BELLINGHAM BAY COMPREHENSIVE STRATEGY FINAL ENVIRONMENTAL IMPACT STATEMENT

Prepared for:
Washington Department of Ecology

Prepared by:
Anchor Environmental L.L.C. and associated firms

October 2000

FACT SHEET

Project Name: Bellingham Bay Comprehensive Strategy

Proposed Action and Alternatives:

The purpose of the Bellingham Bay Demonstration Pilot is to expedite the cleanup of contaminated marine sediments through comprehensive planning and action. The EIS is both a programmatic EIS that evaluates impacts from implementation of the Comprehensive Strategy and an action-specific EIS. For specific cleanup action proposals for which sufficient information is available at this time, the EIS includes a project-specific evaluation of impacts associated with these specific cleanup alternatives (referred to herein as the Integrated Near-Term Remedial Action Alternatives). Evaluation of specific cleanup action proposals for which sufficient information does not currently exist will occur in future supplemental environmental documents. The alternatives evaluated in this EIS are:

Alternative 1, No Action, No Comprehensive Strategy

Alternative 2, Comprehensive Strategy: Implement a long-term planning context to inform future actions regarding sediment cleanup sites and source control, sediment disposal siting, habitat, and land use in Bellingham Bay, including specific cleanup alternatives:

Alternative 2A, Removal and Capping to Achieve Authorized Channel Depths (Confined Aquatic Disposal): Alternative 2A would achieve sediment quality standards (SQS) criteria at priority sediment cleanup sites within Bellingham Bay. This alternative would maintain existing navigation channels, and minimize dredging (420,000 cubic yards) and disposal of contaminated sediment. Subtidal aquatic habitat would be converted to intertidal aquatic habitat by the use of caps and confined aquatic disposal (CAD). The emphasis of this alternative is minimal disturbance in the near-term, potentially precluding future options to achieve deeper than currently authorized navigation depths.

Alternative 2B, Removal and Capping to Achieve Authorized **Channel Depths (Upland Disposal):** As in Alternative 2A, Alternative 2B would achieve SQS criteria at priority sediment cleanup sites within Bellingham Bay. This alternative would maintain existing navigation channels and minimize dredging (420,000 cubic yards) and disposal of contaminated sediment. However, unlike Alternative 2A, dredged materials would be disposed of at one or more off-site upland landfills. The emphasis of this alternative is the same as Alternative 2A.

Alternative 2C, Full Removal from Navigation Areas (Confined Aquatic Disposal): Alternative 2C would achieve SQS at priority sediment cleanup sites within Bellingham Bay. By removing more material that Alternatives 2A or 2B, this alternative would allow for future deepening of the existing navigation channels. Subtidal aquatic habitat would be converted to intertidal aquatic habitat by using caps and CAD facilities. This includes dredging of 820,000 cubic yards. The emphasis of Alternative 2C is on removal of contaminated sediments to provide maximum flexibility to meet future navigational needs (deeper than currently authorized).

Alternative 2D, Full Removal from Navigation Areas and Partial Removal from the G-P ASB and Starr Rock Areas (Upland Disposal): Alternative 2D would achieve SQS criteria at priority sediment cleanup sites in Bellingham Bay. Like Alternative 2C, removing more material from the navigation channels allows flexibility for future deepening. However, unlike Alternative 2C, dredged materials would be disposed of at one or more off-site upland landfills. This alternative includes dredging of 1,100,000 cubic yards. The overall emphasis of Alternative 2D is on removal of contaminated sediments to provide maximum flexibility to meet future navigational needs (deeper than currently authorized); and removal of areas with elevated mercury concentrations from state-owned aquatic lands.

Alternative 2E, Full Removal from Public Lands (Upland Disposal): Alternative 2E would achieve SQS at priority sediment cleanup sites in Bellingham Bay by removing all contaminated sediment that is located on state-owned lands (2,400,000 cubic yards). This alternative calls for disposal of these materials at one or more off-site upland landfills. This alternative would also allow for maximum flexibility regarding the future deepening of the navigation channels and the use of state-owned harbor areas. The overall emphasis of Alternative 2E is the removal of contaminated materials from state-owned aquatic lands.

Preferred Remedial Action Alternative, Full Removal from Navigational Areas (Treatment/Confined Aquatic Disposal): The Preferred Remedial Action Alternative is similar to Alternative 2C and includes provisions for treatment. This alternative would allow for future deepening of the existing navigational channels through dredging of 820,000 cubic yards. At least 400,000 cubic yards of this would be treated, if a viable treatment technology is identified. Subtidal aquatic habitat would be converted to intertidal aquatic habitat by using caps and potentially a CAD facility. The overall emphasis of the Preferred Remedial Action Alternative is on removal of contaminated sediments to provide maximum flexibility for future navigational needs, while at the same time allowing flexibility in managing the dredged material.

Project Location: Bellingham Bay, Washington, within a line drawn from Point Francis to Governor's Point, including Portage Bay and Chuckanut Bay.

Lead Agency: Washington Department of Ecology

Pilot Team:

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

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Approvals Required:

For the specific cleanup action proposals evaluated in this EIS, some or all of the following permits and other approvals will be required:

- Model Toxics Control Act Cleanup Action Plan (Ecology)
- Hydraulic Project Approval (HPA – WDFW)
- Department of the Army Section 10/Section 404 Permit (Corps of Engineers)
- 401 Approval (Ecology)
- Aquatic Use Authorization (DNR)
- Coastal Zone Management Certification (Ecology)
- Shoreline Substantial Development (City of Bellingham)
- ESA Compliance (NMFS and USFWS)

Authors and Principal Contributors:

Anchor Environmental, L.L.C.

Project Management

EIS Preparation and Technical Editing

Geology, Water, Sediment & Environmental Health

Land Use, Shoreline Use, Recreation/Public Use

Air and Noise

Cultural Resources (based on report by LAAS 1999)

Pacific International Engineering, P.L.L.C.

Fish and Wildlife

Tribal and Commercial Fishing

Final EIS Issue Date: October 10, 2000

Approximate Date of Final Action:

Ecology expects to release its draft Cleanup Action Plans (CAPs) for the Whatcom Waterway, Cornwall Avenue Landfill, and Harris Avenue Shipyard sites in 2001. The draft CAPs will be the subject of public notice and comment. Following review of public comments, Ecology will issue final CAPs. Thereafter, final design and permitting for the selected Near-Term Remedial Action Alternative will occur, with construction expected to begin in 2002. Expedited remedial action at the G-P Log Pond is scheduled to occur in Late 2000.

Type and Timing of Subsequent Review:

This is the SEPA review for the Comprehensive Strategy and remedial actions to implement the strategy in the near future – specifically the cleanup of the Whatcom Waterway Site, the Cornwall Avenue Landfill Site, and the Harris Avenue Shipyard Site. SEPA review of these actions is planned to be complete with issuance of the final EIS. However, more environmental work may occur after the final EIS. For example, disposal sites would be monitored after construction to ensure that they meet water quality standards. The environmental analyses contained in this document has been prepared to inform upcoming regulatory decision-making processes, including Ecology's cleanup decisions made pursuant to MTCA and Corps of Engineers permits.

Subsequent proposals in Bellingham Bay that implement the Comprehensive Strategy – for instance, source control projects, habitat restoration projects, or public shoreline access projects – may elect to use this EIS in some form to assist in their own SEPA review process.

It is expected that future supplemental environmental analyses will be prepared for any specific proposed cleanup actions other than those identified in this EIS as Near-Term Remedial Action Alternatives.

Location of Background Data and Documents Incorporated by Reference:	Washington Department of Ecology Northwest Regional Office 3190 160th Avenue SE Bellevue, WA 98008 (425) 649-7272 Washington Department of Ecology Bellingham Field Office 1204 Railroad Avenue Suite 200 Bellingham, WA 98225 (360) 738-6250 Bellingham Public Library 210 Central Avenue Bellingham, WA 98225 (360) 676-6860
Cost to the Public:	The initial printing is free of charge. If subsequent printings are necessary, then copies will be available for a nominal fee.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

SUMMARY

PROJECT BACKGROUND

Contaminated marine sediments in urban areas of Puget Sound, including Bellingham Bay, can pose a threat to both marine life and public health. Cleanup of contaminated sediments has proven to be a difficult task, complicated by high costs, limited disposal site options, concerns about environmental liability, source control issues, habitat alterations, and regulatory and land owner constraints. To address the need for sediment cleanup and overcome some of the existing roadblocks to expedited actions, the Bellingham Bay Demonstration Pilot (Pilot) was established.

The Pilot brings together a cooperative partnership of agencies and tribes, local government and businesses known collectively as the Pilot Team, to develop an approach for source control, sediment cleanup and associated habitat restoration in Bellingham Bay. As part of the approach, the Pilot Team has developed a Comprehensive Strategy that considers contaminated sediments, sources of pollution, habitat restoration and in-water and shoreline land use from a baywide perspective. The Strategy integrates this information to identify priority issues requiring action in the near-term and to provide long-term guidance to decision-makers.

This final Environmental Impact Statement (final EIS) evaluates the potential environmental impacts of implementing the Bellingham Bay Comprehensive Strategy, under the State Environmental Policy Act (SEPA). The Comprehensive Strategy was identified as the preferred alternative by the Pilot Team following a review and evaluation of comments to the draft EIS that was published in August 1999. The Preferred Alternative also includes a preferred integrated near-term remedial action alternative. The Preferred Alternative is summarized in this section, and described in more detail in Section 2.

COMPREHENSIVE STRATEGY DEVELOPMENT

The Pilot Team first crafted a Mission Statement for the project as well as a number of objectives – environmental, process, partnering, and policy – to ensure achievement of the overall Mission Statement. The Mission Statement is:

"To use a new cooperative approach to expedite source control, sediment cleanup and associated habitat restoration in Bellingham Bay."

Based upon this initial work, four fundamental project elements were defined – sediment cleanup and source control, sediment disposal siting, habitat, and land use. This was followed by the creation of seven baywide pilot goals that reflect the collective interests of the Pilot Team and the desired outcome of the project.

The Pilot Team compiled, collected and analyzed information for each project element separately and applied the baywide goals to identify priorities. The information and priorities for sediment cleanup and source control, sediment disposal siting, habitat and land use were then combined to create the Comprehensive Strategy.

Baywide Pilot Goals

Goal 1 - Human Health and Safety
Implement actions that will enhance the protection of human health

Goal 2 - Ecological Health
Implement actions that will protect and improve the ecological health of the bay

Goal 3 - Protect and Restore Ecosystems
Implement actions that will protect, restore, or enhance habitat components making up the bay's ecosystem

Goal 4 - Social and Cultural Uses
Implement actions that are consistent with or enhance cultural and social uses in the bay and surrounding vicinity

Goal 5 - Resource Management
Maximize material re-use in implementing sediment cleanup actions, minimize the use of non-renewable resources, and take advantage of existing infrastructure where possible instead of creating new infrastructure

Goal 6 - Faster, Better, Cheaper
Implement actions that are more expedient and more cost-effective, through approaches that achieve multiple objectives

Goal 7 - Economic Vitality
Implement actions that enhance water-dependent uses of commercial shoreline property

Components of the Comprehensive Strategy

The Comprehensive Strategy is comprised of a number of different components:

General Baywide Recommendations: The Comprehensive Strategy includes a number of baywide recommendations for achieving the seven goals of the Pilot. These general recommendations are listed according to the main project elements.

Subarea Strategies: A separate strategy for each of nine geographic subareas was developed that provides greater detail on priorities and recommended actions for land use, habitat, sediment sites, cleanup, disposal, and source control.

Preliminary Draft Habitat Mitigation Framework: A Preliminary Draft Habitat Mitigation Framework was developed by the Pilot Team in order to define the type and extent of mitigation that may be required from implementing sediment remedial actions or other actions in the Comprehensive Strategy. This strategy is a work in progress and has not been applied. Rather, at the discretion of regulatory agencies, it may be used in the future during remedial action permitting or for other actions.

Integrated Near-Term Remedial Action Alternatives: A range of alternatives was developed that focus on cleanup and source control measures at high priority sites in the bay while integrating habitat and land use considerations and opportunities.

The final EIS is both a programmatic and a project specific EIS. The programmatic component evaluates impacts from implementation of the general Bay wide recommendations and subarea strategies. The project specific component evaluates impacts from implementation of the Integrated Near-Term Remedial Action Alternatives and is intended to satisfy the SEPA requirements of the Whatcom Waterway, Cornwall Avenue Landfill, and Harris Avenue Shipyard sites.

General Baywide Recommendations

The Bellingham Bay Comprehensive Strategy includes a list of recommendations organized by the four project elements – sediment sites and source control, sediment disposal siting, habitat, and land use. The recommendations address general issues and then make specific suggestions for actions. For instance, the Land Use element includes the recommendation that human impacts, such as commerce and navigation, be focused in the federal waterways and state harbor areas and away from the Nooksack Delta, and other highly productive areas.

Subarea Strategies

As part of the Bellingham Bay Comprehensive Strategy, the Pilot Team developed individual strategies for nine geographic subareas of the bay. Beginning on the west side of the Bay, and moving east, these subareas are:

1) West Bay
2) Squalicum Industrial
3) Squalicum Harbor
4) Central Waterfront
5) Whatcom Industrial
6) South Hill
7) Fairhaven
8) South Bay
9) Marine (open water in bay)

Each subarea strategy includes a description of the 'Primary Use' associated with the subarea, as well as recommended guidelines for 'Land Use', 'Habitat', and 'Sediment Sites, Cleanup, Disposal, and Source Control'.

Preliminary Draft Habitat Mitigation Framework

The implementation of sediment remedial actions can change aquatic habitat. Some of the changes could be beneficial while others could be potentially harmful. A Preliminary Draft Habitat Mitigation Framework (Appendix C) was developed by the Pilot Team to provide an ecosystem context for mitigation actions within Bellingham Bay that may be required as a result of implementing remedial actions or future projects in the Bay. The Preliminary Draft Mitigation Framework, which is still a work in progress, can be used at the discretion of relevant regulatory agencies.

Integrated Near-Term Remedial Action Alternatives

In the draft EIS, five alternatives were developed to address priority sediment cleanup and source control sites in the Bay, and to integrate habitat restoration and land use considerations with the cleanup. Based on public comment, a Preferred Integrated Near-Term Remedial Action Alternative (Preferred Remedial Action Alternative) was identified.

The alternatives are:

Alternative 2A, Removal and Capping to Achieve Authorized Channel Depths (Confined Aquatic Disposal): Alternative 2A would achieve sediment quality standards (SQS) criteria at priority sediment cleanup sites within Bellingham Bay. This alternative would maintain existing navigation channels, and minimize dredging (310,000 cubic yards) and disposal of contaminated sediment. Subtidal aquatic habitat would be converted to intertidal aquatic habitat through the use of caps and confined aquatic disposal (CAD). The emphasis of this alternative is minimal disturbance in the near-term, potentially precluding future options to achieve deeper than currently authorized navigation depths.

Alternative 2B, Removal and Capping to Achieve Authorized Channel Depths (Upland Disposal): As in Alternative 2A, Alternative 2B would achieve SQS criteria at priority sediment cleanup sites within Bellingham Bay. This alternative would maintain existing navigation channels and minimize dredging (310,000 cubic yards) and disposal of contaminated sediment. However, unlike Alternative 2A, dredged materials would be disposed of at one or more off-site upland landfills. The emphasis of this alternative is the same as Alternative 2A.

Alternative 2C, Full Removal from Navigation Areas (Confined Aquatic Disposal): Alternative 2C would achieve SQS at priority sediment cleanup sites within Bellingham Bay. By removing more material than Alternatives 2A or 2B, this alternative would allow for future deepening of the existing navigation channels without the risk of exposing or excavating contaminated sediments, while converting subtidal aquatic habitat to intertidal aquatic habitat by using caps and CAD facilities. This includes dredging of 820,000 cubic yards. The emphasis of Alternative 2C is on removal of contaminated sediments to provide maximum flexibility to meet future navigational needs (deeper than currently authorized).

Alternative 2D, Full Removal from Navigation Areas and Partial Removal from the G-P ASB and Starr Rock Areas (Upland Disposal): Alternative 2D would achieve SQS criteria at priority sediment cleanup sites in Bellingham Bay. Like Alternative 2C, removing more material from the navigation channels allows flexibility for future deepening without the risk of exposing or excavating contaminated sediments. However, unlike Alternative 2C, dredged materials would be disposed of at one or more off-site upland landfills. This alternative includes dredging of 1,100,000 cubic yards. The overall emphasis of Alternative 2D is on removal of contaminated sediments to provide maximum flexibility to meet future navigational needs (deeper than currently authorized); and removal of areas with elevated mercury concentrations from state-owned aquatic lands.

Alternative 2E, Full Removal from Public Lands (Upland Disposal): Alternative 2E would achieve SQS at priority sediment cleanup sites in Bellingham Bay by removing all contaminated sediment that is located on state-owned lands (2,400,000 cubic yards). This alternative calls for disposal of these materials at one or more off-site upland landfills. This alternative would also allow for maximum flexibility regarding the future deepening of the navigation channels and the use of state-owned harbor areas without the risk of exposing or excavating contaminated sediments. The overall emphasis of Alternative 2E is the removal of contaminated materials from state-owned aquatic lands.

Preferred Remedial Action Alternative, Full Removal from Navigation Areas (Treatment/Confined Aquatic Disposal): The Preferred Remedial Action Alternative would achieve SQS at priority sediment cleanup sites within Bellingham Bay. This alternative removes the same amount of material as Alternative 2C, and allows for future deepening of the existing navigation channels without the risk of exposing or excavating contaminated sediments, while converting subtidal aquatic habitat to intertidal aquatic habitat by using caps and a CAD facility. This includes dredging of 820,000 cubic yards that may be disposed of in a CAD located adjacent to the Cornwall Avenue Landfill. The Preferred Remedial Action Alternative incorporates treatment of contaminated dredged sediments and also acknowledges the potential to beneficially re-use dredged material, if appropriate. The emphasis of the Preferred Remedial Action Alternative is on removal of contaminated sediments to provide maximum flexibility for future navigational needs, while at the same time allowing flexibility in managing the dredged material. The Preferred Remedial Action Alternative best achieves the seven goals of the Pilot (see Page S-2).

The following table summarizes the potential adverse impacts and mitigation measures for the Integrated Near-Term Remedial Action Alternatives and the Preferred Remedial Action Alternative. This table highlights the adverse impacts that are expected from implementation of the alternatives. The impacts described in this summary table are based on the construction of a

Table S.1 Summary of Adverse Impacts and Mitigation for Integrated Near-Term Remedial Action Alternatives

Geology, Water, Sediment & Environmental Health

Impacts Common to all Near-Term Remedial Action Alternatives	Impacts Under Aquatic Disposal Alternatives	Impacts Under Upland Disposal Alternatives	Potential Mitigation Measures
- Dispersion of some contaminants during dredging operations. - Short-term impacts to water quality from dredging contaminated sediment (i.e., increased suspended solids, turbidity and dissolved contaminants, reduced dissolved oxygen).	Alternatives 2A , 2C and Preferred Remedial Action Alternative - Short-term impacts to water quality from placing contaminated sediment in confined aquatic disposal facility and placement of caps (i.e., increased suspended solids, turbidity and dissolved contaminants, reduced dissolved oxygen). - Possible uptake of contaminants by birds as material is transported by barge to disposal site. - Potential leaching of contaminants from disposal facility to surface water.	Alternatives 2B, 2D, and 2E - Potential exposure to construction personnel from volatilization of organics causing inhalation of toxic chemicals and dust. - Possible uptake of contaminants by plants and animals. - Potential leaching of contaminants from landfill to groundwater.	Technology - Mechanically dredge. - Use water quality control measures at the point of dredging or aquatic disposal such as oil booms, silt curtains, or bubble walls. - Use watertight buckets. - Use bottom-dump barge with downpipe or submerged discharge, if warranted. - Use available technology at the disposal facility (i.e., liners, leachate collection system, run-on controls, and treatment technologies). - Use Subtitle D upland landfill or equivalent. - Keep ponded water on top of sediments during barge transport to discourage birds - Place interim caps, if warranted, and construct final cap of effective thickness and stability. - Construct detention basins, sedimentation ponds and runoff controls. - Avoid construction during storms. Operation - Develop contingency plans; conduct monitoring to ensure effectiveness of remediation strategy.

