppm range, but the highest surface concentration in the Bay, which occurs in the Georgia Pacific log pond, exceeds 10 ppm. Mercury concentrations exceeding 69 ppm have been detected in the subsurface sediments of the G-P log pond; despite such high concentrations, at the present time there are no exposure pathways of concern for contaminants at depth.

The complex behavior of mercury in the environment makes it difficult to predict the potential for toxic effects based on bulk sediment concentrations. Mercury concentrations in fish tissue collected from the Whatcom Creek Waterway, the most contaminated portion of the Bay, are elevated as much as three times above regional background levels. However, maximum tissue concentrations measured in this area are below the benchmark concentrations calculated to protect tribal fishers who may consume relatively large amounts of seafood.

[1] Three Ecology sediment standards are referenced in Figure 2. The *Bioaccumulation Screening Level* corresponds to a level of contamination that is protective of potential bioaccumulation exposures. The *Sediment Quality Standard* (SQS) is Ecology's long-term goal for sediment quality; it corresponds to a level of contamination that has no adverse effects on organisms. The *Minimum Cleanup Level* (MCUL) corresponds to minor adverse effects on biological organisms.

Other contaminants of concern in and near the Whatcom Waterway include phenol and 4-methylphenol, which are degradation products of wood materials, and solid wood wastes which physically alter the substrate. Areas of copper, lead, zinc, polychlorinated biphenyls (PCBs), and bis(2-ethylhexyl)phthalate contamination have been identified at the Cornwall Avenue Landfill. The metals can cause toxic effects on organisms and PCBs are also bioaccumulative. Shown below in Table 1 is a list of contaminated areas within Bellingham Bay designated for clean up, the size of the contaminated site, and the contaminants of concern within each site. Each of these sites are shown in figure 3.

TABLE 1
CONTAMINATED AREA DATA
(See Figure 3)

Site	Approx. Area (acres)	Contaminants of Concern
1. Mid/Outer Whatcom Waterway Channel	46	Mercury, 4-methylphenol, phenol, wood material
2. Head of Whatcom Waterway 30' Channel	7	Mercury, 4-methylphenol, phenol, wood material
3. Head of Whatcom Waterway 18' Channel	5	Mercury, 4-methylphenol, phenol, wood material
4. G-P Log Pond	8	Mercury, wood material
5. G-P Aerated Stabilization Basin	43	Mercury, wood material
6. Port Log Rafting Area	24	Mercury, wood material
7. Starr Rock	48	Mercury, wood material
8. I&J Waterway [2]	9	wood material – potentially suitable for open water disposal
9. Cornwall Avenue Landfill	4	solid waste, metals, organic chemicals
10. Other Sites [3]	5	Mercury, anti-fouling paint compounds, plasticizer compounds

(2) <u>Degraded Nearshore Habitat</u>. Sediment contamination has not been the only type of habitat degradation to result from maritime and industrial activities in Bellingham Bay. Bellingham's urbanized waterfront has been subject to filling, shoreline armoring (rip rap and vertical bulkheads), and construction of marinas, docks, and large

[2] Based on recent tests, sediments dredged from this waterway may be suitable for open water disposal and could potentially be used as capping material.

[3]These sites include: Harris Avenue Shipyard, Olivine, Squalicum Inner Harbor Boat Basin, Weldcraft Steel and Marine. These sites are not designated for clean up in this study but the CAD site would be sized to accommodate an estimated 50,000 cy of contaminated sediments dredged from these areas.

vessel berths. These activities have drastically altered the estuaries of Bellingham's four urban creeks, Little Squalicum, Squalicum, Whatcom, and Padden. See figure 1 for the location of each creek. A reduction in the area and diversity of estuarine and shallow nearshore marine habitats, such as salt marshes, eelgrass meadows, mudflats/sandflats, and sand/gravel beaches, has impacted the Bay's capacity to support the variety of finfish (including the eight salmonids that occur in the Bay as well as surf smelt, sand lance, Pacific herring, and groundfish such as starry flounder and five species of sole) bird, and crustacean species that were historically abundant.

In March 1999, Puget Sound chinook salmon were listed as a threatened species under the Federal Endangered Species Act. Bellingham Bay and Bellingham's urban creeks have been designated as critical habitat for this species. Another salmonid, the Coastal/Puget Sound Population bull trout, was listed as a threatened species in December 1999. Estuaries and the nearshore marine environment provide important rearing habitat for all salmonids, but juvenile chinook are perhaps the most estuarine-dependent. Estuaries provide juveniles with abundant prey during critical growth periods, and refuge from high stream flows and predators. Estuaries also provide both spawning adults and outmigrating juveniles transition or staging sites for the physiological shift from fresh to salt water.

(3) Navigation. Because some of the contaminated sediments are located in the Whatcom Creek Navigation Waterway and up to now there has not been an acceptable cost effective disposal location, neither maintenance dredging or channel improvements in this waterway have occurred. As a result, the navigation channel is not being maintained (it was last dredged in 1969) and has experienced shoaling in several areas. For example, a significant portion of the inner waterway, which has an authorized depth of -30 feet MLLW, currently has a depth ranging from about -20 to -28 feet MLLW . In addition, the upper portion of the waterway, which has an authorized depth of 18 feet, currently has depths ranging from -10 to -16 feet MLLW. Deep draft ships operating in this waterway call at both the Port of Bellingham Terminal as well as the Georgia Pacific dock. Many of these vessels experience tidal delays on arrival and departure, must sometimes be moved to deeper water during a low tide, have to make port calls in an inefficient routing manner which results in sometimes having to accommodate double pilots (U.S. and Canadian) on board as well as add to increased vessel operating costs.

(4) Brownsfields. The Environmental Protection Agency has two Brownsfields assessment pilot projects located next to Bellingham Bay. Detailed information on these project is currently not available however, there may be opportunities to pursue these projects under environmental restoration to further the Brownsfield effort.

C. Expected Future Without Project Conditions. This condition assumes the Pilot Project has not implemented. As a result, the following future without project conditions have been assumed:

(1) Environmental Restoration. An acceptable disposal site is not available and without such a site the contaminated sediments will not be dredged or capped. Sediments that exceed the State of Washington bioaccumulation screening level criteria would remain in the Bay. Degraded nearshore and estuarine habitat would continue to impact recovery of the eight salmonid stocks that spawn in Bellingham Bay's tributaries – two of which are federally listed as threatened. Impacts to crustaceans and bottom fish would also continue.

(2) Navigation. Deep draft ships operating in the Whatcom Creek Waterway will continue to experience tidal delays, vessel shifting during low tides, inefficient routing of port calls, double piloting and additional vessel operating costs.

D. Planning Criteria and Constraints.

Following are suggested criteria for screening proposed alternative projects. These criteria will be finalized in the feasibility report.

- Projects must be in compliance with cleanup standards and applicable laws.
- The expected restoration and/or navigation projects must be economically justified with expected benefits extending over the project life of 50 years.
- The proposed alternative is compatible with other ongoing Federal, State and local agency issues.
- Proposed alternative is acceptable to federal, state and local agencies as well as the Tribes.
- Federal clean up plan and a MTCA cleanup plan will be identified.
- Public health, safety and well-being will be protected.
- The environmental alternatives should be designed to re-establish natural processes and be as self sustaining as possible.
- The navigation alternatives should minimize total costs.
- Proposed work will enhance habitat for threatened or endangered species that occupy the Bay and tributaries to the Bay.
- A monitoring plan with provisions for corrective action will be evaluated and recommended if applicable.
- Real Estate is reasonably available and is cost effective.

- The non-federal sponsor is willing to operate and maintain the recommended project (except for any Corps responsibility for navigation requirements) in coordination with other parties that may be responsible for actions under MTCA.

- The proposed alternative will have positive benefits to existing ecosystems.

- Provide a long-term solution that is engineeringly feasible, environmentally acceptable and publicly acceptable.

E. Specific Problems and Opportunities.

The following identifies specific problems and potential solutions to address the water resource problems outlined above.

(1) Contaminated Sediments. There are several limiting factors which impact Bellingham Bay's ecosystem, specifically the production of out-migrating juvenile salmon. One of these factors, contaminated sediments, has functionally degraded areas of the bay in a couple of different ways. The toxic effects of contaminants can limit the population size and diversity of organisms living in and on marine sediments (called "benthic" and "epibenthic" invertebrates). Toxicity can cause direct mortality or chronic effects like impaired growth. In either case these effects could have a corresponding effect on the next trophic level, since reduced populations of affected organisms may no longer function as a viable prey source within the food chain (e.g., reduced populations of the epibenthic crustaceans that juvenile salmonids feed on may affect their survival). A second type of degradation occurs when a contaminant physically alters the natural habitat. In Bellingham Bay, this occurs when wood material or solid waste present in the substrate affects the production of benthic and epibenthic organisms.

Another type of degradation occurs with compounds, like mercury, that tend to bioaccumulate. Bioaccumulative compounds sometimes do not have population-level effects on the lower trophic levels where they first enter the food chain. However, as the compound is passed up the food chain it can produce effects in higher trophic levels (e.g., mercury toxicity may be most severe in bald eagles or humans that have eaten salmon that have eaten contaminated epibenthic invertebrates). This process, called biomagnification, can take a long time to manifest itself relative to direct toxic effects. Ecology's Bioaccumulation Screening Level (BSL) for Puget Sound, which corresponds to a level of contamination that is thought to be protective of bioaccumulative exposures, is 1.2 ppm. Surface sediments in a small portion of the Bay, largely in and adjacent to the Whatcom Waterway, exceed the BSL (see Figure 2). Since there is an exceedance of the BSL, these sediment hotspots are considered to pose a potential health risk to people that consume a large amount of seafood taken from the inner bay. However, the highest measured mercury levels in fish and shellfish tissues are below risk screening levels. The complex behavior of mercury in the environment makes it difficult to correlate tissue concentrations or toxic effects with bulk sediment concentrations.

The proposed project, capping and/or removing contaminated sediments from Bellingham Bay, provides an opportunity to significantly reduce or eliminate the ecological degradation and potential for human health risks associated with high levels of mercury and other contaminants, while improving navigation efficiencies.

(2) Habitat Degradation. Another factor limiting the production of juvenile salmonids in Bellingham Bay is a lack of estuarine and nearshore marine habitat. Remediation of contaminated sediments in the Bay presents an opportunity not only to ameliorate the functional degradation that has occurred as a result of contamination, but also to create and restore the types of habitat important for juvenile salmon.

For example, beneficial placement and configuration of Confined Aquatic Disposal (CAD) sites and sediment caps could provide elevations and substrates that could support eelgrass meadows, which provide food and cover for juvenile salmonids. Other potential habitat projects that could be constructed during sediment removal/disposal include:

- creating salmonid migratory corridors by building benched areas on CAD side slopes;
- other elevation modifications such as fill removal or increasing elevation in areas that are currently subtidal so that they become intertidal; and
- removal of large boulders/rocks, pilings, wooden structures, and derelict floats.

Under the Pilot Team's preferred plan, approximately 20-30 acres of intertidal habitat would be created in areas targeted for CADs, capping, and other remedial/restoration actions which would translate into a significant increase in juvenile production. The target type of habitat includes gently sloping (10H:1V) gravel/cobble beaches that transition into gently sloping shallow subtidal sandflats/mudflats and eelgrass meadows.