Table S.1 Summary of Adverse Impacts and Mitigation for Integrated Near-Term Remedial Action Alternatives (continued)

Fish & Wildlife

Impacts Common to all Near-Term Remedial Action Alternatives	Impacts Under Aquatic Disposal Alternatives	Impacts Under Upland Disposal Alternatives	Potential Mitigation Measures
Long-Term Impacts - Loss of 0.5 acres of eelgrass habitat (eelgrass impact depends on thickness of cap and extent of eelgrass) - Conversion of intertidal habitat to subtidal, with loss of rearing/foraging habitat for juvenile finfish, Dungeness crab, salmonids, flatfish, hardshell clams and pandalid shrimp: Preferred Alt.: 1 acre converted Alternative 2A: 1 acre converted Alternative 2B: 1 acre converted Alternative 2C: 1 acre converted Alternative 2D: 8 acres converted Alternative 2E: 16 acres converted - Conversion of subtidal habitat to intertidal/shallow subtidal with loss of rearing habitat for juvenile finfish, Dungeness crab, pandalid shrimp: Preferred Alt: 41 acres converted Alternative 2A: 36 acres converted Alternative 2B: 10 acres converted Alternative 2C: 57 acres converted Alternative 2D: 1.5 acres converted Alternative 2E: 2 acres converted	**Disturbed Habitat**[1] Preferred Remedial Action Alternative - 180 acres of subtidal habitat - 38 acres of intertidal/shallow subtidal habitat Alternative 2A - 181 acres of subtidal habitat - 47 acres of intertidal/shallow subtidal habitat Alternative 2C - 206 acres of subtidal habitat - 44 acres of intertidal/shallow subtidal habitat **Temporary, Short-Term Impacts** Preferred Remedial Action Alternative - 38 acres of epibenthic invertebrate habitat - 38 acres of intertidal benthic habitat, and - 180 acres of subtidal benthic habitat Alternative 2A - 47 acres of epibenthic invertebrate habitat - 47 acres of intertidal benthic habitat and 154 acres of subtidal benthic habitat Alternative 2C - 44 acres of epibenthic invertebrate habitat - 44 acres of intertidal benthic habitat and 206 acres of subtidal benthic habitat	**Disturbed Habitat** Alternative 2B - 140 acres of subtidal habitat - 41 acres of intertidal/shallow subtidal habitat Alternative 2D - 163 acres of subtidal habitat - 38 acres of intertidal/shallow subtidal habitat Alternative 2E - 168 acres of subtidal habitat - 38 acres of intertidal/shallow subtidal habitat **Temporary, Short-Term Impacts** Alternative 2B - 41 acres of epibenthic invertebrate habitat - 41 acres of intertidal benthic habitat and 140 acres of subtidal benthic habitat Alternative 2D - 38 acres of epibenthic invertebrate habitat - 38 acres of intertidal benthic habitat and 163 acres of subtidal benthic habitat Alternative 2E - 38 acres of epibenthic invertebrate habitat - 38 acres of intertidal benthic habitat and 161 acres of subtidal benthic habitat **Long-Term Impacts** Alternative 2E Converts 7 acres of upland habitat to subtidal and/or intertidal and shallow subtidal	- Design ASB cap to avoid or minimize impacts on existing eelgrass. - Mitigation measures to be defined through regulatory mechanisms, such as Department of the Army permit, water quality certification and consultation with NMFS. - Habitat Mitigation Framework could be applied at the discretion of relevant regulatory agencies. - Integrate habitat benches into the design of the Cornwall CAD.

[1] Most of this acreage is currently contaminated and, as a result, the disturbed habitat is already impaired.

Table S.1 Summary of Adverse Impacts and Mitigation for Integrated Near-Term Remedial Action Alternatives (continued)

Land Use, Shoreline Use, & Recreation/Public Use

Impacts Common to all Near-Term Remedial Action Alternatives	Impacts Under Aquatic Disposal Alternatives	Impacts Under Upland Disposal Alternatives	Potential Mitigation Measures
- Interference or displacement of tribal, commercial, and recreational fishing and crabbing from created eelgrass habitat at Starr Rock site. - Boat moorage above caps and/or CADs could affect integrity of system.	Preferred Remedial Action Alternative - Log Pond cap would limit future water-dependent uses - Cornwall CAD would limit future water-dependent uses at Cornwall Avenue Landfill - Development of Cornwall CAD site requires use of State owned aquatic lands for contam. seds. Alternative 2A - Any future need to increase navigation depths in federal navigation channels would require disposal of contaminated sediments. - Log Pond CAD would limit future adjacent water-dependent uses. - Starr Rock CAD would limit future water-dependent uses at the south end of Cornwall Avenue Landfill. - Development of Starr Rock CAD site requires use of state-owned aquatic lands for contaminated sediment disposal. Alternative 2C - Log Pond CAD would limit future adjacent water-dependent uses. - Starr Rock CAD would limit future water-dependent uses at the south end of Cornwall Avenue Landfill. - Development of Starr Rock CAD site requires use of state-owned aquatic lands for contaminated sediment disposal.	Alternative 2B - Any future need to increase navigation depths in federal navigation channels would require disposal of contaminated sediments. - Log Pond cap would limit future water-dependent uses. Alternative 2D - Log Pond cap would limit future water-dependent uses. Alternative 2E - Log Pond cap would limit future water-dependent uses.	- Assess need for Regulated Navigation Area (RNA). - Coordinate with tribal fishing activities. - Cap and CAD size and thickness designed to prevent failure of the system, potentially caused by anchor drag from boat moorage.

Table S.1 Summary of Adverse Impacts and Mitigation for Integrated Near-Term Remedial Action Alternatives (continued)

Air & Noise

Impacts Common to all Near-Term Remedial Action Alternatives	Impacts Under Aquatic Disposal Alternatives	Impacts Under Upland Disposal Alternatives	Potential Mitigation Measures
- Sediment cleanup construction activities may have short-term impacts on air quality.	- No additional significant impacts expected.	- Potential for volatilization of contaminants or wind transport of sediments during disposal.	- Testing of dredged material to evaluate potential for volatility and odors to ensure minimized impacts to air quality. - Keep material saturated during transport. - Minimize distance between dredge sites and disposal sites.

Cultural Resources

Impacts Common to all Near-Term Remedial Action Alternatives	Impacts Under Aquatic Disposal Alternatives	Impacts Under Upland Disposal Alternatives	Potential Mitigation Measures
- Majority of activities proposed are within areas of low probability for cultural resources.	Alternative 2A , 2B and Preferred Remedial Action Alternative - Activities proposed are within areas of low probability for cultural resources. - None expected, but dredging near Citizens Dock, a National Register of Historic Places property, may affect the dock's integrity.	Alternative 2C & 2D - Activities proposed are within areas of low probability for cultural resources. - None expected, but dredging near Citizens Dock, a National Register of Historic Places property, may affect the dock's integrity. Alternative 2E - Potential to disturb historic artifacts at Harris Avenue Shipyard and Citizens Dock, a National Register of Historic Places property.	- Coordination with the WA State Office of Archaeology and Historic Preservation (OAHP) to ensure impacts to cultural resources are identified and mitigated. - Develop a Determination of Effect through consultation with the OAHP if activity is proposed near Citizens Dock. - Have professional archaeologist monitor dredging activities in vicinity of Citizens Dock and mudflats. - Field reconnaissance to establish site boundaries of any previously recorded hunter-fisher-gatherer sites that are adjacent to fill deposits. Have professional archaeologist monitor any ground disturbing activities near any previously recorded hunter-fisher-gatherer cultural deposits.

CAD as part of the Preferred Remedial Action Alternative. If treatment is identified as a viable remedy for the contaminated dredged materials in Bellingham Bay, a separate SEPA analysis will be required.

EIS SCOPING

A public scoping period for the environmental impact statement was held in June 1998. At an open house held June 25, 1998, the Pilot Team presented the priorities and a range of near-term project alternatives that would result in cleanup, habitat, and land use actions that would have an immediate positive impact on the Bay's environmental health.

During the scoping period, the Pilot Team received feedback from the public that included responses to the following questions:

- What is your vision for the future environmental health of Bellingham Bay?
- What environmental issues are you most concerned about?
- How can the Pilot approach be improved to more effectively address your concerns?

As might be expected, the majority of comments from the public reflected a desire to have a clean, healthy and productive bay. Citizens were concerned about existing contamination in the bay, controlling future contamination, minimizing environmental impacts during cleanup, and ensuring that cleanup solutions could withstand natural disasters such as earthquakes or tidal waves. Concern was also expressed for protecting and restoring aquatic habitat, both during cleanup activities and after clean up was complete. Some citizens want to see improved public access to the waterfront. And some citizens expressed the need to consider cost/benefit analysis when evaluating cleanup alternatives. The Pilot Team considered these public comments as it assembled the final list of alternatives to be analyzed and elements of the environment to be studied.

PROJECT BACKGROUND
PURPOSE AND NEED FOR THE ACTION

1 PROJECT BACKGROUND, PURPOSE AND NEED FOR THE ACTION

Typically, environmental remediation, habitat restoration and economic development projects are undertaken individually, under approvals from a variety of regulatory agencies, and by individual project proponents. This project by project approach does not enable actions to be taken within the context of a larger holistic vision of an area and, as a result, opportunities to achieve multiple objectives may be lost, time and resources may be spent on non-priority activities, potentially conflicting jurisdictional requirements may require resolution on a case by case basis, and decisions may not be as well informed as possible. This translates into the potential for delays, increased costs, and disincentives for project proponents to under take voluntary actions.

By aiming toward integrated solutions under the Bellingham Bay Comprehensive Strategy, it may be possible to provide increased cost effectiveness for individual projects, opportunities for broad-scale environmental improvements in the Bay, and incentives for voluntary actions. With the cooperation of parties at the federal, state, tribal and local level, the goal is to achieve tangible results in a reasonable timeframe for a series of specific successes within the context of a larger baywide plan.

The following sections describe how the Pilot was conceived and the steps that have led to the development of a Comprehensive Strategy for Bellingham Bay and this final Environmental Impact Statement (final EIS). Based upon comments received on the draft EIS, the Comprehensive Strategy is identified as the preferred alternative, and includes a preferred integrated near-term remedial action alternative (Preferred Remedial Action Alternative). The Preferred Remedial Action Alternative is similar to Integrated Near-Term Remedial Action Alternative 2C evaluated in the draft EIS and includes a provision for treatment. The Preferred Remedial Action Alternative is described in Section 2.3.4 of this final EIS.

1.1 INTRODUCTION AND BACKGROUND ON DEMONSTRATION PILOT CONCEPT

In May 1994, a group of five federal and state agencies in Washington state formed the Cooperative Sediment Management Program (CSMP) to address the need for sediment cleanup and overcome some of the existing roadblocks to expedited action. The agencies included:

- Washington Department of Ecology
- Washington State Department of Natural Resources
- U.S. Environmental Protection Agency, Region 10
- U.S. Army Corps of Engineers
- Puget Sound Water Quality Action Team

The Washington State Department of Transportation later joined the CSMP signatory agencies. Working collectively, these agencies proposed to help fund a demonstration pilot (the Pilot) to develop sediment cleanup priorities in an urban embayment of Puget Sound by creating a partnership with local governments and businesses. The key goals identified for the Pilot were to control the sources of contamination and expedite cleanup of high priority sediment sites, test various incentives for cleanup, and create new and flexible methods for achieving cleanup. The CSMP agencies also acknowledged that actions for source control, cleanup, habitat, dredging and other activities such as navigation/commerce are interrelated. The agencies agreed that a broader approach is the proper scale for identifying and managing these activities and for translating laws and programs into effective action. Ecology set aside a grant available to local governments under the Model Toxics Control Act (MTCA) to help fund the Pilot. In June 1996, following discussion with interested parties from four urban bays of Puget Sound, Bellingham Bay was selected as the location for the CSMP Demonstration Pilot.

At the same time the CSMP agencies decided to undertake the Demonstration Pilot, they also agreed to evaluate the feasibility of a Multi-User Disposal Site (MUDS) facility as another method to expedite sediment cleanup. A MUDS facility would accept contaminated sediment from multiple users. The Puget Sound Confined Disposal Site Study Programmatic EIS was issued jointly by the Corps of Engineers, Ecology, and DNR in October 1999.

The Pilot addresses the area of Bellingham Bay within a line drawn from Point Francis to Governors Point, including Portage Bay and Chuckanut Bay (Figure 1.1-1). The geographic scope of the Pilot is focused on the urban portion of Bellingham Bay for data summary and development of strategies for source control and sediment cleanup, and the broader bay (including the urban portion) for evaluation of natural resource issues and opportunities for habitat protection and restoration.

1.2 THE BELLINGHAM BAY PILOT TEAM AND ITS SCOPE OF WORK

In September 1996, the Bellingham Bay Pilot Team was established. The Pilot Team includes:

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- National Marine Fisheries Service
- Washington Department of Ecology
- Washington State Department of Natural Resources
- Washington State Department of Transportation
- Washington Department of Fish and Wildlife
- Puget Sound Water Quality Action Team
- City of Bellingham
- Whatcom County Health Department
- Port of Bellingham
- Lummi Nation
- Nooksack Tribe
- Georgia-Pacific West, Inc

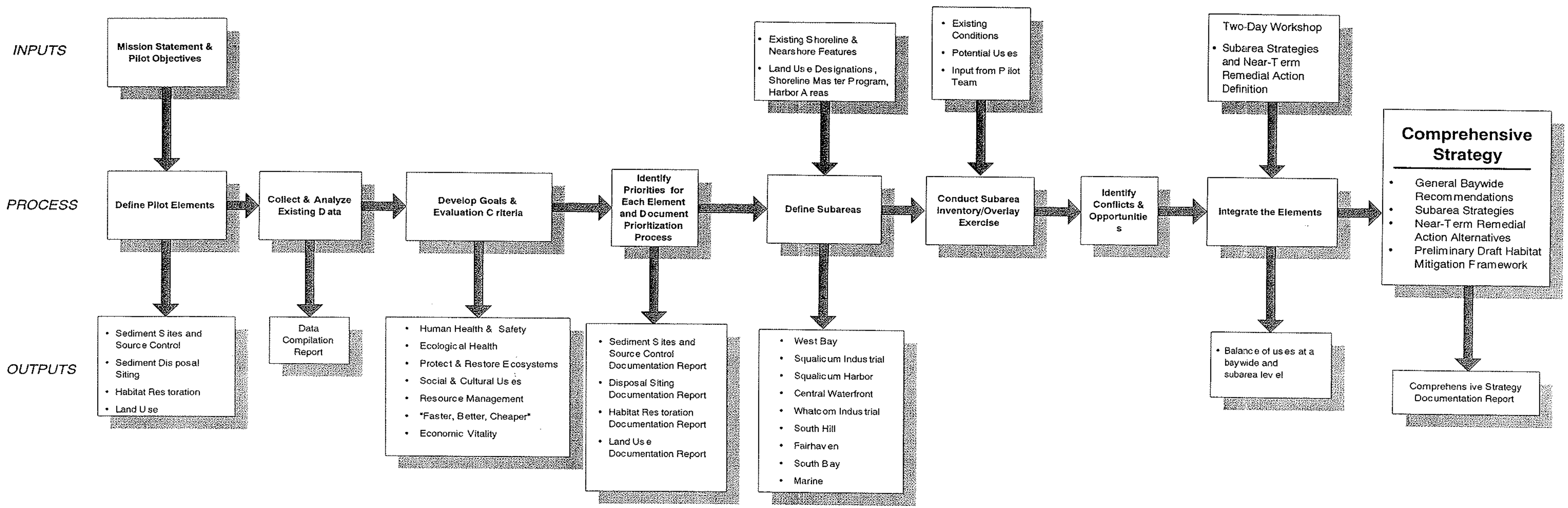

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Figure 1.2-1
Process for Developing Comprehensive Strategy

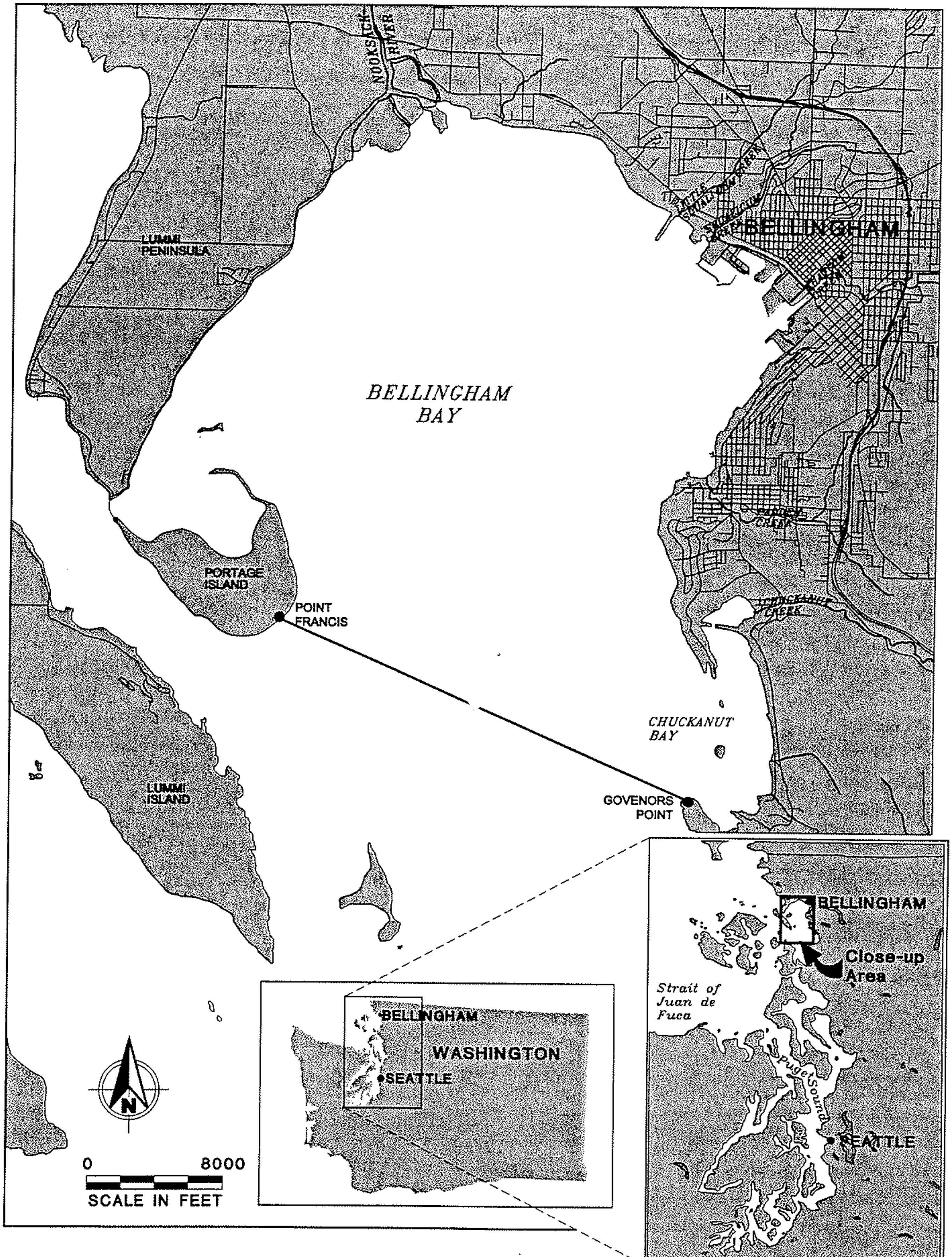

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Figure 1.1-1
Vicinity Map

The Port of Bellingham agreed to be co-project manager with Ecology. The Mission Statement developed by the Pilot Team, which is based on the goals articulated by the Cooperative Sediment Management Program, is:

Use a new cooperative approach to expedite source control, sediment cleanup and associated habitat restoration in Bellingham Bay

1.2.1 The Pilot Process/Developing the Comprehensive Strategy

After establishing the Pilot's Mission Statement, the Pilot Team developed specific objectives in four areas – environmental, process, partnering and policy (Table 1.2-1). The Pilot Team defined four project elements; sediment sites and source control, sediment disposal siting, habitat, and land use. Subcommittees were established to study existing conditions and identify/prioritize issues under each of these elements (Disposal siting was discussed by the entire Pilot Team). The subcommittee process provided a forum to study issues in-depth and drew on the technical expertise of individual Pilot Team members.

Using consensus-based decision making, the Pilot Team established seven "baywide" goals to be achieved within a Comprehensive Strategy. Each subcommittee also used these goals as the basis for evaluating issues and developing priorities. The seven baywide goals are:

- **Human Health and Safety** – Implement actions that will enhance the protection of human health
- **Ecological Health** – Implement actions that will protect and improve the ecological health of the Bay
- **Protect and Restore Ecosystems** – Implement actions that will protect, restore, or enhance habitat components making up the Bay's ecosystem
- **Social and Cultural Uses** – Implement actions that are consistent with or enhance cultural and social uses in the Bay and surrounding vicinity
- **Resource Management** – Maximize material re-use in implementing sediment cleanup actions, minimize the use of non-renewable resources, and take advantage of existing infrastructure where possible instead of creating new infrastructure
- **Faster, Better, Cheaper** – Implement actions that are more expedient and more cost-effective, through approaches that achieve multiple objectives
- **Economic Vitality** – Implement actions that enhance water-dependent uses of commercial shoreline property

Based on work performed within the subcommittees and among the whole group, the Pilot Team eventually developed a draft Comprehensive Strategy for the Bay. Figure 1.2-1 briefly outlines the process the Pilot Team used to develop the Comprehensive Strategy. Readers interested in additional detail should refer to Appendix B for the Executive Summary of the *Comprehensive Strategy Documentation Report*. (All documentation reports and the Data Compilation Report are available at the repositories listed in the Fact Sheet.)