(3) Navigation Improvements to Whatcom Creek Waterway. As a result of the currently authorized channel depth of -30 feet MLLW, deep draft vessels calling at Whatcom Creek Waterway experience several problems which result in increased operating costs. These problems consists of tidal delays, need to move vessels to deeper water during low tides, inefficient routing of vessel calls resulting in double piloting and increased vessel operating costs. With an acceptable disposal site available and assuming an economically justified project, the Whatcom Creek Waterway could be dredged beyond its authorized depths of -30 feet MLLW and -18 feet MLLW. This would result in a more efficient movement of waterborne cargo resulting in transportation cost savings.

F. Alternative Plans. Using the Bellingham Pilot Study draft EIS, several alternative measures applicable to environmental restoration, which would provide significant benefits to fish and the overall ecosystem in Bellingham Bay, have been identified and evaluated to a limited extent. These restoration alternatives were separated into those which address the clean up of contaminated sediments and those which address the degraded nearshore habitat. In addition, a navigation improvement project for

deepening the Whatcom Creek Waterway has been identified and also evaluated to a limited extent. The environmental restoration and navigation improvement measures included the following:

(1) Environmental Restoration Measures.

(a) Clean up of Contaminated Sediments. As shown in Table 1 and Figure 2, there are several sites in Bellingham Bay which contain contaminated sediments. Clean up of these sites could potentially be accomplished by:

- Capping all contaminated sediments in place,
- Dredging and disposal with capping at a CAD site (or upland disposal),
- Dredging and treatment,
- Combination of the above measures.

(b) Improvements to Nearshore Habitat.

- Providing suitable substrate for improved habitat function including, planting eel grass where contaminated sediments have been capped.
- Creating benched areas on the capped area side slopes.
- Removing old creosote piling and docks from several locations.
- Fill/rip rap removal and other elevation modifications.

(2) Navigation Measures.

(a) Relocating deep draft vessels calling at the Whatcom Creek Waterway to berths at other waterways within Bellingham Bay.

(b) Deepening of the Whatcom Creek Waterway navigation channel.

G. Preliminary Evaluation of Alternatives. Alternatives were separated into the following categories:

- those which address the clean-up of contaminated sediments in Bellingham Bay,
- those which address other ecosystem restoration measures in the Bay (i.e. nearshore habitat improvements), and
- navigation improvement to Whatcom Creek Waterway.

Those alternatives which were eliminated from further consideration as well as those to be carried forward to the feasibility study are identified below.

(1) Clean Up of Contaminated Sediments: At the current level of analysis, environmental benefits achieved from each alternative (except no action) are primarily the same. Benefits achieved from the clean up of these contaminated sites include

reducing the ecological degradation associated with mercury, PCB's, metals, and wood products, and eliminating or significantly reducing the risk of mercury contamination biomagnifying through the food chain. Furthermore, alternatives which result in capping also create the opportunity to develop additional subtidal habitat areas at the cap sites. On the other hand, those alternatives which remove contaminated sediments from the water reduce or eliminate the need for future monitoring of those sediments. Any additional benefit(s) associated with a specific alternative is described below.

(a) No Action. The description of the no action alternative applies to the total project to include the clean up of contaminated sediments, other ecosystem restoration measures and navigation improvements. The no action alternative will not reduce ecosystem degradation from contaminated sediments and lack of nearshore habitat. Human health risks associated with high levels of mercury contamination would remain and the existing transportation cost inefficiencies associated with moving cargoes through the Whatcom Creek Waterway would continue.

(b) Capping In Place. This alternative consists of capping all contaminated sediments in place to include the Whatcom Creek Waterway. This alternative would require the placement of approximately 500,000 – 600,000 cy of clean material. In addition, most of the Whatcom Creek Waterway navigation channel would be reduced to a depth shallower than its authorized depths of -30 and -18 feet MLLW – eliminating all deep draft vessel movements on this waterway. This reduction would result in significant increased shipping and infrastructure cost and a requirement to authorize a shallower channel depth. An additional benefit of this alternative is that, compared to the other alternatives, it may create a larger area for habitat enhancement. In addition, it eliminates the need for in-water dredging and construction of a CAD facility. However, because of the cost impacts to navigation plus the need to obtain a new channel authorization or de-authorization for a shallower channel, this alternative was eliminated from further consideration.

(c) Dredging and Disposal at CAD Site. This alternative consists of dredging all contaminated material, placing it in a designated CAD site located at the Cornwall Avenue Landfill, and placing a cap over the CAD site. Cost of this alternative consists of constructing a CAD site large enough to accommodate all contaminated sediments, relocating two Georgia Pacific pipelines which currently cross the navigation channel at a depth of 40 feet , plus the dredging and disposal of 2.6 million cy of contaminated sediments plus the placement of 300,000 cy of cap material. This alternative assumes the availability of an approved CAD site. Environmental benefits of this alternative would be comparable to the above measure plus there would be some incidental navigation benefits as a result of a deeper navigation channel. Construction cost of this alternative is estimated to range between $60 to $75 million. Due to the extremely high cost of this measure and the unlikely probability of state and Tribal agreement to expanding the size of

the proposed CAD site in Bellingham Bay, it was eliminated from further consideration.

(d) Dredging and Transport To Upland Site. Other disposal options include dredging and transporting the sediments to an upland site such as eastern Washington or Oregon via train or truck. Cost to dredge and transport sediments to these upland disposal sites is currently $68 per cy. Assuming 2.6 million cy of contaminated sediment and the above cy cost, this alternative has an estimated cost of $179 million. Benefits would be basically the same as the above measures except the contaminated sediments would be removed from the water. Due to the very high cost of this alternative and lack of interest to pursue this alternative by the project sponsor, this disposal option was eliminated from further consideration.

(e) Combination of the Above Measures. A combination of the above measures was also evaluated. This alternative is expected to be the preferred alternative presented in the Bellingham Bay Comprehensive Strategy final EIS and includes combining dredging and disposal of contaminants at the proposed Cornwall Avenue CAD site with capping in place of the other contaminated areas in the bay. Specifically, this alternative consist of constructing a CAD facility at the Cornwall Avenue Landfill stie sufficient to accommodate 700,000 cy of sediments, dredging much of the navigation channel to a depth sufficient to totally remove the contaminated sediments (about -40 feet MLLW) and disposing of the dredged contaminated material at the CAD site. The two Georgia Pacific pipelines that cross the navigation channel at elevation -40 feet MLLW would remain in place and the contaminated material in this particular location would be partially dredged to a depth of about -35 feet MLLW. The remaining contaminated sediments would be capped in place with 3 feet of clean material, resulting in a channel depth in this location of about -32 feet MLLW . Contaminated sediments dredged from this area would also be disposed of at the proposed CAD site. The other contaminated sediment sites proposed for initial clean-up in Bellingham Bay would be either be capped in place or dredged and disposed of at the CAD site. The depth of the capped areas as well as the depth of the dredged areas in the navigation channel will be evaluated in the feasibility study. Beneficial use of dredged material for use as capping material will also be evaluated in the feasibility study. Cost of the alternative is estimated to be between $30 and $40 million. See Figure 3 for a delineation of this alternative.

(f) Dredging and Treatment of Contaminated Sediments With Capping. Dredging and treatment would consist of dredging the contaminated sediments from the Whatcom Creek Waterway, de-watering and storing of the sediments for subsequent treatment. In addition, the other areas of contamination in Bellingham Bay would be capped in place. Currently, there are no treatment facilities located on the West Coast but there have been pilot programs initiated on the East Coast. Currently, Georgia Pacific and DNR are in preliminary

discussions regarding treatment. This alternative, with a sufficient quantity of sediments, could be cost competitive. Currently, there is not enough specific information to evaluate the viability of this alternative. The viability of this alternative is being further evaluated under a separate process for Puget Sound – the Multi-User Disposal Site (MUDS) – a joint Department of Ecology and Corps of Engineers study. Based on the results of the MUDS study, this alternative will be evaluated further as part of the feasibility study. Also, dredging of all contaminated sediments from the bay for subsequent treatment will be evaluated in the feasibility study.

(2) Improvements To Nearshore Habitat.

(a) Planting of Eelgrass. The areas where contaminated material has been capped in place and/or a CAD site has been constructed, could provide an area of 20 to 30 acres where eelgrass meadows could be established. Eelgrass meadows would provide feeding, reproductive, and refuge/cover habitat for salmon, Dungeness crab, Pacific herring, tube snout, perch and aquatic birds. Cost to develop eelgrass meadows is estimated to be about $200,000 per acre. Based on this per acre cost, the cost of this alternative is estimated at $4 to $6 million.

(b) Development of Salmon Migration Corridors. This measure consists of benching areas of the CAD and capped sites as well as moderating the nearshore slope angle to provide improved salmon habitat/migration corridors. Cost of this measure is estimated to range between $2 to $4 million.

(c) Removal of old Docks and Pilings. There are several areas within Bellingham Bay where there are numerous creosote piling which are no longer serving any use. The removal of these contaminates from the Bay will improve the ecosystem environment in those areas. This measure will be evaluated in more detail in the feasibility study.

(d) Combination of the Above Measures. A combination of the above measures to determine the most cost effective combination will be explored. These measures could include the planting of eel grass in the areas where it is most likely to survive, the benching of nearshore CAD area as well as capped areas plus the removal of old piling where it provides the greatest benefit for the cost.

(3) Navigation Improvements.

(a) Relocation of Deep Draft Vessels. Consists of moving the deep draft vessels calling at the Whatcom Creek Waterway to other berths in Bellingham Bay. The other two berth areas in the bay are Squalicum Creek Waterway and I&J Waterway. In order to accommodate these vessels, the Squalicum Creek and/or I&J Waterways would have to be deepened beyond their

existing respective 26 foot and 18 foot authorized depths and cargo handling equipment added to their berth areas. Cargo departing from the Georgia Pacific paper plant, which is located on the Whatcom Creek Waterway, would have to be trucked to these other waterways. The cost to develop either one of these waterways to handle the deep draft cargo moving on the Whatcom Creek Waterway would exceed the cost of deepening the Whatcom Creek Waterway. As a result, these alternatives are not feasible and have been eliminated from further evaluation.

(b) Deepening the Whatcom Creek Waterway. Consists of deepening the Whatcom Creek Waterway navigation channel to a nominal depth of -35 feet MLLW . This will result in reduced tidal delays, less vessel shifting and a more efficient vessel calling order which in turn will eliminate double piloting costs plus reduce vessel operating costs. Currently, vessels must often play the tides to operate in this waterway. In addition, there are times when vessels must be moved out to deep water when the tides are low and the vessel has a significant draft. Also, because of the shallow channel, the vessels call in Canada first, then call at Bellingham and finally back to Canada. Since vessels calling at Canada require a Canadian pilot and vessels calling in the U.S. require a U.S. pilot, there are times when the vessels have both a Canadian and U.S. pilot on board a vessel at the same time. With a deeper channel, tidal delays would be reduced, vessels could call at ports in a more systematic manner thereby reducing vessel operating cost and reducing the extra pilot cost. A preliminary analysis of potential navigation benefits versus navigation costs indicates a navigation improvement project is probably not economically justified. However, navigation benefits will still need to be quantified in more detail in the feasibility study to ensure this fact plus if the channel is dredged for environmental purposes, the navigation benefits will be incidental and as such will still need to be quantified. Feasibility study will evaluate a range of depths to ascertain economic feasibility and, if needed, optimum channel depth.