Table 1.2-1. Pilot Team Consensus Objectives

Environmental Objectives

- Implement a thoughtful planning approach for integrated environmental actions within Bellingham Bay, including source control, sediment cleanup and protection of aquatic resources

- Identify and prioritize needs for environmental protection, and if appropriate, mitigation and, then take early action on contaminated sediment sites which pose a threat to public health and the environment in the Bay, specific examples include the following MTCA sites:
    - Whatcom Waterway
    - Cornwall Avenue Landfill
    - Harris Avenue Shipyard

- Identify sites and design requirements for multi-user disposal sites for contaminated sediments associated with priority problem areas

Process Objectives

- Build a comprehensive record of environmental and land use information to support planning efforts in Bellingham Bay

- Develop and utilize a coordinated approach to inter-governmental communication to help streamline regulatory actions leading to more predictable permitting, design and implementation of priority projects

- Consider a reasonable range of alternatives for sediment remediation that are protective, cost-effective and practicable within an urban embayment

- Maintain coordination with, and adopt where appropriate, other sources of emerging information and methods regarding sediment remediation and habitat restoration, for example, provisions for protection, restoration, replacement, or acquisition of equivalents for habitat, populations, and human services

- Provide for effective integration of environmental remediation with economic development, including cleanup and redevelopment of contaminated property, coordination of project timelines to achieve multiple objectives, and maintaining flexibility for individual landowners and tribal governments

Partnering Objectives

- Develop a framework for sediment remediation among cooperative partners, that is environmentally protective, cost-effective and practicable within the urbanized portion of Bellingham Bay

- Maintain an effective working relationship among project participants by:
    - ensuring federal, state, Treaty tribes and local government participation
    - providing a forum for cooperative discussion
    - utilizing local expertise and resources as much as possible
    - identifying and implementing means for broader public participation
    - allowing for future expansion of the current Pilot Team as appropriate

- Identify and coordinate public and private opportunities for project participation and funding, including a framework for project cost-sharing

- Provide for cooperative resolution of liability for historical environmental problems associated with contaminated marine sediments with less litigation, less administrative redundancy and less project delay through adequate assessment and planning

- Document elements of the Baywide Pilot that may be transferable to other locations

Policy Objectives

- Have the Pilot project contribute to the understanding and resolution of existing policy conflicts that have prevented such a collaborative and coordinated effort in the past

The Comprehensive Strategy is comprised of general baywide recommendations, Subarea Strategies that articulate specific recommendations linked to particular geographic areas, a range of Integrated Near-Term Remedial Alternatives, and a preliminary draft Habitat Mitigation Framework. The description of the Comprehensive Strategy is in Section 2.3.

1.2.2 Bellingham Bay Demonstration Pilot Pilot Planning/Implementation

The Pilot is divided into three stages. The first stage focuses on the Comprehensive Strategy and establishing a planning framework within which coordinated actions can be conducted. The culmination of the planning stage is this final EIS.

The second stage of the Pilot focuses on the actions necessary to bridge the gap between the planning stage and the future implementation of coordinated actions within Bellingham Bay (Stage 3). Stage 2 activities are on-going and include:

- Ensuring coordination between the various investigation efforts in the Bay (for example, Cornwall Avenue Landfill, Harris Avenue Shipyard, Whatcom Waterway, and the Olivine Site).
- Presenting relevant proposals to appropriate agency decision-makers for development of draft decisions.
- Considering public input and making final decisions with respect to particular projects.
- Identifying and pursuing sources of potential funding for implementation of cleanup actions and other actions.
- Beginning the development of conceptual agreements between public and private entities for implementation of cleanup actions and other actions.

Stage 3 actions will include implementation of source control and sediment cleanup measures at multiple contaminated sites, habitat mitigation and restoration actions, public access enhancements, and land use permitting. Design, permitting and actual implementation of the specific remedial action alternative selected through the MTCA process would be included in Stage 3, which is scheduled for 2001/2002. As directed by SEPA (WAC 197-11-055), this final EIS is being done now to ensure that planning and decisions reflect environmental values, to ensure that specific agency decisions (e.g., decisions selecting cleanup actions pursuant to MTCA) are fully informed regarding environmental impacts associated with the proposed actions, to avoid delays later in the process, and to seek to resolve potential problems.

1.3 PURPOSE AND NEED OF THE BELLINGHAM BAY COMPREHENSIVE STRATEGY

The Bellingham Bay Comprehensive Strategy is a response to several different needs, which can be divided by the four project elements – Sediment Sites and Source Control, Sediment Disposal Siting, Habitat, and Land Use. By aiming toward integrated solutions for sediment management under the Bellingham Bay Comprehensive Strategy, it may be possible to meet these needs by providing increased cost effectiveness for individual projects, opportunities for broad-scale environmental improvements in the Bay, and incentives for voluntary actions. The following subsections briefly describe the identified needs both in a general sense and with specific information related to Bellingham Bay.

1.3.1 Sediment Sites and Source Control

Many urban bays in the United States have contaminated marine sediments. These sediments pose a threat to ecosystems, marine resources, and human health. Estuaries and nearshore-submerged habitats are important to the production and replenishment of living marine resources and contribute to commercial and recreational fisheries, and non-consumptive recreation in marine waters. Bellingham Bay is no exception, as described below and in Section 3, Affected Environment.

Marine sediments in the more urbanized portions of Bellingham Bay are contaminated from years of historic industrial and urban activities. While over the past 25 years the implementation of source control has decreased the amount of contaminants discharged to Bellingham Bay, recent studies have found that certain contaminants continue to persist in bottom sediments. These sediments pose a potential threat to human health and to a healthy ecosystem.

1.3.2 Sediment Disposal Siting

Dredged sediments that are unsuitable for unconfined open-water disposal need to be handled and disposed of in a safe manner. While treatment technologies are evolving, confinement may be the most viable remedy when dealing with the large volume of low-level contamination that exists in Bellingham Bay.

Efforts to clean up contaminated sediments have been slowed by the lack of viable disposal sites and the time involved obtaining regulatory agency approval.

1.3.3 Habitat

Since the late 1800's, the local community has relied on and enjoyed the abundant natural resources within and around Bellingham Bay. However, urbanization has had an impact. Bellingham Bay once provided a much richer and more diverse habitat for fish, wildlife, and other aquatic organisms. Native eelgrass, salt marsh, and other areas that are home for aquatic resources historically existed in more parts of the Bay than today. Land uses and industrial activities have adversely impacted much of that valued habitat, particularly in the northeast corner of the Bay, through filling of the historic natural shoreline, construction activities, and release of contaminants. As demonstrated by the recent listing of juvenile chinook under the Endangered Species Act (ESA), our society is placing a high value on fish, wildlife, and the habitat that supports them.

The need for habitat protection and restoration is two-fold (1) to support the groups that depend on fishing for economic and/or cultural purposes, and (2) to meet our society's emphasis on enhancing ecosystems.

1.3.4 Land Use

Sediment contamination can affect land uses when controversies over sediment cleanup interfere with the regular and periodic need to dredge navigation channels and the movement and shipment of cargo. The economic vitality of Bellingham's waterfront is currently affected by the difficulty in performing routine dredging in federal channels or in developing properties in designated harbor areas (BST Associates 1998).

Other land uses that would benefit from the cleanup of contaminated sediment include commercial fishing, recreation, marinas, tourism, and water-dependent industry.

1.3.4.1 Navigation and Commerce

Both the Whatcom and I&J Street waterways are authorized federal navigational channels. While existing depths within these areas are generally compliant with the federally authorized channel depths, some shoaling to depths shallower than the authorized depth has occurred. Shoaling prevents full use of the Bellingham Shipping Terminal (BST) as well as properties at the head of Whatcom Waterway.

1.3.4.2 Shoreline Use

The shoreline area is the critical interface between upland and aquatic activities and environments. The range of activities along the shoreline define the balance of uses that the community envisions for the waterfront including a mix of industrial, commercial, public access, and maritime-oriented uses. However, land use activities are regulated by a variety of federal, state, local, and tribal programs.

The shoreline and aquatic areas of Bellingham Bay support many uses such as commerce and shipping, fishing and other natural resource uses, and recreational activities. DNR manages use of state-owned aquatic lands on behalf of the citizens of Washington. The shoreline itself is used by a variety of business and governmental organizations, often under leases from DNR and the Port of Bellingham. The presence of contaminated sediment limits productive uses of the Bay.

1.3.5 Pilot Purpose and Need

After considering the original goals of the CSMP agencies (Section 1.1) and the needs for each project element, the Pilot Team developed the following Purpose and Need Statement:

> *Marine sediments in several areas of Bellingham Bay are contaminated. These sediments are a potential threat to a healthy ecosystem and perhaps ultimately to human health. They also limit productive uses of the Bay, including habitat, recreation, navigation, and commerce.*
>
> *The purpose of the Bellingham Bay Demonstration Pilot is to expedite the cleanup of contaminated marine sediments through comprehensive planning and action. A Comprehensive Strategy is proposed which articulates a collective*

vision and sets forth recommendations for Bellingham Bay for integrating sediment cleanup (including the advanced identification of appropriate disposal sites), source control, habitat restoration, and aquatic land use. Within that Comprehensive Strategy, near-term environmental actions (Integrated Near-Term Remedial Action Alternatives) are proposed.

1.4 EIS AND REGULATORY PROCESS

1.4.1 Lead Agency

Washington's most comprehensive environmental quality law is the State Environmental Policy Act (SEPA). SEPA requires all government agencies to assess the environmental consequences of their proposed actions and to involve the public before making decisions that could cause significant harm to the environment. This assessment includes looking at alternatives that would meet the project's objectives with less environmental damage.

State cleanup action plans for contaminated sediments typically require SEPA compliance. Decisions by federal agencies to permit these actions require National Environmental Policy Act (NEPA) compliance. Both NEPA and SEPA require government agencies to cooperate as much as possible to integrate environmental studies with permitting requirements and encourage public involvement in the environmental review process.

They also require that the agencies with the largest role in making permit or other decisions on a project be the "lead agency" for purposes of preparing the EIS. Ecology has assumed the lead agency role in the preparation of this final EIS. Technical consultants helping to prepare the document are responsible to Ecology.

1.4.2 Role of Pilot Team Agencies

The following provides some background on the key roles and responsibilities of each agency. The formal SEPA term that describes each agency's role is listed in italics at the end of each description:

Ecology - Lead Agency. Ecology is the focal point for making cleanup decisions through the Model Toxics Control Act (MTCA) and the Sediment Management Standards (SMS). State standards require cleanups to meet "all applicable state and federal laws," and Ecology will consider the regulations and concerns of other agencies in making its decision. Ecology will need to issue cleanup action decisions for cleanup as well. Where MTCA is not the lead authority, Ecology will issue permits for cleanup. Ecology also administers the state Shoreline Management Program, water quality standards under Section 401 of the Clean Water Act, and is responsible for administration of the NPDES program in Washington. In addition, under the Clean Water Act, Ecology administers the 303(d) list of impaired water bodies (that includes Bellingham Bay). *Lead Agency.*

Department of Natural Resources – review role. DNR manages state-owned aquatic lands to achieve the legislatively directed management goals of ensuring environmental protection, fostering water dependent uses, encouraging direct public access to state-owned aquatic lands, utilizing renewable resources and generating income where it is consistent with the other management goals. As a land manager, DNR is concerned about cleanup, appropriate land use, and liability issues. As a natural resource trustee, DNR is interested in protecting the environment and sustaining natural resources. *Agency with jurisdiction.*

Corps of Engineers – review role. The U. S. Army Corps of Engineers will decide whether to issue a Department of the Army permit for cleanup activities in the water. The permit decision is made under the authorities of Section 404 of the Clean Water Act, when the discharge of dredge or fill material into the waters of the United States occurs; and Section 10 of the Rivers and Harbors Act of November 3, 1899 when certain work or placement of structures is done in navigable waters. If the proposed work involves either of these authorities, the Regulatory Branch of the Corps will conduct the permit evaluation. If open water disposal of sediments is considered, dredging and disposal activities will also be reviewed by the Dredged Material Management Program (DMMP), an interagency group (Corps, EPA, Ecology, DNR) for which the Corps acts as lead agency. The Corps public interest review process will involve federal and state resource agencies, local governments, Indian Tribes, and the general public. The Corps permit decision will be based on compliance with the Clean Water Act 404(b)(1) guidelines and the general public interest (as defined in the Corps Regulatory Program guidelines). The Corps will use the information developed in the SEPA process in its NEPA review. *Agency with jurisdiction.*

Environmental Protection Agency – review role. EPA has expertise on a number of public health, environmental and cleanup issues relating to the Bay. EPA's overall interests and concerns are similar to Ecology's. EPA reviews and approves Ecology's 303(d) listings. EPA's formal roles include technical review of federal EISs and Public Notices of Corps permit applications for consistency with dredging and filling regulations (Section 404(b)(1) guidelines). *Agency with jurisdiction.*

Port of Bellingham – review role. The Port has a strong interest in baywide cleanup, particularly as it supports the local transportation needs of the region (for example, shipping, marinas), full utilization of existing facilities, and enables future development (and redevelopment) of Port facilities, especially those that are dependent on access to Bellingham Bay. The Port does not issue permits. The Port of Bellingham and DNR have a "Port Management Agreement" that allows the Port to make land use decisions regarding state-owned aquatic lands in the Port's area as long as those decisions comply with state statutes and aquatic lands regulations. *Agency with jurisdiction.*

City of Bellingham – review role. In addition to the City's interest in baywide cleanup and development, transportation, water quality, public access, neighborhood quality of life, and related subjects, the City will make decisions on any shoreline substantial development permits that may need to be issued. The City also has police powers over various activities within the Bay and harbor. *Agency with jurisdiction.*

Washington State Department of Fish and Wildlife – review role. WDFW has a role in both reviewing and permitting work in waters that could affect fisheries through the hydraulic permit approval (HPA) process, as well as a role as a state natural resource trustee in seeking restoration of fish and wildlife habitat. *Agency with jurisdiction.*

United States Fish and Wildlife Service – review role. USFWS has a similar interest as WDFW in seeking restoration of fish and wildlife habitat. It asserts that interest through commenting on federal permits, most notably Section 404 permits issued by the Corps. USFWS is also the administrating agency of the federal Endangered Species Act (ESA). *Agency with jurisdiction.*

National Marine Fisheries Service – review role. NMFS also has an interest in the restoration of fish habitat. Like USFWS, NMFS reviews and comments on federal permits. NMFS also reviews project proposals for compliance with Section 7 of the ESA. *Agency with jurisdiction*

Tribal governments – Lummi Indian Nation and Nooksack Tribe – review role. Federally recognized Tribal governments are sovereign. The role of Tribal agencies in the planning, environmental review, and permitting process is similar to other agencies with expertise and consulting roles, such as EPA, and state and federal fisheries agencies, with the exception that tribes also review potential conflicts with ceremonial and spiritual uses. In addition, the Lummi Nation and the Nooksack Tribe have interests in Bellingham Bay as part of their usual and accustomed fishing area. *U.S. v. Washington* recognized tribal property interests in fisheries and shellfish. The Tribes are interested in restoring fisheries and shellfish habitat, reducing exposure of marine organisms to contaminated sediments, and avoiding navigational conflicts with fishing activities. *Affected Tribes.*

Georgia-Pacific West, Inc. – G-P is under an Agreed Order with Ecology to conduct a Remedial Investigation/Feasibility Study (RI/FS) of the Whatcom Waterway Site. As part of that Order, a SEPA EIS must be prepared. Therefore, G-P has played an active role on the Pilot Team since its inception. G-P has contributed both information it has gathered for the final RI/FS for the Whatcom Waterways site and has coordinated activities from that project with the Pilot final EIS, which will serve as the SEPA review of the cleanup of the Whatcom Waterway Site.

A number of other agencies are also interested or involved in the proposed project, but to a smaller degree or focused on a particular item. For instance, the **Whatcom County Health Department** (agency with jurisdiction) would review or permit cleanup facilities, especially if sediments were taken off site to a facility for treatment or disposal in a landfill. The **Puget Sound Water Quality Action Team** (a member of the CSMP) is participating in the review because of its overall interest in Puget Sound water quality. The **Washington State Department of Transportation** (also a CSMP member) is participating because of its interest in sediment cleanup policies in the state as they affect operations near ferry terminals.

1.4.3 SEPA Review of the Bellingham Bay Comprehensive Strategy

This SEPA final EIS analyzes and compares the major environmental differences between implementing the Bellingham Bay Comprehensive Strategy and not implementing the Comprehensive Strategy (the No-Action Alternative). The Comprehensive Strategy attempts to integrate sediment cleanup, control of pollution sources, habitat, and aquatic and shoreline use to create a context for decision making in Bellingham Bay. The Comprehensive Strategy also includes a range of Integrated Near-Term Remedial Action Alternatives (Alternatives 2A through 2E and a Preferred Remedial Action Alternative) that address priority sediment cleanup/source control sites in Bellingham Bay (Whatcom Waterway, Cornwall Avenue Landfill and Harris Avenue Shipyard). This SEPA final EIS analyzes and compares these alternatives as well.

By analyzing both the planning level (Comprehensive Strategy v. no Comprehensive Strategy) and the project-specific components (Integrated Near-Term Remedial Action Alternatives), this final EIS is both a "plan EIS" and a "project EIS". The use of plan and project environmental analysis is commonly called "phased review" under SEPA. This refers to studying more general matters in a broad environmental analysis with subsequent analysis concentrating on the issues specific to particular detailed alternatives. While this type of review is more traditionally done in two separate documents, for this project it is more appropriate and useful to reviewers to combine this analysis in one document. Combining these non-project and project actions also helps to expedite cleanup by integrating the environmental review.

This final EIS is intended to serve as a SEPA "base" for subsequent actions supporting the Comprehensive Strategy. Depending on the details of the particular proposals, project proponents would be able to adopt or amend this final EIS and use its analysis in their environmental review. Appendix G of this final EIS presents a conceptual implementation framework that describes potential future actions that could be taken to support the Bellingham Bay Comprehensive Strategy.

This final EIS is also intended to provide sufficiently detailed environmental analysis to inform regulatory decisions regarding the proposal to implement an Integrated Near-Term Remedial Action Alternative to address priority contaminated sediment sites/source control sites in Bellingham Bay. Therefore, the Bellingham Bay Comprehensive Strategy final EIS is intended to satisfy the SEPA requirements for the Whatcom Waterway, Cornwall Avenue Landfill and Harris Avenue Shipyard Sites.

Some of the aspects of the Integrated Near-Term Remedial Action Alternatives discussed in this final EIS – such as dredging plans, habitat mitigation/restoration plans, and monitoring and contingency plans – will be refined through future regulatory and permitting processes which include public review.

1.4.4 Integration with Other Laws

SEPA requires the EIS process to be integrated with other environmental review laws. Cleanup laws, such as the Model Toxics Control Act (MTCA) and state Sediment Management Standards (SMS), similarly require remedial actions to consider and comply with environmental standards in other "applicable laws," and to combine and coordinate the cleanup process with the EIS process.

To that end, the Whatcom Waterway Remedial Investigation/Feasibility Study and the Focused Remedial Investigation/Feasibility Study, Cornwall Avenue Landfill are companion documents to this final EIS and are incorporated by reference. These cleanup documents were prepared in accordance with the MTCA and SMS and received public review concurrent with the draft EIS.

This final EIS analyzes the proposed implementation of the Comprehensive Strategy and addresses the applicable laws that are known at this time. Appendix D provides a summary of these "applicable laws" and discusses the consistency of the Comprehensive Strategy and these laws.

Of particular note is the Endangered Species Act, due to the listing of Puget Sound Chinook and potential listing of Coastal/Puget Sound bull trout. The Corps of Engineers, as lead federal agency for the federal license (permit), will consult with NMFS and USFWS pursuant to the Endangered Species Act (ESA). A draft Biological Assessment (BA) will be prepared for Corps approval as part of future permitting of the Integrated Near-Term Remedial Action Alternative ultimately selected by Ecology through the MTCA process. The Corps will forward the BA to NMFS/USFWS for their concurrence.

1.4.5 How the Comprehensive Strategy and EIS will be used in Planning and Decision-Making

The Bellingham Bay Comprehensive Strategy is designed to provide information to decision makers in the areas of sediment cleanup and disposal, control of pollution sources, restoration of habitat, and in-water and shoreline land use. However, the Comprehensive Strategy does not change the regulatory/permitting framework that is already in place. Those individual agencies that currently have decision-making authority retain that authority.

The EIS will be used by agencies, including Ecology, WDFW, and the City of Bellingham, to satisfy the SEPA requirements for cleanup decisions, and permit and other approval decisions that will be necessary for implementation of the Integrated Near-Term Remedial Action Alternative ultimately selected by Ecology through the MTCA process. These decisions include Cleanup Action Plan decisions that will be made for the Whatcom Waterway, Cornwall Avenue Landfill and Harris Avenue Shipyard sites by Ecology, the Hydraulic Project decision that will be made by WDFW, and the shoreline decisions that will be made by the City of Bellingham under the Shoreline Management Act.

Specifically, under the MTCA regulatory process, in the case of the Department of Ecology, the Final EIS and cleanup studies completed for the Whatcom Waterway and Cornwall Avenue Landfill sites will be used to inform Ecology in the selection of a near-term remedial action alternative. The remedy Ecology proposes to select will be presented for public review in a draft Cleanup Action Plan. After Ecology considers public comment on its draft Cleanup Action Plan, a final remedy will be selected and articulated by Ecology in a final Cleanup Action Plan.

1.4.6 Appendices

The following documents are Technical Appendices to this final EIS and are bound herein.

Appendix A – Subarea Strategies

Appendix B – Executive Summaries of Pilot Documentation Reports (the full reports are available at the Project Repositories listed in the Fact Sheet)

- Disposal Siting Documentation Report
- Habitat Restoration Documentation Report
- Sediment Sites and Source Control Documentation Report
- Aquatic Land Use Documentation Report
- Comprehensive Strategy Documentation Report

Appendix C – Preliminary Draft Habitat Mitigation Framework

Appendix D – Relationship of the Bellingham Bay Comprehensive Strategy to Other Plans, Policies, and Programs

Appendix E - Supporting Habitat Evaluation Data

1.5 PUBLIC PARTICIPATION

The Pilot Team recognizes the importance of informed public involvement and participation. Key public outreach components include:

- An introductory open house-style information fair at Bellingham Cruise Terminal (November 1997)
- A speakers bureau for community briefings at meetings of local governments, tribal councils, and business and civic groups (ongoing)
- A media relations approach that includes editorial board meetings, calendar and story news releases, and public service announcements (ongoing)
- Publication of scoping notice in SEPA Register and local newspapers (June 1998)
- Scoping workshop at Bellingham Cruise Terminal (1,200 community members invited) (June 1998)
- Dissemination of informational articles written for identified community newsletters and publications by individual Pilot Team members (ongoing).
- Bellingham Bay Comprehensive Strategy Draft Environmental Impact Statement, public comment period from July 1999 to September 1999. Public Meeting August 1999.
- Final Remedial Investigation/Feasibility Study Whatcom Waterway Site, public comment period from July 1999 to September 1999. Public meeting August 1999.
- Final Focused Remedial Investigation/Feasibility Study Cornwall Avenue Landfill public comment period from August 1999 to September 1999. Public meeting September 1999.
- Informational public meeting providing a status report on the Pilot Project, July 2000

In addition, ReSources (a local environmental organization) is implementing additional community outreach through a public participation grant provided by Ecology. The community outreach efforts of ReSources focus on providing information resources (i.e., *State of the Bay Report*, fact sheets, newsletters), neighborhood discussion groups, community forums, and water quality tours of the Bay (co-sponsored by the Port of Bellingham). The goal of these outreach activities is to encourage area residents to become involved and stay involved in the decision-making process.