6. FEDERAL INTEREST. The preliminary assessment of environmental restoration of the Bellingham Bay indicates there are measures that appear to be economically justified, environmentally acceptable, would likely be supported by the local sponsor and would be consistent with Army policies, costs and benefits. A sediment clean up measure that appears to be cost effective consists of dredging part of the navigation channel with disposal at a nearby CAD site (or treatment facility if available and cost effective) plus capping in place all of the remaining contaminated sediments. Restoration benefits are based on ecosystem improvements achieved as a result of the project compared to the without project condition. Navigation benefits are based on transportation cost savings in the with project condition compared to the without project condition. The U.S. Army Corps of Engineers has an appropriate role in assisting in environmental restoration, to include the clean up of contaminated sediments, as well as commercial navigation improvements within Bellingham Bay.

7. PRELIMINARY FINANCIAL ANALYSIS. As the local sponsor, the Port of Bellingham will be responsible for providing 50 percent of the cost of the feasibility phase. The local sponsor is aware of the cost sharing requirements for potential project implementation. A letter of intent from the local sponsor stating a willingness to purse the feasibility study and to share in its cost, and an understanding of the cost sharing that is required for project construction is attached. The letter states the Port's ability and willingness to enter into a feasibility cost sharing agreement with the Corps of Engineers and project implementation. The Port also understands that the state MTCA clean up action is a smaller component of the likely preferred alternative to be presented in the Comprehensive Strategy final EIS and that the construction cost for a state clean up action (MTCA) where there is (are) an identified principal responsible party (parties) is a non-federal responsibility.

8. SUMMARY OF FEASIBILITY STUDY ASSUMPTIONS. Based on the baseline work that has been accomplished to date, some feasibility study assumptions can be made and are as follows:

- With project condition assumption critical to the evaluation is:
    - There is a contaminated sediment disposal option(s) acceptable to all applicable federal, state, and local agencies, local sponsor, principal responsible parties, and tribes.
- Operation and maintenance dredging of the authorized navigation channel in the Whatcom Creek Waterway will be performed prior to the clean up action by the Corps of Engineers as part of the operation and maintenance of a federal navigation channel. This action can only take place if there is an acceptable disposal option available.
- The feasibility study will be conducted in accordance with Principles and Guidelines and Corps of Engineer's regulations and policy which define determination of federal interest.
- The feasibility report will identify and document the most appropriate cost-effective long term solution for ecosystem restoration and commercial navigation project at Bellingham Bay.
- Considerable data and analysis has been developed as part of the Bellingham Pilot Study which will help enable the feasibility study to be completed at a reasonable cost. The feasibility study will rely heavily on the recent data collection and analysis that was presented in or prepared for the Pilot Study.
- The proposed work is compatible with other agencies ongoing efforts by federal, state and local agencies.

- Proposed work will enhance habitat for threatened or endangered species that occur in Bellingham Bay.

- The document will be a combined EA and Feasibility Report.

- The costs and benefits of all alternative measures, except the no action alternative, will be quantified on the basis of a 50-year economic life at the current WRC interest rate.

- The proposed project will have positive net benefits.

- The costs of all alternatives not eliminated in the alternatives screening process will reflect a design level of 10 percent. The cost of the recommended plan will reflect a 35 percent design level.

- An MCACES cost estimate will be performed on the recommended plan.

- The Port of Bellingham has sufficient funding to provide the required combination of cash and in-kind services required in the feasibility study.

9. FEASIBILITY PHASE MILESTONES. The initiation of the feasibility phase schedule is highly dependent upon completion and negotiation of the Project Study Plan (PSP) with the non-federal sponsor and certification by higher authority. The following feasibility phase milestones and schedule, as shown in table 2, will be modified as the PSP is developed.

Table 2
Feasibility Phase Milestones

Milestone	Description	Target Dates
---	Submit 905(b) Report	June 2000
---	NWS – Submit Draft PSP and FCSA	August 2000
060	Sign FCSA	Sept. 2000
100	Initiate Feasibility Study	October 2000
120	Technical Review Conference (TRC) [4]	July 2001
124	Alternative Formulation Briefing (AFB)	August 2001
130	Feasibility Review Conference (only if no AFB)	N/A
145	Draft Feasibility Report and Draft EIS for Public Review	March 2002
---	NWS – Final Public Meeting	April 2002
---	NWS – NWS Submit Final Feasibility Report/EIS to CENWD	June 2002
170	Complete Feasibility Report (Div. Cmdr. Public Notice)	August 2002
290	PED Agreement Executed	TBD
310	Final EIS Filed	TBD
330	Chief's Report to ASA(CW)	TBD
340	ASA(CW) Letter to OMB	TBD

[4] Review of existing conditions, proposed alternatives and tentative preferred plan.

10. FEASIBILITY PHASE COST ESTIMATE. The estimated feasibility phase cost estimate, shown in table 3, is only preliminary and will be modified and refined pending formulation and negotiation of the PSP. The estimate is most likely on the high side as it is expected that the cost could be substantially less because of the technical information provided by the Bellingham Bay Demonstration Pilot Study.