1.6 SIGNIFICANT AREAS OF CONTROVERSY AND UNCERTAINTY

The primary areas of controversy and uncertainty are:

- Combining a non-project EIS with a project EIS

- Identification, prioritization and implementation of actions under the Comprehensive Strategy beyond the Integrated Near-Term Remedial Action Alternatives
- The future of the Pilot Team
- The State of Washington's position regarding the containment of contaminated sediments on state-owned aquatic land
- The availability of funds for implementation of all or part of the Comprehensive Strategy
- The complexities involved with implementation of the Integrated Near-Term Remedial Action Alternative ultimately selected by Ecology through the MTCA process
- The availability and timing of practicable sediment treatment methods

ALTERNATIVES

present within nominal overdredge tolerances (in other words, 2 feet below the federally authorized channel depths) could potentially be exposed by dredging and become "surface" sediments. The Integrated Near-Term Remedial Alternatives address cleanup of these currently subsurface but potentially surface sediments.

Different techniques are used for the cleanup of contaminated sediments (see Figure 2.1-1). These techniques range from allowing nature to naturally clean up or isolate the sediments to removing (dredging) and disposing of large volumes of material. The goal of each is to isolate and confine contaminated sediments so that plants and animals are no longer exposed to the contamination.

To maintain and/or improve existing navigation depths in areas with contaminated sediments, dredging and disposal of sediments is typically necessary. The following are standard disposal techniques:

Confined Upland Disposal. Contaminated sediments are dredged and placed in a specially designed landfill that is on dry land, away from surface water. The landfill includes liners and surface water controls to minimize infiltrations. A special water collection system is also required so that water draining through the landfill ("leachate") does not escape and contaminate the groundwater.

Confined Aquatic Disposal (CAD) places the dredged contaminated sediment in a submerged location and caps (covers) it with clean material. CADs are designed and placed in locations where they will always be completely underwater. The thickness of the cap and the grain size of the clean sediment are designed to prevent contaminants from migrating back into the aquatic environment. With appropriate design and plantings, the clean material used to cover CADs can be used as aquatic habitat.

Confined Nearshore Disposal, otherwise known as a **Nearshore Fill**, a confined nearshore disposal facility is a type of landfill constructed underwater along the shoreline. A berm is constructed of clean material near the shoreline. The lower layer of the area between the berm and the shoreline is filled with the dredged contaminated sediment. The upper layer is covered with clean sediment or fill material until it is above tidal level. Nearshore fills create new land that can be used for public shoreline access or for businesses that depend on being near water. Since they convert submerged land to dry land, they eliminate aquatic habitat.

Capping in Place. Some sites have relatively low levels of contamination and are in areas that do not need to be dredged. These sediments can be left where they are and covered with a layer of clean material through bringing new material into the site. This method has minimal impacts during construction because the contaminated material is not stirred up by dredging. The cap can also be designed in a way to provide enhanced aquatic habitat.

Natural Recovery. This natural process approach relies on nature to provide a clean layer over the contaminated sediments. For example in areas where rivers are discharging clean sediments at rates that will cap contaminated sediments naturally, humans do not need to interfere.

In addition to these standard disposal techniques, an area of cleanup technology that is receiving increased attention is **Treatment**. Treatment technologies can potentially reduce contaminant concentration, contaminant mobility, and/or toxicity of the sediments. Most prospective treatment technologies rely on methods that first require sediment removal, followed by chemical destruction, conversion, separation, extraction, or stabilization. Although most treatment techniques are still being evaluated and refined, others have been used successfully (e.g., stabilization). Sediment treatment research has also been promoted by incentives in the 1992 and 1996 Water Resources Development Acts (WRDA), including an ongoing demonstration project to examine the feasibility of treating contaminated sediments from the New York/New Jersey Harbor. This applied research could potentially lead to faster development of sediment treatment technologies.

The RI/FS for the Whatcom Waterway Site presents a more detailed discussion on sediment treatment options. As discussed in the RI/FS as well as in the WRDA studies, different technologies have been evaluated and some are being carried forward for additional analysis. Although several existing treatment technologies are feasible, the potential implementability and effectiveness on various types of contaminants and volumes of sediment is uncertain. Specifically, the high sediment volumes and low contaminant concentrations involved may be difficult to address using available treatment technologies. In addition, many of the available "treatment" technologies do not remove, concentrate or recover mercury – a key contaminant present in Bellingham Bay, but rather alter the sediment containing the mercury. In spite of these potential limitations, there are nevertheless a number of promising treatment technologies that could possibly be developed for application to Bellingham Bay and other areas of Puget Sound. DNR will complete a pilot study to evaluate treatment technologies specific to the Bellingham Bay sediments. A promising treatment technology will be evaluated to assess production, cost and effectiveness. This site-specific study, coupled with the Cooperative Sediment Management Program (CSMP) described below will provide a determination of the practicability of sediment treatment for Bellingham Bay sediments. If a SEPA analysis is required for an identified sediment treatment technology, it will be conducted separately from this EIS.

The CSMP, a consortium of federal and state agencies formed in 1994 to oversee the management of Puget Sound sediments, recently initiated a study to assess the feasibility and practicability of developing a multi-user treatment program or facility to help manage contaminated sediments in Puget Sound. The multi-user treatment and disposal study was initiated in spring, 2000. The study will:

- Assess the market feasibility of treating contaminated sediments in the Puget Sound area;
- Identify the most technically feasible treatment methods;
- Characterize potential environmental impacts associated with the more promising alternatives;
- Compare sediment properties associated with typical urban sediments in Puget Sound with East Coast sediments that have previously been used in bench- and pilot-scale treatment demonstrations;
- Determine the feasibility of a regional treatment facility, including identification of barriers to a constant minimum flow of contaminated dredged material (or alternative raw materials) required to maintain facility operation;

- Identify and suggest options for private or public-private funding of a regional treatment facility, including government incentives to encourage private sector development; and
- Perform public outreach to solicit public comments on the feasibility of treating contaminated sediments in the Puget Sound region.

The results, of the study, expected in draft form in late 2000 or early 2001, may recommend one of three possible courses of action:

1. Pursue a public or private management option to construct and implement the most promising treatment technology(ies);
2. Issue a Request for Proposals for a private/public partnership to construct and implement the most promising treatment technology(ies); or
3. Implement a pilot study of the most promising treatment technology(ies), and use that information to determine the feasibility of a future public management or private/public partnership option.

With this basic introduction to sediment issues in mind, the following sections describe the alternatives analyzed in the final EIS.

2.2 ALTERNATIVE 1 – NO ACTION, NO BELLINGHAM BAY COMPREHENSIVE STRATEGY

SEPA requires a no-action alternative be included in the analysis of environmental impacts (WAC 197-11-440). Typically, the No-Action Alternative considers what would happen if a proposal is not implemented. The analysis of the No-Action Alternative provides a benchmark against which the environmental impacts of the project alternatives can be compared.

Under the No-Action Alternative the Comprehensive Strategy for Bellingham Bay would not be implemented. Implementation of the No-Action Alternative would mean that decisions regarding sediment sites and source control, sediment disposal siting, habitat, and land use in Bellingham Bay would continue to be made without the benefit of a baywide perspective to assist with integration of regulatory requirements for actions within the Bay. There would be no long-term planning context to inform and/or integrate future actions, whether those actions involve sediment cleanup, source control, habitat restoration, or land use. Multi-agency coordination to address state-wide issues that also affect Bellingham Bay (for example, CSMP) would continue; however it would likely continue to be coordination between federal and state agencies focusing on state-wide issues. Multi-agency coordination would likely lack the strong local involvement that characterizes the Bellingham Bay Demonstration Pilot Team and the Comprehensive Strategy.

The following subsections describe, by project element, the specifics of the No-Action Alternative. The discussion focuses on the regulatory framework through which decisions are made. This is not to imply that implementation of the Comprehensive Strategy would change the regulatory framework. Laws and regulations would stay the same under either programmatic alternative. The primary difference between Alternative 1 – No Comprehensive Strategy and Alternative 2 – the Comprehensive Strategy is the lack of a baywide perspective to assist with integration of regulatory requirements for actions within Bellingham Bay.

2.2.1 Sediment Sites and Source Control

Without a long-term planning context to inform sediment cleanup and source control efforts, the Sediment Sites project element would continue to be addressed on an individual site basis.

Sediment cleanup and disposal decisions in Washington State are made primarily under the statutory criteria set forth in MTCA and the SMS. These criteria include:

1. Overall protection of human health and the environment
2. Compliance with cleanup standards and applicable laws
3. Short-term effectiveness
4. Long-term effectiveness
5. Implementability
6. Cost
7. Degree to which community concerns are addressed
8. Degree to which recycling, reuse, and waste minimization are employed
9. Environmental impacts

Permits and approvals related to sediment cleanup/disposal that would be required by other federal, state, and local agencies include:

- Hydraulic Project Approval (HPA - WDFW)
- Department of the Army Section 10/Section 404 Permit (Corps of Engineers)
- 401 Approval (Ecology)
- Aquatic Use Authorization (DNR)
- Coastal Zone Management Certification (Ecology)
- Shoreline Substantial Development (City of Bellingham)
- ESA Compliance (NMFS and USFWS)

The control of sources contributing to sediment contamination is currently regulated by various provisions of the Federal Water Pollution Control Act (Clean Water Act) and the Revised Code of Washington (RCW). Regulations have been promulgated under the Clean Water Act to control point source discharges into national waterways, including the National Pollutant Discharge Elimination System (NPDES) and the National Pretreatment Program. NPDES was established to regulate point sources discharging directly into national waters and the National Pretreatment Program was established to address sources discharging indirectly into national waters via publicly owned treatment works. Separate effluent limitations and pretreatment standards have been developed through each program. The State of Washington has been delegated the authority to administer the federal programs and has its own statute and rules interpreting the federal program. Because of contaminated sediments, Ecology has listed Bellingham Bay as an impaired waterbody under Section 303 (d) of the Clean Water Act. As an impaired waterbody, Bellingham Bay is subject to a Total Maximum Daily Load (TMDL) or Water Cleanup Plan process.

Non-point sources of contaminants, including stormwater and other diffuse or dispersed sources, are regulated at certain industrial, commercial, and/or agricultural facilities under the NPDES program. Various best management practices and watershed management planning programs have also been implemented under a variety of federal, tribal, state, and local authorities to address these sources. Future federal executive orders are expected to regulate the control of alien or invasive biological organisms.

2.2.2 Sediment Disposal Siting

Under the No Comprehensive Strategy Alternative, Ecology would draft a cleanup plan for the identified contaminated sediment sites based on a site-specific evaluation. If removal and in-water disposal were elements of the preferred cleanup alternative at the individual sites, each cleanup plan may identify distinct disposal sites. The ultimate decision regarding disposal siting would be made in concert with other state, federal and local organizations, Indian Tribes and the general public.

2.2.3 Habitat

Under the No Comprehensive Strategy Alternative, sensitive aquatic habitat areas would continue to receive protection primarily under the following laws, regulations, and management policies without the benefit of a baywide perspective:

- Section 404 of the Clean Water Act
- ESA
- HPA
- Tribal ordinances
- Whatcom County Comprehensive Plan
- City of Bellingham Comprehensive Plan
- City of Bellingham Shoreline Master Program

Habitat actions would likely continue to be directly linked to the mitigation for impacts caused by an individual shoreline development project.

2.2.4 Land Use

Under the No Comprehensive Strategy Alternative, aquatic and shoreline land use decisions would continue to be made within the existing regulatory structure without the benefit of a baywide perspective. That structure is primarily influenced by the Shoreline Management Act. On the shoreline of Bellingham Bay, the SMA is implemented in the Shoreline Management Plans of two local jurisdictions – the City of Bellingham and Whatcom County. The Lummi Nation regulates shoreline land use within its boundaries.

DNR manages state-owned aquatic lands, including those that are designated "harbor areas" for navigation and commerce. Use of state-owned aquatic lands generally occur through lease or cooperative management agreements with DNR. Whatcom, I&J, and Squalicum waterways in Bellingham Bay have been established by the federal and state governments to protect access to the water for navigation and commerce.

2.3 ALTERNATIVE 2 – BELLINGHAM BAY COMPREHENSIVE STRATEGY (PREFERRED ALTERNATIVE)

This final EIS analyzes a Comprehensive Strategy (the programmatic element), including a suite of Integrated Near-Term Remedial Action Alternatives (project-specific actions). The Comprehensive Strategy is comprised of general baywide recommendations (described in Section 2.3.1), subarea strategies that articulate specific recommendations linked to particular geographic areas of the bay (Section 2.3.2), a range of integrated near-term remedial alternatives (Section 2.3.4), and a Preliminary Draft Habitat Mitigation Framework (Appendix C). Within the range of integrated near-term remedial action alternatives, a preferred integrated remedial action alternative (Preferred Remedial Action Alternative) has been developed by the Pilot Team based upon public comment, and is identified in the discussion under Section 2.3.5.

The Comprehensive Strategy is intended to provide clean sediments, control of pollution sources, and a balance of land use, habitat restoration, and public access throughout Bellingham Bay. Figure 2.3-1 provides a brief summary of the types of actions called for in the various regions of the bay. A brief conceptual description of how the Comprehensive Strategy, and its associated actions, would be implemented is provided in Appendix G of this final EIS.

2.3.1 Baywide Recommendations

The Comprehensive Strategy includes a number of baywide recommendations for achieving the seven goals of the Pilot. These general recommendations are listed below according to the elements of the project – Sediment Sites and Source Control, Sediment Disposal Siting, Habitat, and Land Use.

2.3.1.1 Sediment Cleanup and Source Control

The Comprehensive Strategy addresses contaminated sediment cleanup issues throughout the Bay (for more information, see the *Sediment Site/Source Control Documentation Report*). It recommends baywide source control measures and specific actions to address priority sediment cleanup sites through a range of Integrated Near-Term Remedial Action Alternatives evaluated in detail in this final EIS. The following bulleted list contains the general recommendations pertaining to sediment cleanup and source control.

- Remove or isolate contaminated materials to achieve human and ecological health goals.
- Encourage efforts to control sources that are currently being developed by watershed efforts, local controls, Ecology's TMDLs. Develop contingency plans if, by cleanup action date, the issue of recontamination has not been satisfactorily addressed.
- Encourage local governments and the Tribes to develop stormwater treatment plans where absent.
- Address current and future sources of contamination, with particular attention to upland land use as potential source.
- Evaluate harbor area configuration to determine if adjustments are needed as result of the remedial action alternative ultimately selected by Ecology through the MTCA process.

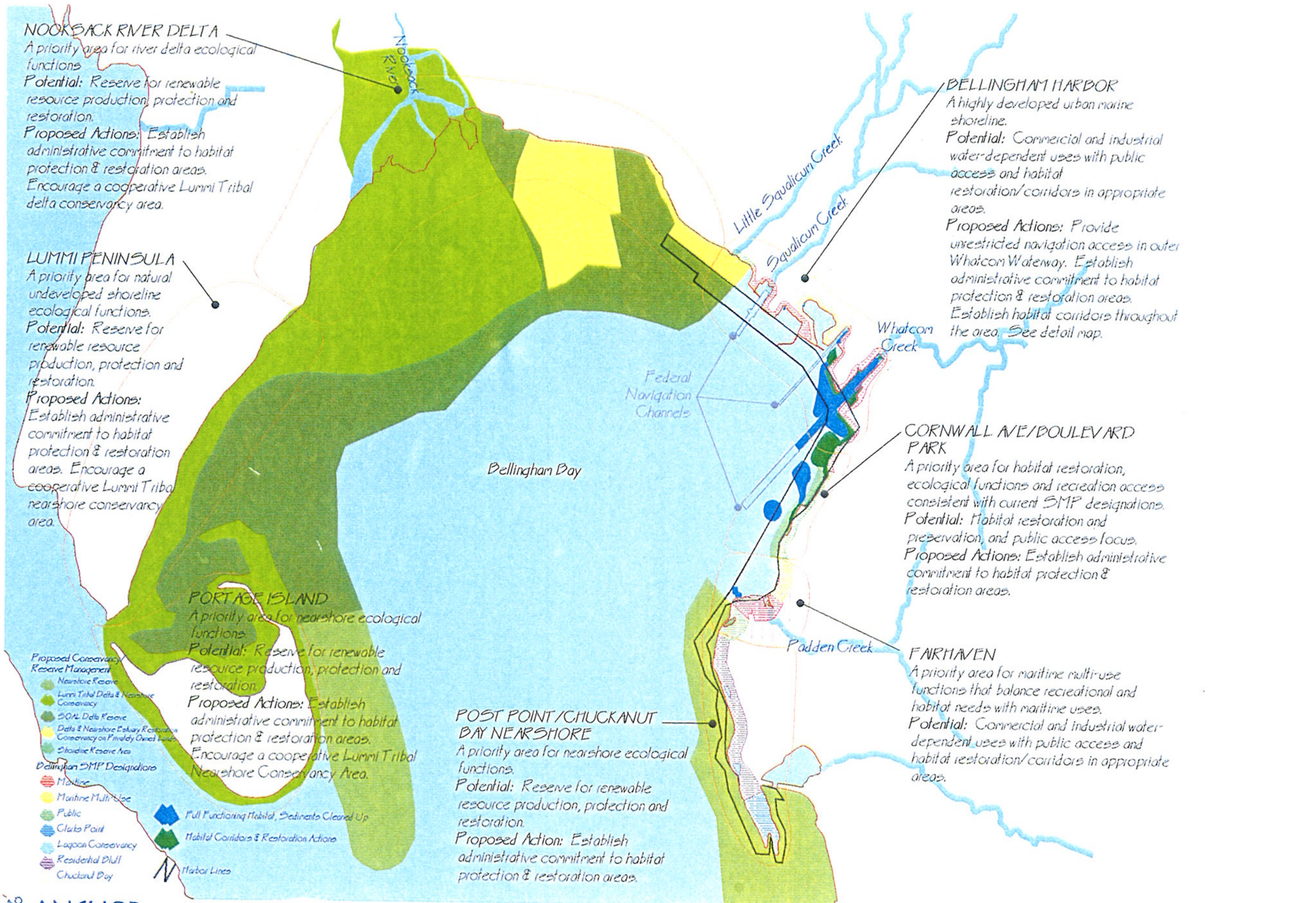

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Figure 2.3-1
Bellingham Bay After Implementation of Comprehensive Strategy

2.3.1.2 Sediment Disposal Siting

The Comprehensive Strategy makes the following recommendations regarding sediment disposal siting (for more information, see the *Sediment Disposal Siting Documentation Report*):

- Monitor and evaluate effectiveness of near-term actions to address impacts and unintended consequences.
- Identify and select methods, techniques, and disposal sites that optimize public benefit and environmental protection.
- Ensure the technical feasibility and long-term function of new habitat on top of confined aquatic containment facilities.

2.3.1.3 Habitat

The Comprehensive Strategy presents long-term habitat objectives to promote biological diversity and productivity in the Bay (for more information, see the *Habitat Documentation Report* and the *Preliminary Draft Habitat Mitigation Framework*). It provides a guide which environmental organizations, and public and private entities can use to develop more definitive, site-specific plans for permit approvals and implementation. It presents recommendations for future habitat preservation, replacement, restoration or enhancement on shoreline and aquatic land that could support a diversity of organisms including species of concern. The habitat component was designed to contribute to the biological productivity of the Bay, while recognizing existing public, private and tribal uses in the area, through recommending future habitat opportunities that: (1) occur in ecologically appropriate locations given existing and historical physical and functional habitat conditions (area and function), (2) demonstrate specific measurable, structural and functional attributes, and (3) provide for species movement through the area. The following Comprehensive Strategy recommendations pertain to habitat:

- Protect existing habitat and the natural processes that sustain them.
- Restore estuary habitat functions and area through implementing projects recommended in the Habitat Documentation Report and/or similar efforts.
- Promote long-term gains in habitat area and function.
- Provide guidance for achieving no net loss and net gain through a Mitigation Framework.
- Link the actions in Bellingham Bay to watershed efforts to ensure healthy, sustainable ecosystems.
- Promote City of Bellingham's SMP designation of critical habitat areas in Bellingham Bay.

2.3.1.4 Land Use

The Comprehensive Strategy includes the aquatic land use objectives and recommended management strategies to achieve these objectives (for more information, see the *Aquatic Land Use Documentation Report*). Focusing on land use enabled the Pilot Team to coordinate multi-agency efforts, integrate information, document appropriate development opportunities, and help inform future aquatic land use decisions in Bellingham Bay. The land use component included an assessment and synthesis of the future conditions proposed by various land managers compared to each other (description of desired futures as derived from existing planning documents). The land use component recommends potential future conditions identified by the Pilot Team (summarized and cross-referenced to remedial action and habitat restoration components).

- Focus human impacts, such as commerce and navigation, in the federal waterways and state harbor areas and away from the Nooksack Delta, and other highly productive areas as noted in the Subarea Strategies.
- Provide opportunities for water-dependent uses where consistent with Subarea Strategies.
- Promote innovative design of public access and other public waterfront facilities to avoid, protect and enhance nearshore habitat.
- Through planning and permitting, control point and nonpoint sources that derive from upland uses.
- Enable current and future commerce and navigational uses where consistent with current infrastructure and future conditions.
- Evaluate harbor area configuration to consider excluding areas, such as West and South Bay, which have no use or potential use for commerce and navigation purposes.

2.3.2 Subarea Strategies

The Subarea Strategies are linked to specific geographic locations, and they make specific recommendations to achieve the project goals. A separate strategy is prepared for each of the nine subareas that are depicted in Figure 2.3-2. The Subarea Strategies include other actions that are not part of the Integrated Near-Term Remedial Action Alternatives discussed in Section 2.3.4, but are recommended near-term actions. Each Subarea Strategy includes the following information:

- **Subarea Description** – The subarea description defines the geographical extent of the subarea, identifies the key features, and describes the character of the shoreline at the land/water edge. The description also identifies the general ecological functions within the subarea and the prominent land uses.
- **Recommended Strategy** –The recommended strategies are presented as statements of action for the future. These strategy statements identify near-term actions that should occur in the subarea to address high-priority sediment cleanup sites. A list of recommended actions and future opportunities pertaining to each of the Pilot Project elements is also included. Other near-term actions that should be taken are identified within the lists, and not within the strategy statement itself.

Table 2.3-1 Summary of Integrated Near-Term Remedial Action Alternatives

Contaminated Sediment Cleanup Areas	Site Unit No.	Approximate Aquatic Site Area (Acres)	Potential Dredge Volume (CY) Incl. Overdredge Allowance	Alternative 2A Removal and Capping to Achieve Authorized Channel Depths (CAD Disposal)	Alternative 2B Removal and Capping to Achieve Authorized Channel Depths (Upland Disposal)	Alternative 2C Full Removal from Navigation Areas (CAD Disposal)	Alternative 2D Full Removal from Navigation Areas and Partial Removal from G-P ASB Area (Upland Disposal)	Alternative 2E Full Removal from Public Lands (Upland Disposal)	Preferred Remedial Action Alternative (Treatment/CAD Disposal)
Whatcom Waterway Site									
Mid/Outer Whatcom Waterway: 30' Federal Channel	1	46	210,000 to 570,000 [1]	Dredge & Cap to Auth. Nav. Depths [1] (210,000)	Dredge & Cap to Auth. Nav. Depths [1] (210,000)	Dredge with CAD Disposal (570,000)	Dredge with Upland Disposal (570,000)	Dredge with Upland Disposal (570,000)	Dredge w/ Treatment, CAD Disposal and/or Beneficial Reuse (570,000)
Head of Whatcom Waterway: 30' Federal Channel	2	7	80,000 (excluding pipeline area)	Dredge & Cap with CAD Disposal (80,000)	Dredge & Cap with Upland Disposal (80,000)	Dredge & Cap with CAD Disposal (80,000)	Dredge & Cap with Upland Disposal (80,000)	Dredge & Cap with Upland Disposal, (80,000)	Dredge and Cap w/ Treatment and/or CAD Disposal (80,000)
Head of Whatcom Waterway: 18' Federal Channel	3	5	20,000 to 90,000	Partial Dredge near New West Fisheries (20,000)	Partial Dredge near New West Fisheries (20,000)	Dredge Existing Channel (excl. Citizens Dock) (40,000)	Dredge Existing Channel (excl. Citizens Dock) (40,000)	Dredge Entire Channel w/ Upland Disposal (90,000)	Dredge Existing Channel (excl. Citizens Dock and habitat features) (50,000)
I&J Waterway	8	9	110,000 [2]	No Action [2]	No Action [2]	No Action [2]	No Action [2]	No Action [2]	No Action [2]
G-P Log Pond	4	8	100,000	CAD	Cap (w/ armor/habitat layers)	CAD	Cap (w/ armor/habitat layers)	Cap (w/ armor/habitat layers)	Thick Cap/Habitat Corridor
G-P ASB	5	43	10,000 to 470,000	Cap w/ armor/habitat layers & Partial Dredge [3] (10,000)	Cap w/ armor/habitat layers & Partial Dredge [3] (10,000)	Cap w/ armor/habitat layers & Partial Dredge [3] (10,000)	Partial Dredge of Mercury BSL Areas & Cap (200,000)	Dredge with Upland Disposal (470,000)	Cap/Habitat Corridor
Port Log Rafting Area	6	24	40,000 to 220,000	Partial Dredge for Chem Dock/Cap [4] (40,000)	Partial Dredge for Chem Dock/Cap [4] (40,000)	Partial Dredge for Chem Dock / Cap (60,000)	Partial Dredge for Chem Dock / Cap (60,000)	Dredge with Upland Disposal (220,000)	Partial Dredge for Chemical Dock/Cap, Habitat Corridor (60,000)
Starr Rock	7	48	480,000	Cap and CAD (part of Starr Rock CAD)	Cap	Cap and CAD (part of Starr Rock CAD)	Partial Dredge of Mercury BSL Areas & Cap (130,000)	Dredge with Upland Disposal (480,000)	Cap and Partial Dredge to Stabilize Slopes (2,000)
Cornwall Avenue Landfill	9	14 [5]	400,000	Cap and CAD (part of Starr Rock CAD)	Cap	Cap and CAD (part of Starr Rock CAD)	Cap	Dredge with Upland Disposal (400,000)	Cap and CAD (Part of Cornwall CAD)
Harris Avenue Shipyard	10	4	20,000 to 50,000	Partial Dredge with CAD Disposal & Cap [6] (20,000)	Partial Dredge with Upland Disposal & Cap [6] (20,000)	Partial Dredge with CAD Disposal & Cap [6] (20,000)	Partial Dredge with Upland Disposal & Cap [6] (20,000)	Dredge with Upland Disposal (50,000)	Partial Dredge with Treatment and/or CAD Disposal (20,000)
G-P Outfall [7]	11	4 [8]	0	No Action [8]	No Action [8]	No Action [8]	No Action [8]	No Action [8]	No Action [8]
Other Sediment Sites [7]	12	5	40,000	Dredge with CAD Disposal [9] (40,000)	Dredge with Upland Disposal [9] (40,000)	Dredge with CAD Disposal [9] (40,000)	Dredge with Upland Disposal [9] (40,000)	Dredge with Upland Disposal [9] (40,000)	Dredge with Treatment and/or CAD Disposal (40,000)
Total Cleanup Areas:		207	2,600,000						
Approx. Const./O&M Cost [10]				$20 Million	$39 Million	$30 Million	$84 Million	$162 Million	$29 Million

(1) The smaller dredge volume (210,000 CY) reflects a dredge-and-cap scenario where the channel would first be dredged to a depth of approximately -35 feet MLLW, and then capped with a clean sand layer, resulting in a final channel depth of at least -32 feet MLLW. The larger dredge volume (570,000 CY) reflects the complete removal of subsurface contaminated sediments from this same area, including necessary side-slope cuts.
(2) Based on the available testing data, surface and subsurface sediments in the I&J Waterway would likely be suitable for PSDDA open-water disposal, should dredging of the waterway be necessary in the future. Should PSDDA suitability not be confirmed, the contingent remedy for the I&J Waterway is likely to be dredging and confined disposal.
(3) Contaminated sediments present near the base of the existing ASB berm that are potentially subject to resuspension would either be dredged (southern berm area between the outfall pipeline and Whatcom Waterway), or capped with a berm/eelgrass system (northern berm area; contiguous with an existing eelgrass meadow in this area).
(4) Under this alternative, if residual contaminated sediments were still present at the sediment surface following completion of a 4-foot dredge cut, the area would be backfilled with a clean sediment cap (thickness of 1 to 3 feet).
(5) Site also includes 8 acres of upland landfill.
(6) An upper-bound estimate of 50,000 CY of contaminated sediment may be present at the Harris Avenue Shipyard site; an estimated 30,000 CY of this material may be suitable for in-place capping.
(7) Cleanup of these sites is not part of the Integrated Near-Term Remedial Action Alternatives evaluated in this draft EIS. However, the location and estimated volume of contaminated sediment at these sites has been considered in sizing potential disposal facilities.
(8) Based on 1999 sediment sampling data, sediments throughout the G-P Outfall Site have recovered to below SQS cleanup criteria.
(9) This alternative includes a preliminary allowance for an additional 40,000 CY of contaminated sediments from other sites within Bellingham Bay (e.g., Olivine, Squalicum, Weldcraft and possibly other sites) that could potentially be co-disposed with other materials.
(10) The basis for construction/O&M costs are provided in the Whatcom Waterway and Cornwall Avenue RI/FS; see Appendix F.

Table 2.3-1 Summary of Integrated Near-Term Remedial Action Alternatives (continued)

	Alternative 2A – Removal and Capping to Achieve Authorized Channel Depths (CAD Disposal)	Alternative 2B - Removal and Capping to Achieve Authorized Channel Depths (Upland Disposal)	Alternative 2C- Full Removal From Navigation Areas (CAD Disposal)	Alternative 2D- Full Removal From Navigation Areas and Partial Removal from G-P ASB (Upland Disposal)	Alternative 2E- Full Removal From Public Lands (Upland Disposal)	Preferred Remedial Action Alternative (Treatment/CAD Disposal)
Preliminary Sediment Cleanup Summary (acres):						
Sediment area remediated by complete removal	24	24	59	97	183	60
Sediment area remediated by engineered containment:						
Engineered cap areas (incl. dredge & cap locations; excl. CAD areas)	117	146	108	100	15	108-119
CAD and associated cap/berm edges:						
CAD/cap/berm footprint over existing sediment contamination	29	0	30	0	0	0-11
CAD footprint over clean sediments (not in cleanup total)	21	0	33	0	0	0-14
Cap and berm footprint over clean sediments (not in cleanup total)	1	0	4	0	0	0-16
Retained subsurface contamination areas with clean surface sediments	37	37	10	10	9	9
Total Sediment Area Remediated	207	207	207	207	207	207
Sediment Capping and Disposal:						
Total Quantity of Clean Cap and Berm Material (CY)	720,000	460,000	940,000	390,000	70,000	970,000
Total Dredged Sediment Requiring Confinement (CY)	420,000	420,000	820,000	1,100,000	2,400,000	820,000
Contaminated Sediment Disposal Facilities	Starr Rock and Log Pond CADs	Roosevelt Landfill and/or local disposal facilities	Starr Rock and Log Pond CADs	Roosevelt Landfill and/or local disposal facilities	Roosevelt Landfill and/or local disposal facilities	Cornwall CAD (if treatment not viable)
Preliminary Habitat Elements (Inner Bellingham Bay):						
Net Change in Aquatic Habitat Acreage	0	0	0	0	+7 acres (Cornwall Landfill)	0
Net Change in Aquatic Habitat Elevation (conceptual design):						
High Intertidal (above +8 to +11 feet MLLW)	0	0	0	0	1	1
Middle Intertidal (+4 to +8 feet MLLW)	1	1	1	1	1	8
Low Intertidal (0 to +4 feet MLLW)	2	2	1	0	0	11
Inter/Subtidal (0 to -4 feet MLLW; potential eelgrass restoration areas)	39	3	61	0	-1	15
Shallow Subtidal (-4 to -10 feet MLLW)	-6	3	-6	-9	-7	6
Deep Subtidal (below -10 feet MLLW)	-36	-10	-57	7	15	-41
Public Access Components	Cornwall/Boulevard Beach Construction		Cornwall/Boulevard Beach Construction			Cornwall/Head of Whatcom
Land Use/Land Value Considerations:						
Acres of Land with Subsurface Contamination:						
Federal Navigation Channels	52	52	17	17	16	16
Harbor Areas (excl. federal channels)	88	88	88	49	0	69
Other Aquatic Lands	43	43	43	43	8	43
Upland Landfill Areas (assuming 25-ft sediment disposal depth)	6	17	7	34	60	7

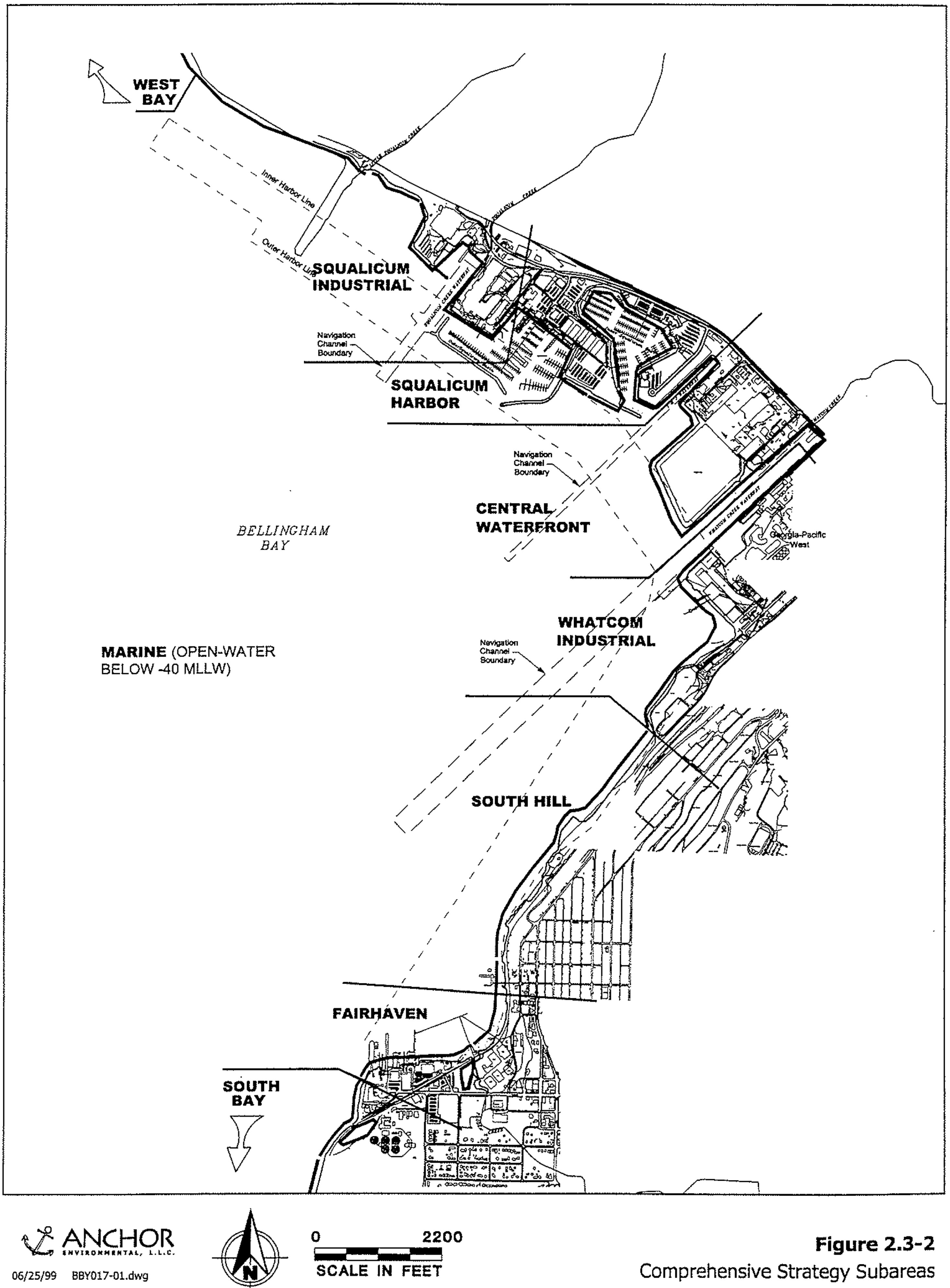

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Figure 2.3-2
Comprehensive Strategy Subareas

Primary Use – The existing primary use(s) is defined within each subarea . Examples include natural resource production, navigation and commerce, public access and recreation, and other descriptors. The primary uses may be subdivided geographically into distinct segments if different uses are spatially separated within a subarea.

- **Land Use** – Land use opportunities that are consistent with the subarea strategy are listed. Opportunities that are recommended for implementation on a near-term basis are identified. Examples include:
  - Evaluate the option of moving the Inner and Outer Harbor Lines offshore and possibly removing the Harbor Area designation in the South Hill and South Bay subareas.
  - Provide for public access and habitat enhancements at the Taylor Avenue Dock.
- **Habitat** – Restoration and protection opportunities present in the subarea are listed in each subarea strategy. The future opportunities that are listed are consistent with the overall habitat restoration vision for the Bay and the subarea strategy. Opportunities that are recommended for implementation on a near-term basis are identified as such within the list. Examples include:
  - Support the habitat protection status "enforced" by the Lummi Tribe in the area in the vicinity of the Nooksack River estuary and in the vicinity of Portage Island.
  - Protect existing herring, surf smelt, and sand lance spawning habitats in this subarea and in particular, protect surf smelt and sand lance spawning habitat along the Lummi Peninsula shoreline through beach nourishment.
- **Sediment Sites, Cleanup, Disposal, and Source Control** – Opportunities to address sediment sites, sediment cleanup and disposal, and control sources of contaminants consistent with the subarea are listed. Examples include:
  - Plan for potential need to remediate other sediment sites, including the Weldcraft, Taylor Avenue Dock, and Olivine Nearshore sites.
  - Support the evaluation of potential sources of water quality and sediment degradation associated with the Oeser site in the Little Squalicum Creek Watershed.
  - Evaluate the presence of phenol and 4-methylphenol in the sediments adjacent to stormwater discharges.
  - Remediate the Squalicum Harbor Inner Boat Basin contaminated sediment site.
  - Evaluate the inactive Tide-Grid site in Squalicum Harbor as a potential sediment site.
  - Develop stormwater treatment plan for adjacent upland areas that currently are untreated.
  - Ensure the stormwater discharge from the "C" Street outfall does not contribute to sediment or water quality degradation and evaluate this outfall as a potential source of phenol and 4-methyl-phenol.

The Subarea Strategies are described in detail in Appendix A (which is bound with this final EIS).

2.3.3 Preliminary Draft Habitat Mitigation Framework

A Preliminary Draft Habitat Mitigation Framework (Appendix C) was developed by the Pilot in order to define the type and extent of mitigation that may be required. As presented in Appendix C, the Preliminary Draft Mitigation Framework is a "work in progress" and may be used at the discretion of the relevant regulatory agencies to inform those agencies decision-making processes. The Preliminary Draft Habitat Mitigation Framework may continue to be updated by the Pilot Team, and could be utilized in the permitting phase of the near-term remedial action alternative that is ultimately selected by Ecology through the MTCA process, or to future actions implementing the Comprehensive Strategy.

The purpose of the Preliminary Draft Mitigation Framework is to provide:

- An ecosystem context for mitigation actions in Bellingham Bay. It is intended to provide more management and mitigation guidance and flexibility than would be possible through individual project consideration.

- Incentives and disincentives for undertaking development or habitat restoration actions in certain areas within the Bay.

A bulleted summary of the Preliminary Draft Mitigation Framework is below. Appendix C provides a more detailed description of the Framework in its current form.

- The Preliminary Draft Mitigation Framework acknowledges existing federal, state, and local laws and tribal interests concerning approaches to mitigation (e.g., mitigation sequencing such as avoidance and minimization).
- Parameters to consider in defining compensatory mitigation requirements include existing current resource conditions, area and function of impact site, and identified habitat restoration objective identified in the Comprehensive Strategy. Information on these parameters can be used as an overlay onto a given Integrated Near-Term Remedial Action Alternative or development project to identify adverse impacts. Any net increase in habitat value or function resulting from a mitigation action can be thought of as a restoration activity.
- Once impacts have been identified, the Preliminary Draft Mitigation Framework identifies potential compensatory mitigation requirements for those unavoidable impacts. This process takes into account several modifiers such as impact location, mitigation location, the type of mitigation action and its relationship to the Comprehensive Strategy, and timing to define compensatory mitigation requirements for a development or remedial action. The modifiers are:

- ♦ In-Kind and Out-of-Kind Habitat Replacement
- ♦ On-Site and Off-Site Habitat Replacement
- ♦ Mitigation Timing
- ♦ Mitigation Feasibility
- ♦ Mitigation Type
- ♦ Habitat Incentives and Disincentives
- ♦ Net Gain

The details of the Preliminary Draft Mitigation Framework still being discussed by the Pilot Team include the development and application of ratios that can be applied to each of these modifiers.

2.3.4 Integrated Near-Term Remedial Action Alternatives

The Integrated Near-Term Remedial Alternatives are a range of alternatives to address high priority sediment cleanup/source control sites in Bellingham Bay and inform future cleanup and land use decisions. The alternatives attempt to integrate sediment cleanup and disposal with source control, habitat, and land use. The six Integrated Near-Term Remedial Action Alternatives (Alternatives 2A through 2E and the Preferred Remedial Action Alternative) are summarized in Table 2.3-1 and are described in more detail in the sections below.

Table 2.3-1 compares the costs of each Integrated Near-Term Remedial Action Alternative (details are provided in Appendix F). Construction projects in general and sediment remediation projects specifically incur two types of costs. "Hard" costs are easily calculated and include the costs of construction, maintenance, and monitoring – acquiring materials, paying designers, and hiring contractors. "Soft" costs are harder to estimate because they include items that are less tangible or are negotiable. As an example, a confined aquatic disposal site in Bellingham Bay would be either on state-owned or privately-owned aquatic land. Land value is negotiable, and landowners would consider whether the creation of a CAD would benefit them or be a liability as they determine an asking price. Another soft cost is related to the environmental costs and benefits from completing a project. A method of measuring this, termed "contingent evaluation" sets monetary value to environmental factors (for example, the value of a single juvenile chinook salmon lost or affected by construction) and attempts to quantify the overall monetary value of a proposed action.