Table 3
Preliminary Feasibility Phase Cost Estimate

WBS#	Description	Cost
JA	Engineering	$70,000
JB	Economic Studies	65,000
JC	Real Estate	50,000
JD	Environmental Studies	150,000
JE	Fish and Wildlife Coordination Act Report	20,000
JF	HTRW Studies	20,000
JH	Cost Estimating	35,000
JI	Public Involvement	50,000
JJ	Plan Formulation	50,000
JK	Draft Report	70,000
JL	Final Report	25,000
JM	Washington Level Review	50,000
JP	Project Management	170,000
	PED Cost Sharing Agreement	75,000
	Contingencies	100,000
	TOTAL	**$1,000,000**
	Study Cost Sharing:	
	Federal Share	$500,000
	Sponsor In-Kind	250,000
	Sponsor Share Cash	250,000
	TOTAL PRELIMINARY STUDY COST ESTIMATE	**$1,000,000**

11. VIEW OF OTHER RESOURCE AGENCIES. Because of the funding and time constraints of the reconnaissance phase, only limited and informal coordination has been conducted with other resource agencies. However, because the Bellingham Bay Pilot Study has been ongoing since 1996, there is a lengthy record of resource agency support for a project that combines clean-up and habitat restoration. Views that have been

expressed to date show support for Corps involvement in the goal of cleaning up and restoring habitat of Bellingham Bay.

12. POTENTIAL ISSUES AFFECTING INITIATION OF FEASIBILITY PHASE.

The preferred alternative in the Bellingham Bay Pilot Study is expected to recommend that that portion of the contaminated sediment which is to be dredged be disposed of at the proposed Cornwall Avenue CAD Site. This 905(b) report assumes the Cornwall CAD disposal site is approved for construction and part of the with project conditions. This site is located on aquatic land owned by Washington State and managed by the Department of Natural Resource (DNR). While DNR has raised concerns about the use of state-owned lands for sediment remediation and development of a CAD facility, negotiations between the local sponsor, Georgia Pacific Corporation, DNR and Ecology have resulted in a verbal agreement to allow construction of and disposal at the Cornwall Avenue CAD site. The agreement also calls for treatment of up to 400,000 cubic yards of sediments if a treatment facility is available at the time of dredging. The parties are expected to enter into a signed agreement for sediment remediation later this year.

13. PROJECT AREA MAPS. A map of the project area as well as the preferred plan presented in the Bellingham Bay Pilot Study are provided as Figures 1 and 3 respectively.

14. RECOMMENDATIONS. The preliminary analysis indicates the identified ecosystem restoration and commercial navigation problems in Bellingham Bay warrant federal participation in a cost-shared feasibility study. The identified planning objectives are in the federal interest, are in accord with Administration policy and budgetary priorities, and are strongly supported by the local sponsor. Recommend approval of this 905(b) analysis as a basis to complete development and negotiations of the Project Study Plan and to enter into a Feasibility Cost Sharing Agreement with the Port of Bellingham to conduct the feasibility study.

I recommend that the Bellingham Bay Environmental Restoration Project proceed to feasibility phase.