The total hard costs associated with each Integrated Near-Term Remedial Action Alternative have been estimated in the Whatcom Waterway and Cornwall Avenue Landfill RI/FS documents, and are summarized in Table 2.3-1. Because it is too early in the process to estimate potential value of aquatic land or other soft costs such as Treaty Rights and mitigation, these values have not been assessed . A contingent evaluation analysis is not required by SEPA and was not done for this project.

The Integrated Near-Term Remedial Action Alternatives were devised to inform the future regulatory decisions which will address the contamination issues at specific areas in Bellingham Bay. The following subsections describe the issues at each area.

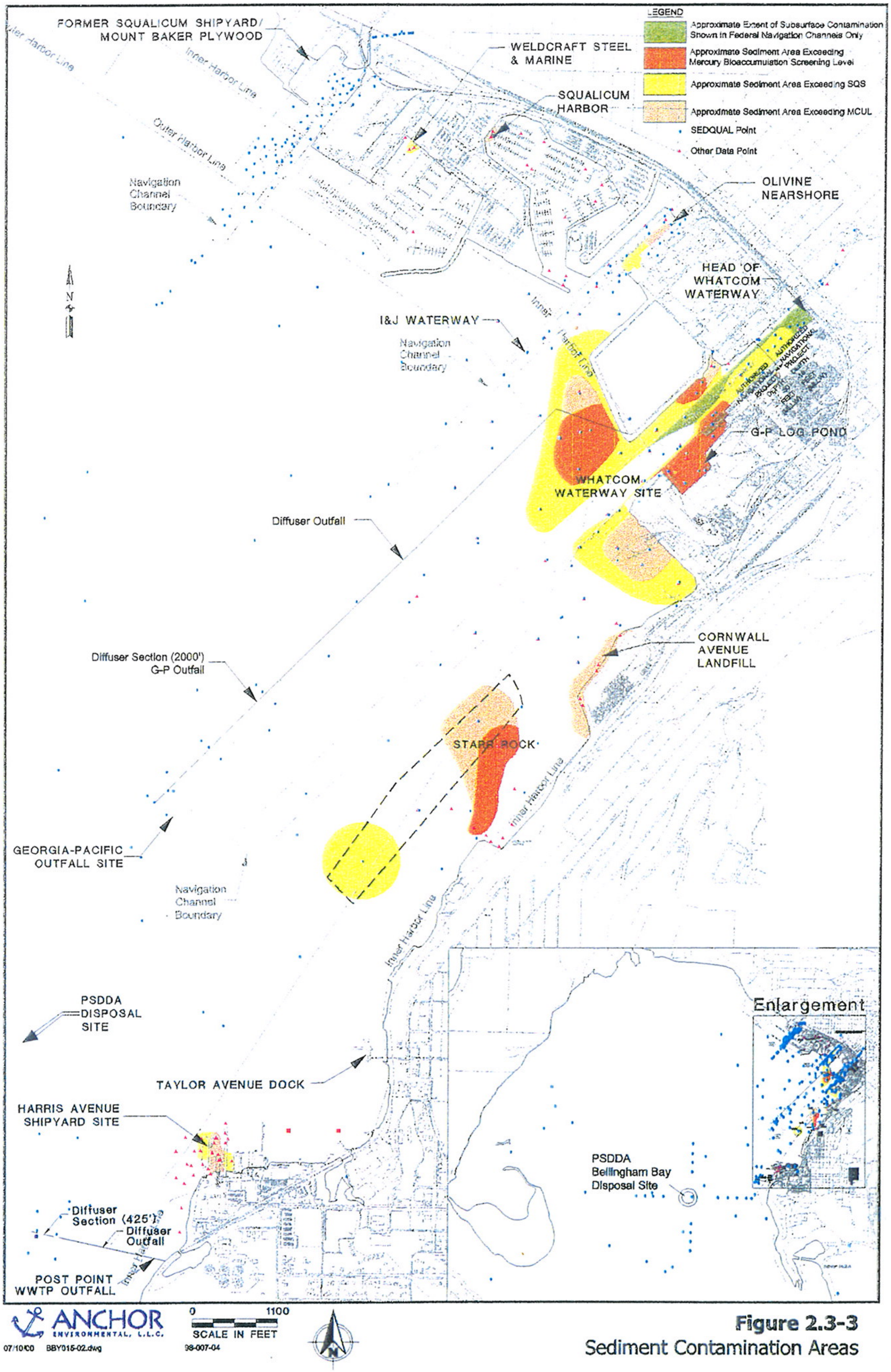

Figure 2.3-3
Sediment Contamination Areas

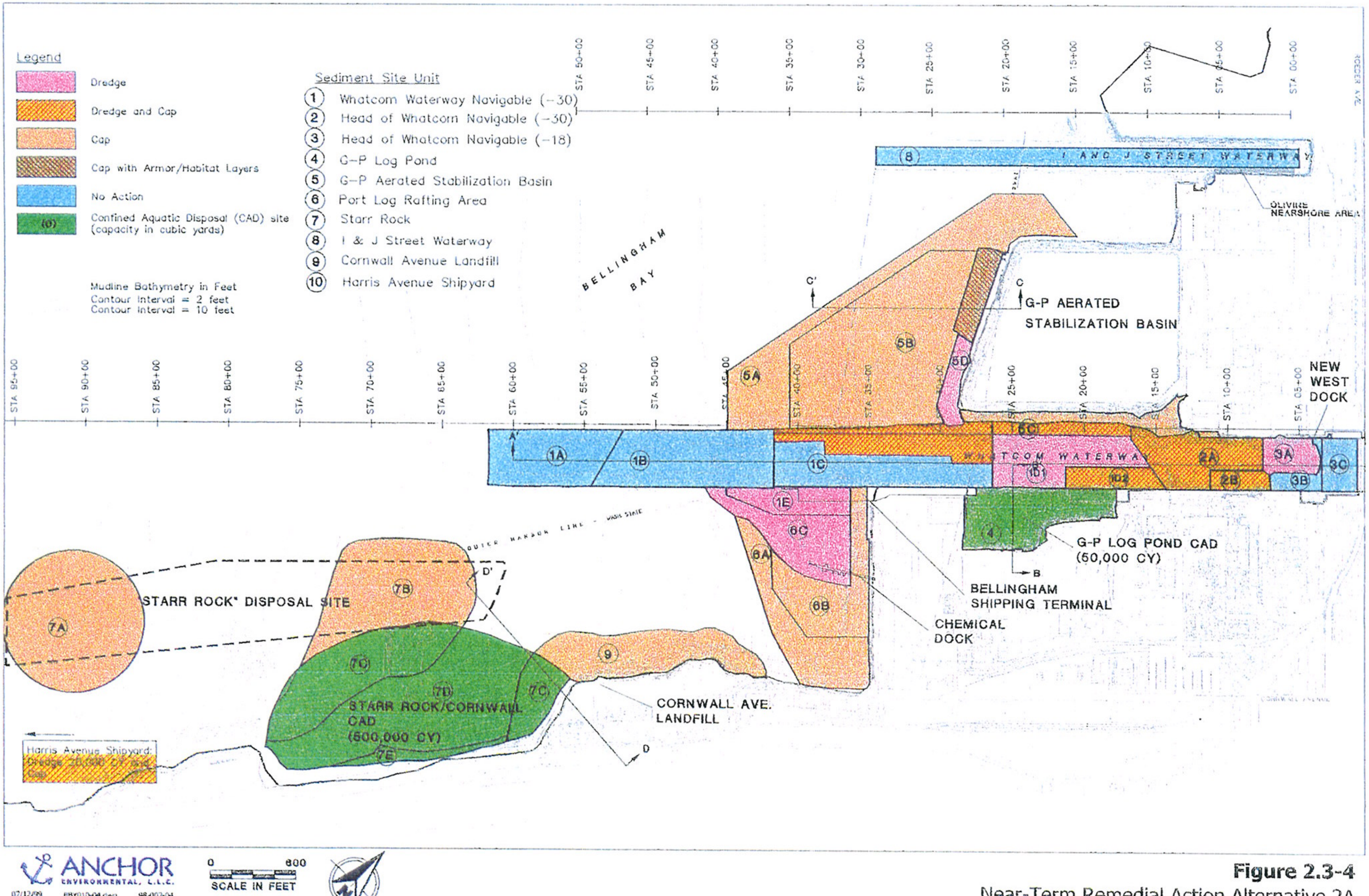

Figure 2.3-4
Near-Term Remedial Action Alternative 2A

2.3.4.1 Sediment Cleanup/Source Control Sites

The *Sediment Sites and Source Control Documentation Report* (summarized in Appendix B) identified several cleanup areas that are briefly described below. Many of these sites are a part of the overall Whatcom Waterway site that is being addressed in the Agreed Order between Ecology and G-P. The final RI/FS for the Whatcom Waterway Site is a companion document to this final EIS and is incorporated by reference. The following section is a brief summary of the final RI/FS for the Whatcom Waterway Site. Figure 2.3-3 is a map of inner Bellingham Bay that features the following sediment cleanup sites. Section 3.1.3.2 has more detail on the specific contamination issues at these sites.

Whatcom Waterway Draft Final RI/FS Summary

The final RI/FS for the Whatcom Waterway Site presents the integrated results of all sampling and analysis, along with evaluations of sediment site units, cleanup technologies, and detailed evaluations of remediation alternatives. The report presents information relevant to the weighing of alternative actions considering net environmental benefits, permanence, implementability, cost, and other SMS and MTCA criteria.

Detailed sampling and analysis of more than ten potential contaminant sources in inner Bellingham Bay was undertaken as a part of the RI/FS. Though localized discharges were documented, no ongoing, significant sources of mercury or other constituents (for example, wood material) were identified within the Whatcom Waterway Site that have the potential to re-contaminate sediment cleanup areas.

Most of the surface sediments located within the Whatcom Waterway federal navigation channel did not exceed SQS biological effects criteria, even though underlying subsurface sediments within the channel contained some of the highest concentrations of mercury, 4-methylphenol, and wood material detected at the site. These data confirm the protectiveness of the natural sediment cap that has formed in the channel as the result of source controls and natural recovery, and concurrent with active navigation use of the channel.

The RI/FS determined that three sediment sites – the G-P Log Pond, nearshore areas located adjacent to the Whatcom Waterway, immediately offshore of the G-P ASB, and the Starr Rock site – are above SQS criteria. These three areas contain the highest mercury and wood material concentrations reported within inner Bellingham Bay.

Whatcom Waterway Site

The Whatcom Waterway sediment site includes intertidal and subtidal aquatic lands within and adjacent to the Whatcom and I&J Street waterways. Mercury and other constituents (e.g., wood material) have been detected in sediment samples collected within this area at concentrations that exceed state Sediment Quality Standards (SQS) chemical criteria. In January 1996, G-P and Ecology entered into an Agreed Order to perform a remedial investigation/feasibility study (RI/FS) of the area's sediments, pursuant to MTCA cleanup authorities. The following paragraphs describe the particular contamination issues with each site unit of the Whatcom Waterway site.

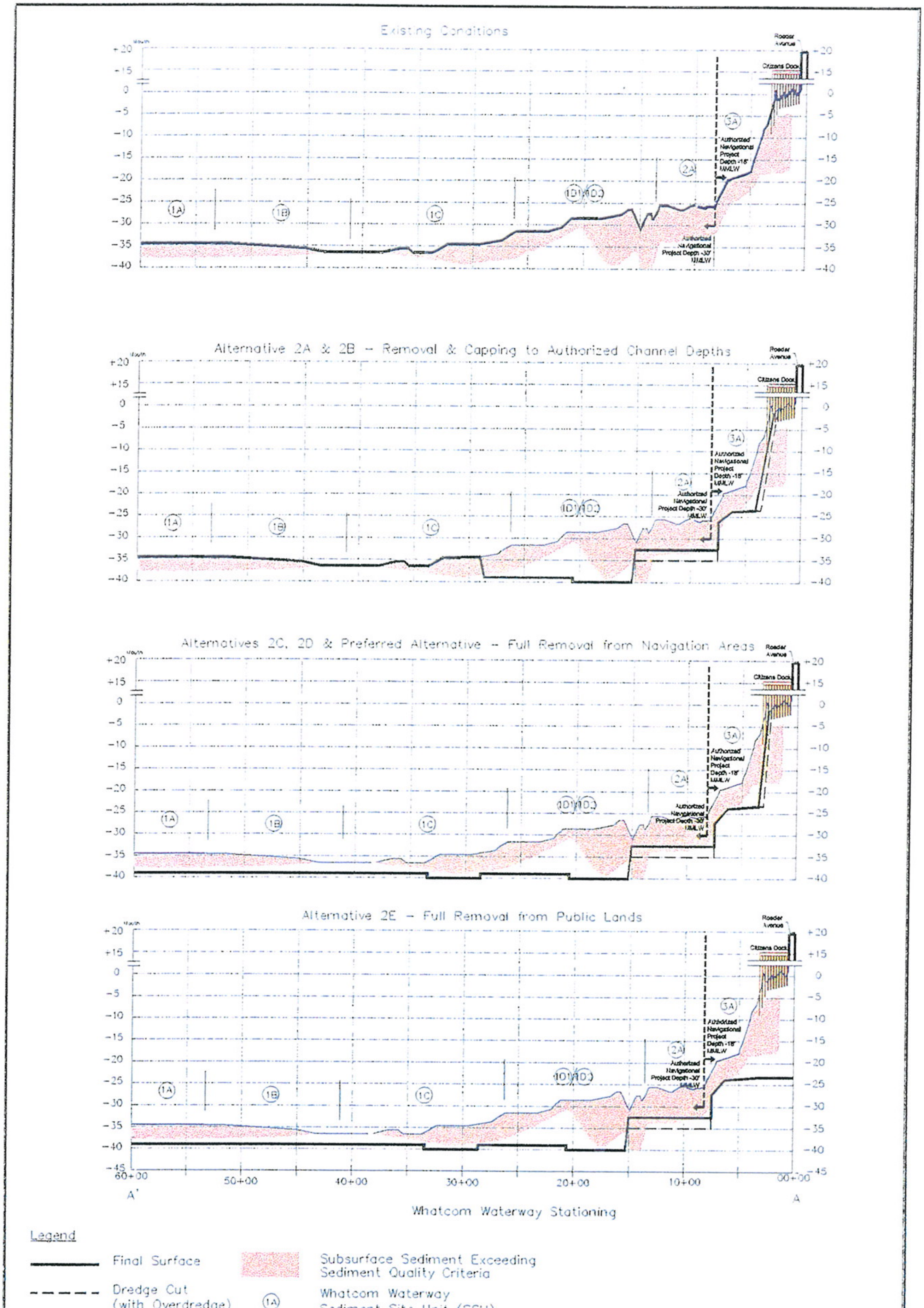

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Figure 2.3-5
Near-Term Remedial Action Alternatives
Typical Cross Sections Through
Whatcom Waterway Centerline

Whatcom Waterway Federal Navigation Channel (site unit within the Whatcom Waterway Site)

Chemicals of potential concern identified in the surface (0 to 10 cm) sediments within the Whatcom Waterway federal navigation channel are largely limited to mercury, 4-methylphenol, and phenol. These chemicals were regularly detected in surface sediments at concentrations that exceeded both SQS and MCUL chemical criteria. Biological testing was performed and exceedences were much lower than that predicted strictly by the SQS and MCUL chemical criteria. However, contamination extends well below the federally authorized channel depths. Surface sediments throughout most of the Whatcom Waterway navigation channel contained less than 2 percent wood material by volume.

I&J Waterway (site unit within the Whatcom Waterway Site)

Although sediments within the I&J Waterway contain detectable concentrations of chemical contaminants, confirmatory bioassays performed on surface sediments collected from this area all passed SQS biological criteria. In addition, screening-level PSDDA bioassays performed on surface and subsurface sediment composite samples collected from this area indicate that these materials may be suitable for open-water disposal, should they be dredged in the future. The opportunity for beneficial reuse of the material dredged from the I&J Waterway may be assessed during remedial design. Surface and subsurface sediments at the head of the I&J Waterway contain 5 to 20 percent wood material by volume, decreasing to less than 2 percent at more offshore locations.

G-P Log Pond (site unit within the Whatcom Waterway Site)

This area of the Whatcom Waterway Site contains the highest mercury levels in Bellingham Bay. Sediments in the G-P Log Pond also contain greater than 50 percent wood material by volume. Low-level concentrations of mercury in groundwater currently seep into the Log Pond from the adjacent uplands.

G-P Aerated Stabilization Basin (ASB) (site unit within the Whatcom Waterway Site)

Surface sediments located immediately offshore of the G-P ASB contain elevated mercury concentrations. Approximately 22 acres off of the southwest end of the ASB contains surface sediment mercury concentrations that exceed the site-specific bioaccumulation screening level (BSL). The northeast portion of this area also contains an eelgrass bed where surface sediment mercury concentrations are less than the SQS. A natural sediment cap has been forming over time throughout most of the G-P ASB area. Surface and shallow subsurface sediments along the southeast and southwest periphery of the G-P ASB contain greater than 50 percent wood material by volume, gradually decreasing to less than 2 percent further offshore.

Port Log Rafting Area (site unit within the Whatcom Waterway Site)

Similar in some respects to the G-P ASB Area, surface sediments located immediately offshore the Port Log Rafting Area also contain elevated mercury concentrations, though not above the site-specific BSL. Bioassay samples collected within this area also exceeded SQS biological criteria. This area of the inner Bay is used for maritime operations. The sediments in the Log Rafting area contain 20 to 50 percent wood material by volume along the southeast shoreline, gradually decreasing to 2 to 5 percent at the outer harbor line.

Starr Rock (site unit within the Whatcom Waterway Site)

This area of the Bay has been addressed to date through the combined efforts of the Whatcom Waterway Agreed Order and the Pilot Project. In 1969, the Starr Rock site, located immediately offshore of Boulevard Park, was used for the disposal of approximately 130,000 CY of sediments dredged from the Whatcom Waterway navigation channel (Hart Crowser 1996). Chemicals of potential concern identified in surface sediments at the site include mercury, phenol, 4-methylphenol, and woody debris. Two of the nine confirmatory sediment bioassays performed in the Starr Rock area exceeded SQS interpretive criteria, and two sediment samples located on or immediately adjacent to the former sediment disposal mounds exceeded the site-specific mercury BSL. Sediments in the Starr Rock area contain variable levels of wood material, ranging from greater than 50 percent near the southern disposal mound, to less than 2 percent by volume near the periphery of this area. Portions of this area also contain eelgrass meadows.

Cornwall Avenue Landfill (under Voluntary Cleanup Program with Ecology)

The Cornwall Avenue Landfill was used between 1953 and 1965 for the disposal of municipal solid waste. The landfill is located on former tideflats of inner Bellingham Bay. In 1996, the Port of Bellingham, City of Bellingham, and DNR performed an expanded site investigation of the Cornwall Avenue Landfill, to characterize the site. The study determined that the landfill is actively eroding into Bellingham Bay. Seeps from the landfill also marginally exceed water quality criteria. The investigations revealed that nearshore sediments in this area are composed primarily of solid waste debris, which also contain elevated concentrations of a variety of metal and organic chemicals. A draft RI/FS for the Cornwall Avenue Landfill is a companion document to this final EIS and is incorporated by reference.

Harris Avenue Shipyard (under Voluntary Cleanup Program with Ecology)

The Harris Avenue Shipyard Site includes upland property currently owned by the Port and aquatic lands owned by the State of Washington. The main shipyard area was used extensively during the 1940s for shipbuilding and launching activities, and has been a focus of local shipbuilding and repair operations since the early 1900s. The Harris Avenue Shipyard Site is located adjacent to Dungeness crab populations, and near eelgrass meadows and local fish spawning and harvesting areas. Sediments in this area contain a variety of metal and organic chemical contaminants. However, the contamination area appears to be localized. Phase 2 sampling at the shipyard has been completed (ReTec 1998a), and the Port of Bellingham has begun an RI/FS to delineate the nature and extent of sediment contamination and to evaluate remedial alternatives.

G-P Outfall

The G-P Outfall Site is located within the immediate vicinity of the G-P wastewater treatment diffuser in inner Bellingham Bay. While historical data previously indicated that sediments at the outfall exceeded SMS standards, subsequent monitoring performed in 1999 revealed that the outfall area has recovered to below SQS cleanup criteria.

Additional monitoring is required in five years under G-P's NPDES permit to verify that sediments continue to remain below cleanup standards.

Other Sediment Cleanup Sites

During the course of the Pilot Project, additional sediment contamination areas have been identified that also exceed state SQS criteria, including:

- **Olivine Nearshore Area** - Located near the head of the I&J Waterway, the Olivine Nearshore Area is adjacent to upland property that was formerly used for scrap/refuse storage and experimental incineration (Landau 1994; HLA 1995). Elevated concentrations of a plasticizer compound (bis[2-ethylhexyl]phthalate) have been detected in sediment within the nearshore area, which has been confirmed to be toxic in sediment bioassays. The extent of sediment contamination at the site appears to be limited. This area is under Voluntary Cleanup Program with Ecology and an RI/FS is being prepared by the Port of Bellingham.
- **Taylor Avenue Dock** – The City of Bellingham recently completed sediment sampling and characterization at the site (GeoEngineers 1999). The Pacific American Tar Company historically used the site for storage, use, and refining of petroleum products. The City of Bellingham Parks and Recreation Department plans on removing the existing dock and railroad trestle from the site and constructing a new overwater pedestrian walkway, dock, and picnic pavilion. Sediment sampling has identified contaminants of concern that are generally limited to polycyclic aromatic hydrocarbons (PAHs).
- **Squalicum Harbor Inner Boat Basin** - The inner basin of Squalicum Harbor includes marina facilities and localized boat maintenance operations. Elevated concentrations of several bottom-paint compounds have been detected in the immediate vicinity of the Marine Services Northwest boat lift. The extent of contamination appears to be limited. Phase 2 sampling has been completed (ReTec 1998b), and the Port of Bellingham has begun work on an RI/FS.
- **Weldcraft Steel and Marine** – This site is located in the outer boat basin of Squalicum Harbor, near a former marine railway facility. Elevated concentrations of bottom-paint compounds have been detected in the immediate vicinity of the former railway. The extent of contamination appears to be limited. Landau completed a Phase 2 Environmental Site Assessment for the Port of Bellingham in 1998. A Phase 3 Site Assessment is underway and initial upland cleanup is scheduled for the summer of 2000.

Other contaminated sites could be identified as additional investigations are completed.

2.3.4.2 Integrated Near-Term Remedial Action Alternatives

Cleanup of the Olivine Nearshore Area, Taylor Avenue Dock, Squalicum Harbor Inner Boat Basin, and Weldcraft Steel and Marine are not evaluated in this final EIS. However, the Integrated Near-Term Remedial Alternatives considered their location and estimated volume of contaminated sediment in sizing potential disposal facilities. These sites have been identified in the Subarea Strategies as sites that should be addressed in the near future.

Sediment cleanup, disposal, habitat, and land use elements of Integrated Near-Term Remedial Action Alternatives are summarized in Table 2.3-1.

The description of each Integrated Near-Term Remedial Alternative with a capping component includes a description of a "1 to 3-foot layer of clean material" that would be used for the cap.

The actual thickness of the cap, and the materials that would be used, will be determined during final remedial design. An assumption of 2 feet was made regarding the cap thickness for the final EIS so that an estimate could be made of the required amount of clean material that would be needed for each alternative.

2.3.4.3 Alternative 2A - Removal & Capping to Achieve Authorized Channel Depths (CAD Disposal)

The overall objective of this alternative is to achieve sediment quality standards (SQS) at priority sites within Bellingham Bay while maintaining existing navigation channels, minimizing dredging and disposal of contaminated sediment, and converting subtidal aquatic habitat to intertidal aquatic habitat by using caps and confined aquatic disposal (CAD) facilities. In this alternative, minimizing dredging and disposal volumes predominates over a competing objective of possible future navigation deepening of the federal waterways.

Alternative 2A would achieve this objective through a combination of dredging, CAD, and capping (Figure 2.3-4). Enough material would be dredged from the Whatcom Waterway federal navigation channel to remove contaminated sediments to below currently authorized depths (including overdredge allowances) in all areas of the waterway that are currently used for navigation. Surface and subsurface sediments throughout most of the waterway (except for the extreme head) would be dredged to a depth of at least 5 feet below the currently authorized channel depths and capped with 1 to 3 feet of clean material. However, no further action would be undertaken in the outer Whatcom Waterway reach where surface sediments currently meet state standards ***and*** where channel depths are consistent with the federally authorized elevations. Other contaminated sediment areas outside the federal navigation channel would be capped with 1 to 3 feet of clean material. In this alternative a 2-acre area of mudflat and adjacent shallow subtidal habitat would be left intact at the head of the Whatcom Waterway.

Alternative 2A would minimize dredging and disposal volumes. Approximately 310,000 cubic yards (CY) of contaminated sediment from primary navigation areas within the Whatcom Waterway would be dredged. Alternative 2A also includes the dredging of roughly 20,000 CY from the Harris Avenue Shipyard site. Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 500,000 CY. In this alternative, the sediment disposal capacity would be provided by two CAD facilities:

1. A small (up to 50,000 CY) CAD sited in the G-P Log Pond; and
2. A larger 500,000 CY CAD sited in the Starr Rock/Cornwall area (Figure 2.3-5).

Both CAD facilities would provide opportunities for habitat restoration by converting approximately 42 acres of subtidal area into intertidal habitat. Specific components of Alternative 2A are discussed below.

Sediment Sites and Source Control/Sediment Disposal Siting

Alternative 2A would achieve State sediment cleanup standards and control sources of pollution at priority sites throughout Bellingham Bay by using a combination of dredging, CAD, and capping technologies. Major sediment cleanup and disposal elements of this alternative are described below:

- **Whatcom Waterway Federal Navigation Channel.** Approximately 310,000 CY of surface and subsurface sediments within the Whatcom Waterway would be dredged to 5 feet below the currently authorized channel depths. No further action would be undertaken in the outer Whatcom Waterway reach where surface sediments currently meet state standards ***and*** where channel depths are consistent with the federally authorized elevations. The dredged material would be disposed at both the G-P Log Pond and Starr Rock/Cornwall CAD facilities. In those areas of the Whatcom Waterway channel where contaminants are still present below the dredge depth, the dredge cut would be capped with a 1 to 3-foot layer of clean material, resulting in a final channel elevation at least 2 feet below the authorized depth. This dredge-and-cap action, as generally depicted on Figures 2.3-4 and 2.3-5, would leave sufficient tolerance to allow future maintenance dredging of the authorized federal channel, considering typical overdredge allowances. The head of the waterway would be dredged near the New West Fisheries facility, and the remaining adjoining habitat area left intact.

- **I&J Waterway.** *(Note: this description is common to all Integrated Near-Term Remedial Action Alternatives.)* Surface and subsurface sediments in the I&J Waterway appear to be suitable for open-water disposal, as determined by a screening-level analysis using PSDDA procedures. Thus, should dredging of the I&J Waterway be necessary in the future (i.e., not as part of a Integrated Near-Term Remedial Action Alternative), the material would receive a full PSDDA characterization and would likely be disposed at the existing Bellingham Bay PSDDA open-water disposal site. Alternatively, it may be possible to incorporate up to 110,000 CY of these sediments as subgrade (below cap) materials in the CAD and/or cap included in this alternative to achieve final design elevations. The opportunity for beneficial reuse of I&J Waterway sediments may be further assessed during the remedial design phase of the project.

- **G-P Log Pond.** Approximately 8 acres of contaminated sediments in the G-P Log Pond would be left in place and contained below the CAD constructed in this area (Figure 2.3-6). The CAD would include sufficient buttressing and armoring to be stable even under long-term seismic conditions, and to ensure isolation and long-term integrity of the capping system. The CAD would also be designed to confine contaminated sediments in an anaerobic, saline environment, providing maximum water quality protection. The shoreline edge of the CAD and adjacent upland remedial activities would be designed to control low-level mercury seepage. This source control measure is common to all Integrated Near-Term Remedial Alternatives. The surface of the CAD cap would be finished to provide 5 acres of intertidal habitat.

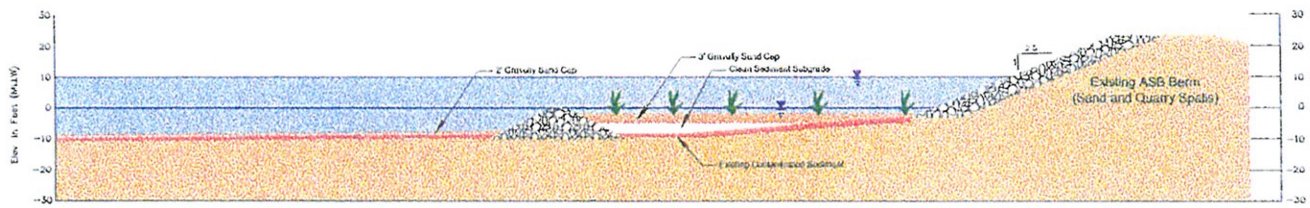
- **G-P ASB**. Approximately 41 acres of sediments located adjacent to the G-P ASB that exceed state SQS criteria would be capped with 1 to 3 feet of clean material. In relatively shallow water areas immediately adjacent to the ASB berm (less than roughly -12 ft MLLW), additional removal (approximately 10,000 CY) would occur. Armoring and wave protection may be necessary (based on final design analyses) to ensure the long-term integrity of the capping system. Such a system could include a relatively small riprap reef to "trip" incoming waves, dissipating wave energy on the reef instead of further inshore on the cap (Figure 2.3-6). The reef would be located away from the G-P outfall pipe.

- **Port Log Rafting Area**. Approximately 40,000 CY of contaminated sediment that exceeds the SQS criteria and which are also located in an active shipping area between the Bellingham Shipping Terminal and the G-P chemical dock, would be dredged (to the clean native layer) and disposed at the Starr Rock/Cornwall CAD facility. The remaining 15 acres of sediments that exceed SQS criteria would be capped with 1-to-3-feet of clean material.

- **Starr Rock.** Approximately 11 acres of sediments exceeding SQS criteria, including the former Starr Rock dredged material disposal mounds, would be left in place and contained below the CAD constructed in this area (Figure 2.3-7). The CAD would also cover portions of submerged solid waste at the Cornwall Avenue Landfill (see below). The remaining 33 acres of intertidal and subtidal sediments in this general area that exceed SQS criteria would be capped with 2 feet of clean material. The CAD would be designed to confine contaminated sediments in an anaerobic, saline environment, and provide water quality protection. The CAD design would include buttressing and armoring for stability during earthquakes. A barrier riprap reef would also be included to ensure the long-term integrity of the capping system, by dissipating wave energy on the reef. Occasional openings in the reef would be designed to minimize trapping of fish during low tides. The surface of the CAD cap would be finished to provide 30 acres of intertidal habitat.

- **Cornwall Avenue Landfill.** Four acres of sediments composed largely (greater than 50 percent) of solid waste materials would be left in place and contained below the CAD constructed in this area (Figure 2.3-7). Thus, the Cornwall Avenue Landfill portion of the CAD would function both as a disposal cell and a containment barrier that would isolate local solid waste deposits from the environment. The remaining 10 acres of solid waste/sediments in this general area would be capped with 1 to 3 feet of clean material (Landau 1999). Although the barrier reef included as an element of the Starr Rock/Cornwall CAD would dissipate wave energy on the reef instead of further inshore, intertidal zones of the landfill cap/shoreline may require additional armoring (based on final design analyses) to ensure its long-term integrity. Cap and/or armour layers, along with adjacent upland remedial activities, would also be designed to control low-level seepage discharges. Source controls at the Cornwall Avenue Landfill have been included in all the Integrated Near-Term Remedial Alternatives.

- **Harris Avenue Shipyard**. It was assumed that approximately 20,000 CY of sediment that exceeds the state MCUL chemical criteria at the Harris Avenue Shipyard site would be dredged (to the clean native layer) and disposed at the Starr Rock/Cornwall CAD facility. The remaining 2 acres of sediments that exceed SQS



1 Horizontal : 10 Vertical

C' - C Typical Cross Section through the G-P ASB Armored Cap/Habitat System

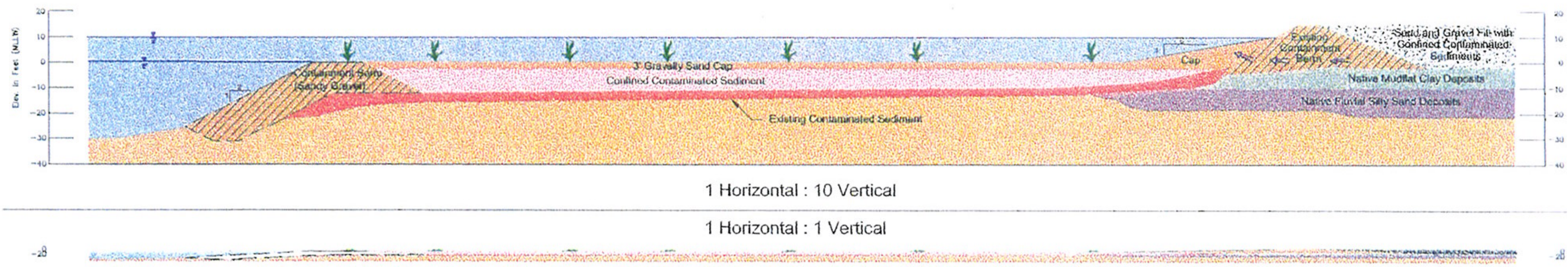


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Figure 2.3-6
Cross SectionsThrough
the G-P Log Pond and ASB

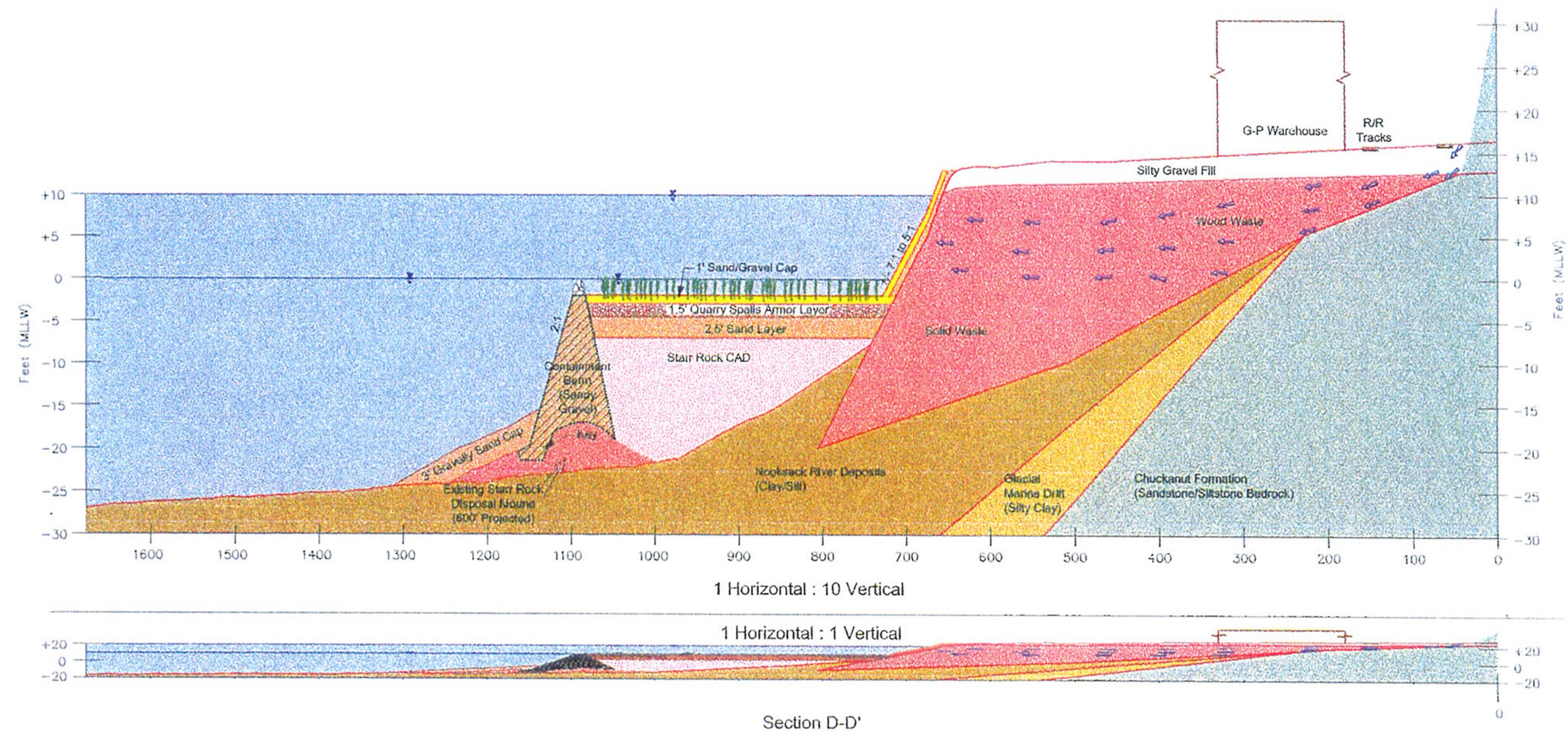

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Figure 2.3-7
Cross Section
at Starr Rock/Cornwall CAD

criteria (generally located outside of the primary shipyard operation area) would be capped with 1 to 3 feet of clean material.

- **G-P Outfall.** *(Note: this description is common to all Integrated Near-Term Remedial Action Alternatives)* While historical data previously indicated that sediments at the outfall exceeded SMS standards, subsequent monitoring performed in 1999 revealed that the outfall area has recovered to below SQS cleanup criteria. Additional monitoring is required in five years under G-P's NPDES permit to verify that sediments continue to remain below cleanup standards.

- **Other Sediment Cleanup Sites.** Cleanup studies are currently underway at several other sites in Bellingham Bay such as the Olivine Nearshore Area and Taylor Avenue Dock. These studies may determine a need for further contaminated sediment dredging and disposal. Accordingly, this alternative includes an allowance for up to 40,000 CY of additional sediments that may be dredged from Bellingham Bay and disposed at the Starr Rock/Cornwall CAD facility. Final decisions on incorporation of materials from these "other" cleanup sites into the Starr Rock/Cornwall CAD facility would be made by Ecology during the remedial design phase of the project.

Habitat

As discussed above, Alternative 2A minimizes dredging and disposal of contaminated sediment, while converting subtidal aquatic habitat to intertidal aquatic habitat by using caps and CAD facilities. In this alternative, a 2-acre area of mudflat and adjacent shallow subtidal habitat that has formed naturally at the extreme head of the Whatcom Waterway over the past 20+ years would be left intact. An additional 5 acres of intertidal and shallow subtidal mudflat habitat would be promoted within this general area by finishing the surface cap of the G-P Log Pond CAD. Construction of the Starr Rock/Cornwall CAD site would convert deeper contaminated (and clean) sediment into shallower subtidal habitat, supporting possible restoration of a 30-acre eelgrass meadow. An additional 2 acres would be brought to intertidal elevations by capping areas immediately adjacent to the G-P ASB. Thus, a total of approximately 38 acres of intertidal habitat could be restored and/or protected in Bellingham Bay as a part of this alternative.

Land Use

Sufficient dredging would be performed within the Whatcom Waterway to remove contaminated sediments from within the authorized depths (-18 and -30 ft MLLW) of the federal navigational channel, including overdredge allowances, in all areas of the waterway that are currently used for navigation. Even though the extreme head of the Whatcom Waterway federal navigation channel is presently shallower than the authorized depths, in this alternative a 2-acre area of mudflats and adjacent shallow subtidal areas would be left intact.

The Starr Rock/Cornwall CAD site is located primarily within public land use (park) zoning/shoreline designation areas, though the northern extent of the site extends slightly into industrial/maritime designations within the Cornwall Avenue Landfill area.

Construction of the Starr Rock/Cornwall CAD would create a sandy intertidal beach at the adjoining shoreline, providing an opportunity for enhanced public access and/or use of the shoreline, perhaps through a connection to Boulevard Park and the City's trail system. The CAD barrier reef would dissipate incoming wave energy, stabilizing the new beach from erosion. The Port is considering potential land uses that would be compatible with this alternative, including shipping terminal operations (requiring barge access) and other water-dependent commercial/industrial use.

Alternative 2B - Removal & Capping to Achieve Authorized Channel Depths (Upland Disposal)

Similar in some respects to Alternative 2A, the overall objective of Alternative 2B is to achieve SQS criteria at priority sites throughout Bellingham Bay while maintaining existing navigation channels (though not providing for future deepening) and minimizing dredging and disposal of contaminated sediment. However, unlike Alternative 2A, avoiding disposal in the aquatic environment is a primary objective.

This alternative includes the same amount of dredging as Alternative 2A, but would dispose of the materials at one or more off-site upland landfills. Other contaminated sediment areas would be capped with 1-to-3-feet of clean material (Figure 2.3-8). All dredged sediments would be brought on shore, de-watered as necessary to facilitate transport, and hauled by rail, truck, and/or barge outside of the Bellingham Bay watershed to upland disposal facilities. Approximately 310,000 CY of contaminated sediment from navigation areas within the Whatcom Waterway, along with other materials, would be dredged (Table 2.3-1). Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 500,000 CY. A relatively large capacity Subtitle D Landfill facility, such as the Roosevelt Regional Landfill or an equivalent facility could provide sediment disposal capacity. Other prospective suitable upland disposal sites may become available as final design is completed. The capacity and availability of these upland sites would be subject to final permitting of the disposal facility(ies).