Date 2 Jun 00

James M. Rigsby
Colonel, Corps of Engineers
District Engineer

Figure 1. Vicinity Map

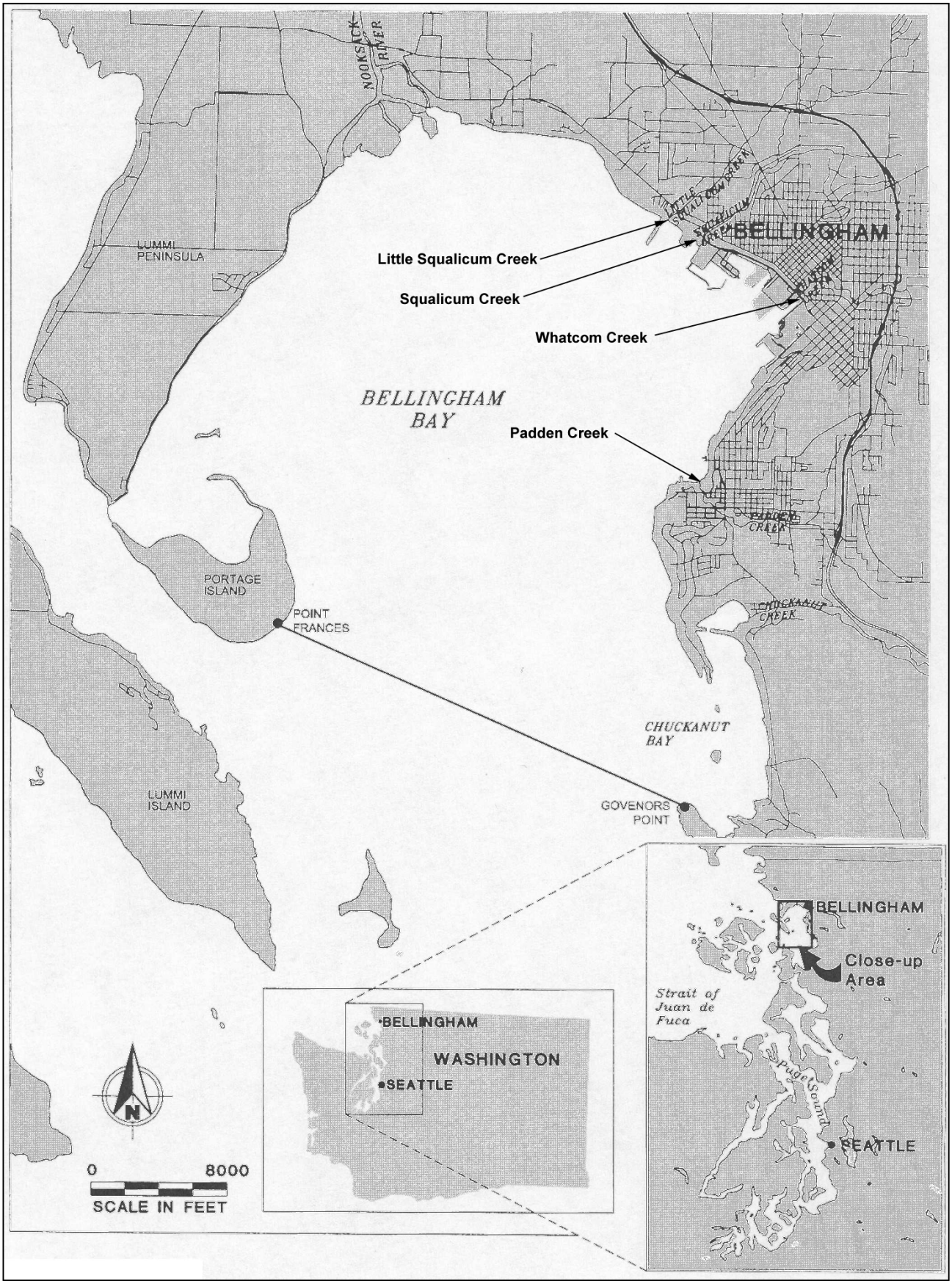


Figure 2. Sediment Contamination Areas

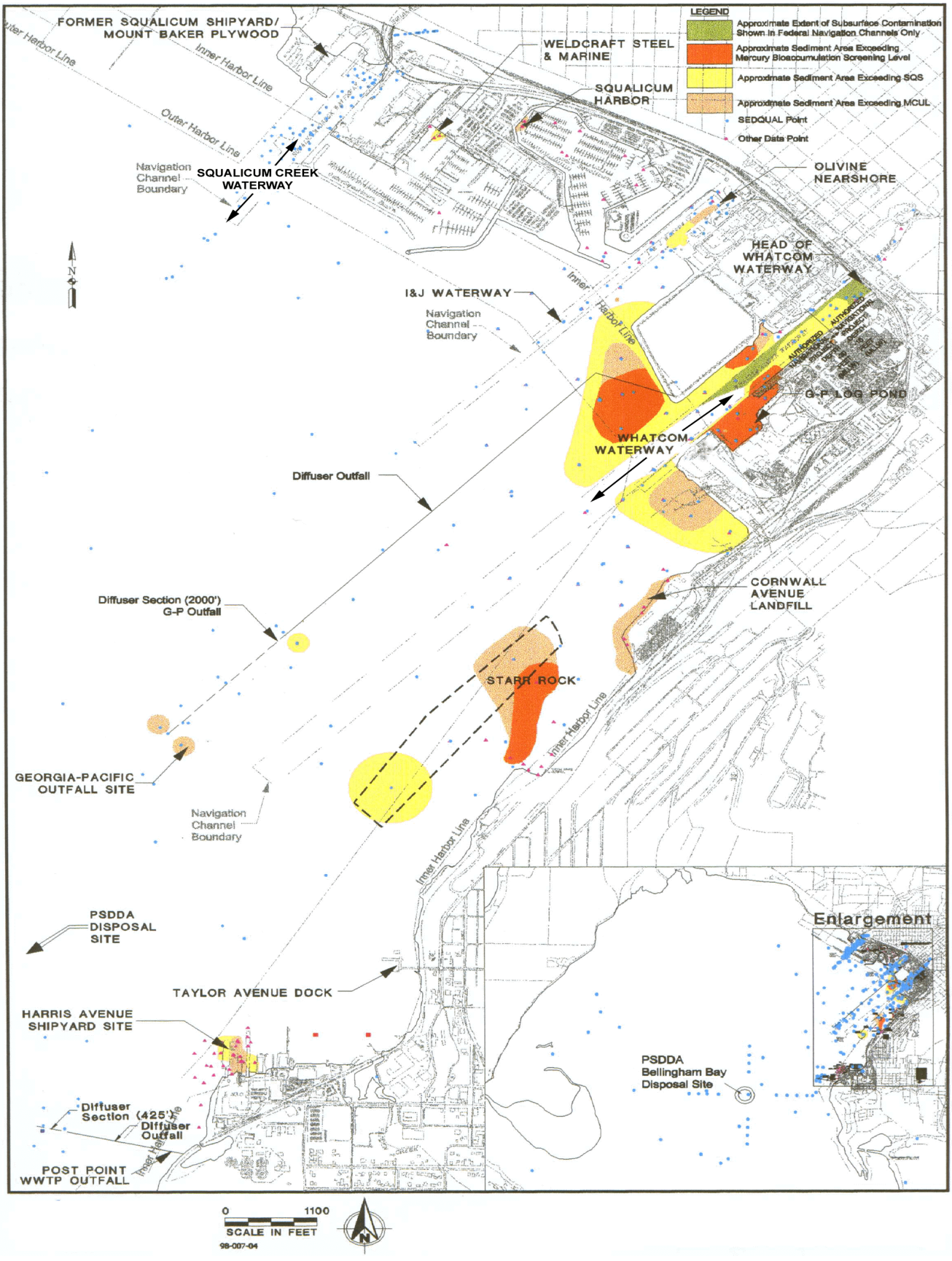
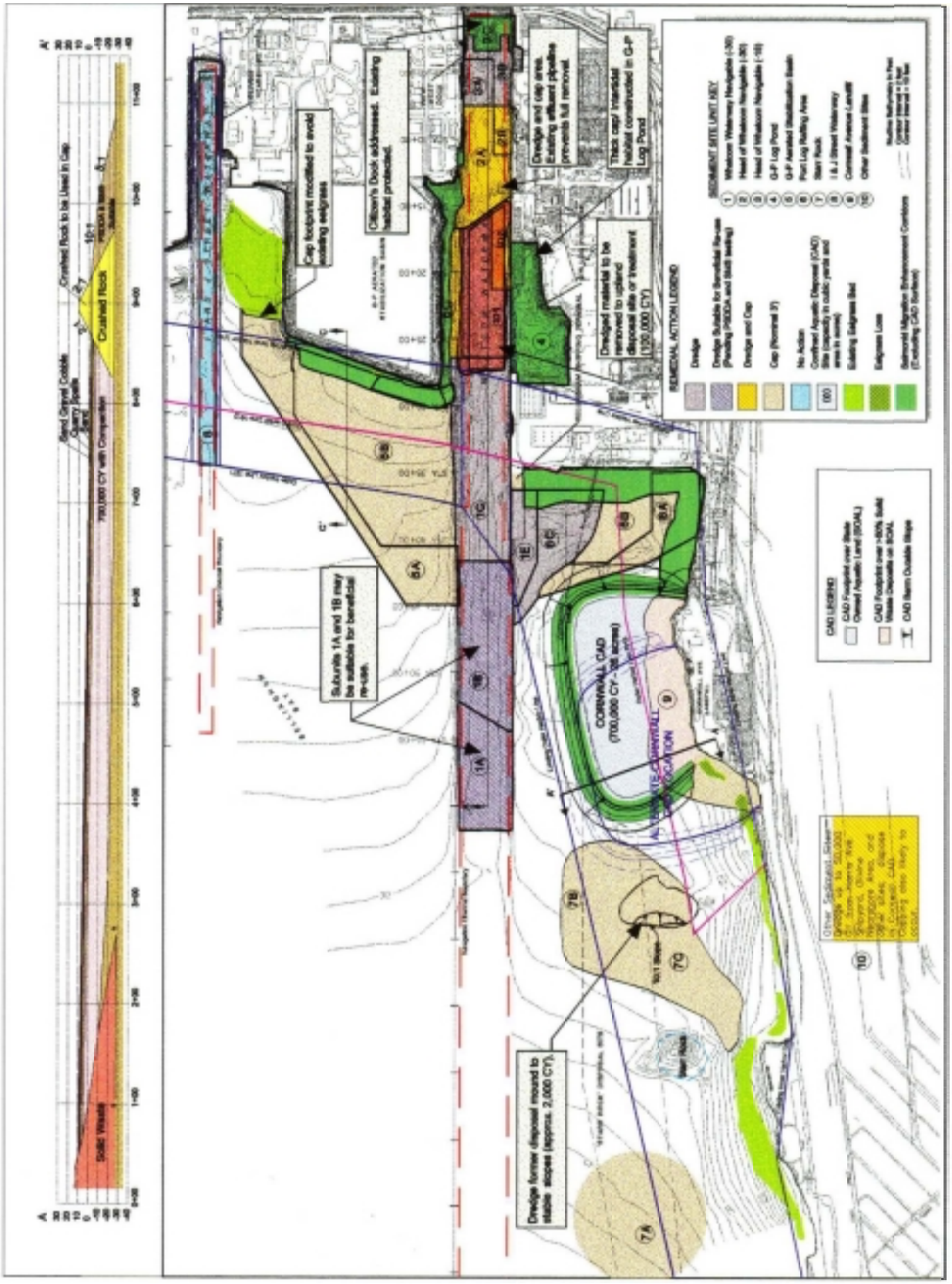


Figure 3.


REMEDIAL ACTION LEGEND
SEDIMENT SITE UNIT KEY
CAD LEGEND
CORNWALL CAD
(700,000 CY - 26 acres)
Subunits 1A and 1B may be suitable for beneficial re-use.
Cap footprint modified to avoid existing eelgrass
Dredge and cap area. Existing effluent pipeline prevents full removal
Thick cap/ intertidal habitat constructed in G-P Log Pond
Dredged material to be removed to upland disposal site or treatment (150,000 CY)
Dredge former disposal mound to stable slopes (approx. 2,000 CY).
Crushed Rock
Solid Waste
Sand Gravel Cobble
Quarry Spalls
Sand
Crushed Rock to be Used in Cap
700,000 CY with Compaction

CENWS-PM-PL

April, 2000

Letter of Intent dated 24 April 2000
Port of Bellingham

General Investigation
Section 905(b) Analysis

Reconnaissance Study
Bellingham Bay, WA

PORT OF BELLINGHAM
Washington State

April 24, 2000

Colonel James M. Rigsby
District Engineer
Seattle District Corps of Engineers
Post Office Box 3755
Seattle, Washington 98124-3755

Dear Colonel Rigsby:

This letter reaffirms our continuing sponsorship of the General Investigations study for Bellingham Bay. We have reviewed the draft reconnaissance report (Section 905(b) Analysis) prepared by your office and fully support the study findings and recommendations.

The report addresses environmental restoration in Bellingham Bay and navigation improvements in the Whatcom Creek Waterway, as part of the Congressionally directed General Investigations reconnaissance study that was initiated in January 2000. It is consistent with the findings of the Bellingham Bay Demonstration Pilot. Our staff has worked together over the course of the Pilot to formulate an innovative environmental restoration/navigation management strategy.

We understand the non-federal cost sharing requirements for the feasibility study under the Water Resources Development Act of 1986, as amended, and fully intend to meet the local cooperation requirements. The Port has the authority and the ability to participate with the Corps of Engineers in the scoping and performance of the feasibility study.

We are also prepared to sign the feasibility cost-sharing agreement during federal Fiscal Year (FY) 2000, following certification of the agreement by your higher authority. We understand that the feasibility study will be initiated in FY 2001. Although this type of study could typically approach $1,000,000, it is our expectation that the cost should be substantially less, because of our ability to use the technical information provided by the Bellingham Bay Demonstration Pilot. In any event, the Port is prepared to provide the required cash contribution.

We believe that the spirit of partnership and careful thought and that has gone into problem identification and preliminary plan formulation will enhance the success of this important project. We anticipate that the excellent partnership we enjoy with your staff will continue during the feasibility study, and are looking forward to entering into the agreements necessary to implement the recommended plan.

Sincerely,

James S. Darling
Executive Director

1801 Roeder Avenue / P.O. Box 1677 / Bellingham, WA 98227-1677
(360) 676-2500 / FAX (360) 671-6411 / www.portofbellingham.com