Sediment Sites and Source Control/Sediment Disposal Siting

Alternative 2B would achieve state SQS criteria and control sources of pollution at priority sites in Bellingham Bay by using a combination of dredging, upland disposal, and capping technologies. Major sediment cleanup and disposal elements of this alternative are described below:

- **Whatcom Waterway Federal Navigation Channel.** Equivalent to Alternative 2A, except that dredged material (310,000 CY) would be disposed at one or more of the upland sites.
- **I&J Waterway.** Equivalent to Alternative 2A, except that dredged sediments could not be incorporated as subgrade materials into CADs. There is a potential to incorporate a portion of these materials (less than 110,000 CY) as cap subgrade materials.
- **G-P Log Pond.** Approximately 8 acres of contaminated sediments in the G-P Log Pond would be left in place and capped with a nominal 3-foot layer of clean material. The cap would include sufficient armoring to ensure isolation and long-term integrity

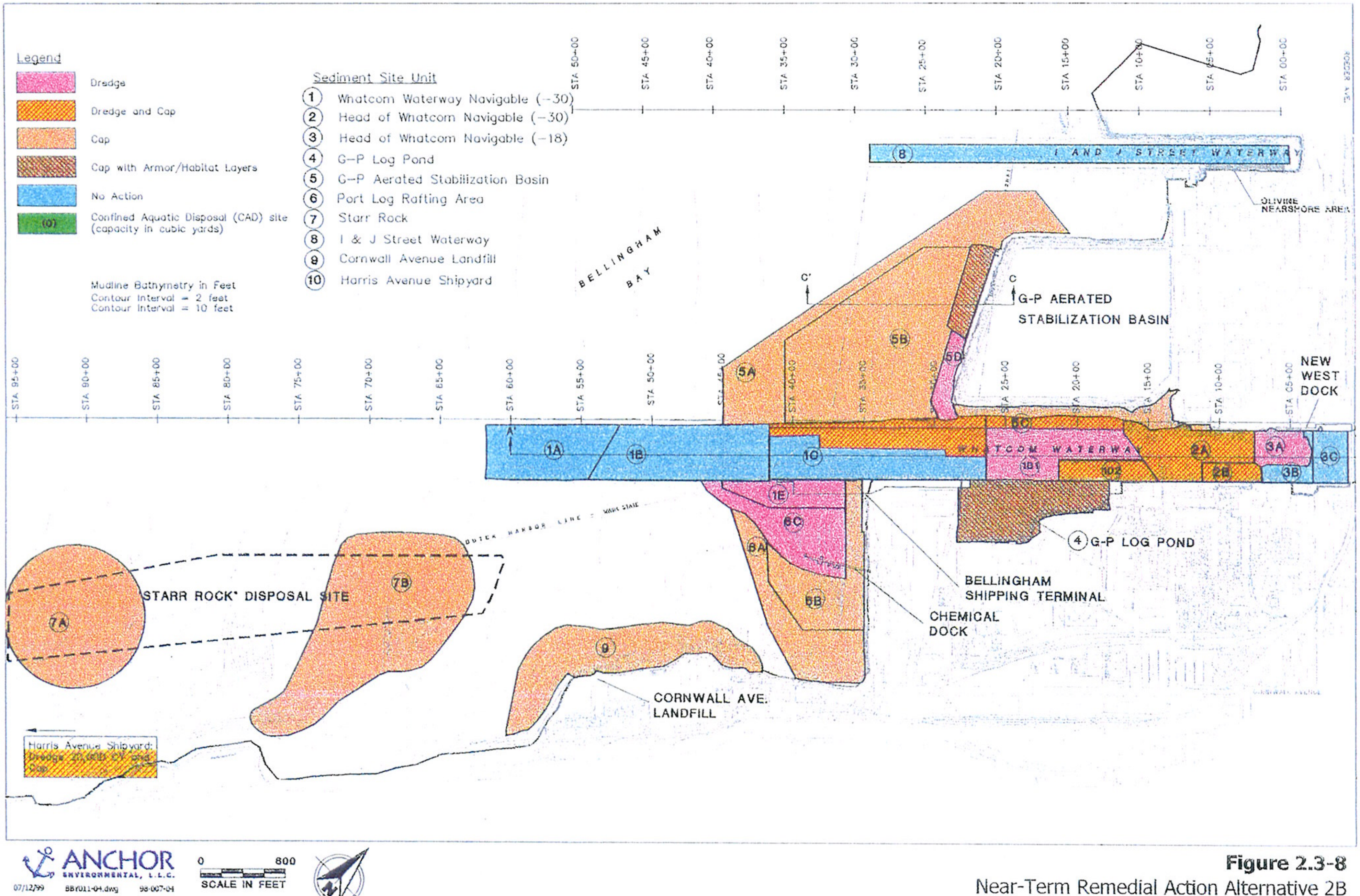


Figure 2.3-8
Near-Term Remedial Action Alternative 2B

of the capping system. The shoreline edge of the cap and adjacent upland remedial activities would be designed to control low-level mercury seepage.

- **G-P Aerated Stabilization Basin.** Equivalent to Alternative 2A.
- **Port Log Rafting Area.** Equivalent to Alternative 2A.
- **Starr Rock.** Approximately 44 acres of sediments exceeding SQS criteria, including the former Starr Rock dredged material disposal mounds, would be capped with a 1 to 3 foot layer of clean material.
- **Cornwall Avenue Landfill.** Approximately 14 acres of sediments composed largely (greater than 50 percent) of solid waste materials would be capped with a 1 to 3 foot layer of clean material. Intertidal and shallow subtidal zones of the landfill cap/shoreline will require armoring (e.g., riprap) to resist incoming wave energy and ensure its long-term integrity.
- **Harris Avenue Shipyard.** Equivalent to Alternative 2A, except that dredged materials (20,000 CY) would be disposed at one of the upland sites.
- **G-P Outfall.** Equivalent to Alternative 2A (see above).
- **Other Sediment Cleanup Sites.** Equivalent to Alternative 2A, except that dredged materials (up to 40,000 CY) would be disposed at one of the upland sites.

Habitat

In this alternative, a 2-acre area of mudflat and adjacent shallow subtidal habitat that has formed naturally at the extreme head of the Whatcom Waterway federal navigation channel would be left intact. An additional 2 acres would be brought to intertidal elevations by capping areas immediately adjacent to the G-P ASB. Thus, a total of 5 acres of intertidal habitat could be restored and/or protected in Bellingham Bay as a part of this alternative.

Land Use

Similar to Alternative 2A, except that no beach would be constructed in the Starr Rock/Cornwall area because capping would not occur along the shoreline.

Alternative 2C - Full Removal from Navigation Areas (CAD Disposal)

The overall objective of this alternative is to achieve SQS at priority sites in Bellingham Bay, allowing for future deepening of the navigation channels without the risk of exposing or excavating contaminated sediments, while converting subtidal aquatic habitat to intertidal aquatic habitat by using caps and CAD facilities.

This alternative would achieve state SQS criteria through a combination of dredging, CAD, and capping. Contaminated sediments that are located within the Whatcom Waterway, even if present below the currently authorized depths, would be dredged under Alternative 2C, providing flexibility to meet future navigation needs. Dredging would be performed in all areas of the Whatcom Waterway federal navigation channel that are currently used for navigation, including an additional 1-acre subtidal area near the head of the waterway at Central Avenue. The extreme head of the Whatcom Waterway near Citizens Dock, consisting of a 2-acre area of mudflats that has formed naturally within this area, would be left intact.

Compared to Alternatives 2A and 2B, this alternative would result in greater dredging and disposal volumes. Approximately 690,000 CY of contaminated sediment from primary navigation areas within and adjacent to the Whatcom Waterway federal navigation channel would be dredged. Comparatively small sediment volumes (130,000 CY) from other cleanup sites in Bellingham Bay would also be dredged. Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 1,100,000 CY. In this alternative, the sediment disposal capacity would be provided by two CAD facilities:

1. A small 50,000 CY CAD sited in the G-P Log Pond
2. A larger 1,100,000 CY CAD sited in the Starr Rock/Cornwall area (Figure 2.3-9)

Both CAD facilities would provide concurrent habitat conversion. Largely because of the CADs, approximately 63 acres of subtidal area would be converted into intertidal area. Specific components of Alternative 2C are discussed below.

Sediment Sites and Source Control/Sediment Disposal Siting

Alternative 2C would achieve State sediment cleanup standards and control sources of pollution at priority sites in Bellingham Bay by using a combination of dredging, CAD, and capping technologies. Major sediment cleanup and disposal elements of this alternative are described below:

- **Whatcom Waterway Federal Navigation Channel.** Approximately 690,000 CY of surface and subsurface sediments within the Whatcom Waterway federal navigation channel would be dredged to the clean native layer. However, within the immediate vicinity of the G-P wastewater transfer pipeline buried within the Whatcom Waterway, sediment would be dredged to within several feet of the pipeline (Figure 2.3-9). The dredge cut in this area would then be capped with a 1 to 3-foot layer of clean material, resulting in a final channel elevation at least 2 feet below the authorized depth (Figure 2.3-5). The dredged material would be disposed at both the G-P Log Pond and Starr Rock/Cornwall CAD facilities. The head of the waterway would be dredged near the New West Fisheries facility up to Citizens Dock, and the remaining adjoining habitat area left intact.
- **I&J Waterway**. Equivalent to Alternative 2A.
- **G-P Log Pond**. Equivalent to Alternative 2A.
- **G-P Aerated Stabilization Basin**. Equivalent to Alternative 2A.
- **Port Log Rafting Area**. Equivalent to Alternative 2A.
- **Starr Rock**. Similar to Alternative 2A, except that the footprint of the CAD would be extended offshore of the former Starr Rock dredged material disposal mounds.
- **Cornwall Avenue Landfill**. Equivalent to Alternative 2A.
- **Harris Avenue Shipyard**. Equivalent to Alternative 2A.
- **G-P Outfall**. Equivalent to Alternative 2A.
- **Other Sediment Cleanup Sites**. Equivalent to Alternative 2A.

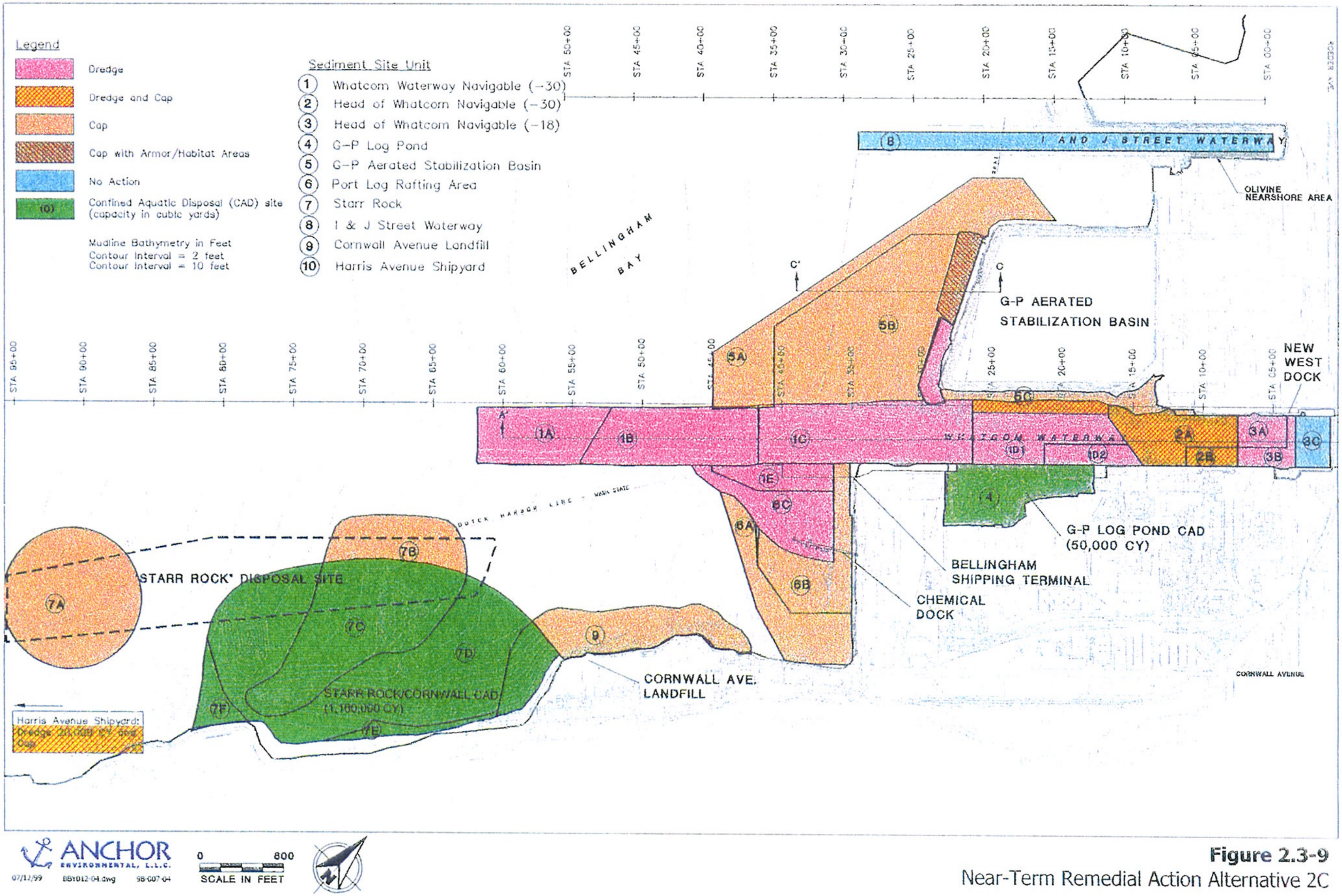


Figure 2.3-9
Near-Term Remedial Action Alternative 2C

Habitat

As discussed above, Alternative 2C converts subtidal aquatic habitat to intertidal aquatic habitat by using caps and CAD facilities. In this alternative, a 2-acre area of mudflat and adjacent shallow subtidal habitat that has formed naturally at the extreme head of the Whatcom Waterway would be left intact. An additional 5 acres of intertidal and shallow subtidal mudflat habitat would be promoted within this general area by finishing the surface cap of the G-P Log Pond CAD. Construction of the Starr Rock/Cornwall CAD site would convert 50 acres of deeper subtidal areas into shallower subtidal habitat in an area of the Bay that historically contained eelgrass meadows. An additional 2 acres would be brought to intertidal elevations by capping areas immediately adjacent to the G-P ASB. Thus, a total of approximately 59 acres of intertidal habitat could be restored and/or protected in Bellingham Bay as a part of this alternative.

Land Use

The land use component of Alternative 2C is similar to Alternative 2A, with the exception of dredging further up to the head of the Whatcom Waterway. Dredging to within 50 feet of Citizens Dock may provide more flexibility to accommodate the navigation and public access issues at New West Fisheries and at Central Avenue. Alternative 2C includes full removal (where technically feasible) of contaminated sediment from federal navigation channels. Like Alternative 2A, there would be an opportunity to construct an intertidal beach.

Alternative 2D - Full Removal from Navigation Areas and Partial Removal from the G-P ASB and Starr Rock Areas (Upland Disposal)

Similar in some respects to Alternative 2C, the overall objective of Alternative 2D is to achieve SQS criteria at priority sites in Bellingham Bay, allowing for flexibility in future deepening of the navigation channels, without the risk of exposing or excavating contaminated sediments. However, unlike Alternative 2C, avoiding disposal in the aquatic environment is a primary objective.

This alternative includes a similar amount of dredging as Alternative 2C, but also includes the dredging of an additional 320,000 CY of sediments exceeding the site-specific bioaccumulation screening level criteria that are located offshore of the G-P ASB and at the former Starr Rock disposal site (Figure 2.3-10). The dredged sediments would be disposed at one or more off-site upland landfills. Other contaminated sediment areas would be capped with a 1 to 3-foot layer of clean material. All dredged sediments would be brought on shore, de-watered as necessary to facilitate transport, and hauled by rail, truck, and/or barge outside of the Bellingham Bay watershed to upland disposal facilities. Approximately 690,000 CY of contaminated sediment from navigation areas within and adjacent to the Whatcom Waterway federal navigation channel, along with other materials, would be dredged (Table 2.3-1). Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 1,300,000 CY. In this alternative, the sediment disposal capacity would be provided by at the same upland disposal facilities described for Alternative 2B.

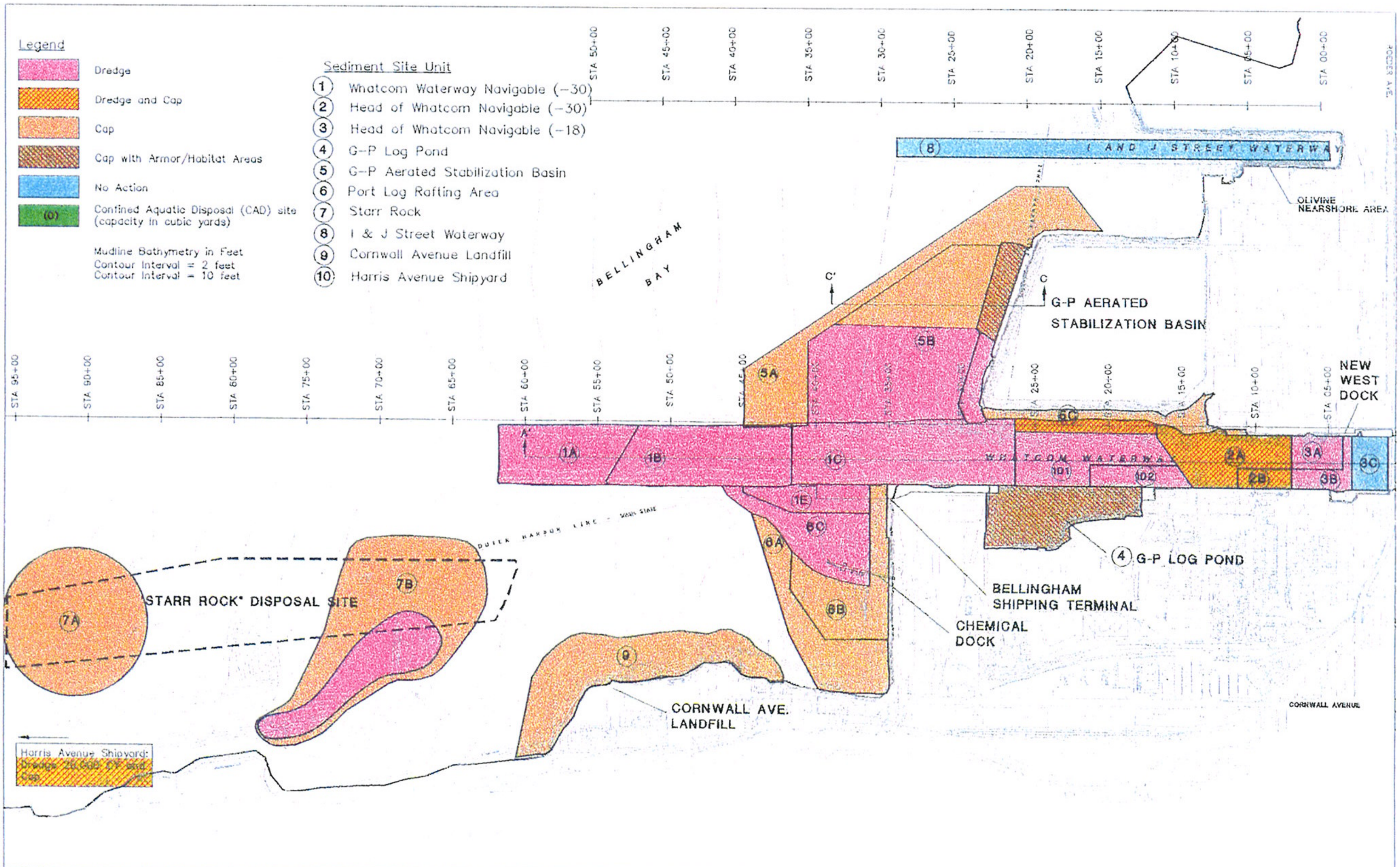


Figure 2.3-10
Near-Term Remedial Action Alternative 2D

Sediment Sites and Source Control/Sediment Disposal Siting

Alternative 2D would achieve State sediment cleanup standards and control sources of pollution at priority sites in Bellingham Bay by using a combination of dredging, upland disposal, and capping technologies. Major sediment cleanup and disposal elements of this alternative are described below:

- **Whatcom Waterway Federal Navigation Channel.** Equivalent to Alternative 2C except that dredged material (690,000 CY) would be disposed at one or more of the upland sites.
- **I&J Waterway.** Equivalent to Alternative 2A except that dredged materials could not be incorporated as subgrade into CADs. There is a potential to incorporate a portion of these materials (less than 110,000 CY) as cap subgrade materials.
- **G-P Log Pond.** Equivalent to Alternative 2B.
- **G-P Aerated Stabilization Basin.** Approximately 200,000 CY of sediments that exceed the site-specific mercury bioaccumulation screening level in this area would be dredged (to the clean native layer) and disposed at one or more upland facilities. The remaining 14 acres that exceed the SQS would be capped with a 1 to 3-foot layer of clean material. Under this alternative, there would be no need for armoring and wave protection of the cap, since the relatively shallow areas that are most susceptible to erosion would be removed.
- **Port Log Rafting Area.** Equivalent to Alternative 2A.
- **Starr Rock**. Approximately 130,000 CY of sediments that exceed the site-specific mercury BSL in this area would be dredged (to the clean native layer) and disposed at one or more upland facilities. The remaining 14 acres that exceed the SQS would be capped with a 1 to 3-foot layer of clean material.
- **Cornwall Avenue Landfill.** Equivalent to Alternative 2B.
- **Harris Avenue Shipyard.** Equivalent to Alternative 2B.
- **G-P Outfall.** Equivalent to Alternative 2A.
- **Other Sediment Cleanup Sites.** Equivalent to Alternative 2B.

Habitat

In this alternative, a 2-acre area of mudflat and adjacent shallow subtidal habitat that has formed naturally at the extreme head of the Whatcom Waterway would be left intact. There would also be a net conversion of approximately 3 acres of existing subtidal sediment into intertidal habitat. Thus, approximately 5 acres of intertidal habitat could be restored and/or protected in Bellingham Bay as a part of this alternative.

Land Use

Alternative 2D is similar to Alternative 2C in terms of dredging and navigational flexibility in the Whatcom Waterway. However, unlike Alternative 2C, there would be no constructed intertidal beach at Boulevard Park.

Alternative 2E - Full Removal from Public Lands (Upland Disposal)

The overall objective of Alternative 2E is to remove all contaminated sediment from Bellingham Bay that are located on state-owned lands, and avoid disposal in the aquatic environment. This alternative would also allow for flexibility regarding the future deepening of the navigation channels, without the risk of exposing or excavating contaminated sediments, and the use of state-owned harbor areas. Like Alternative 2D, avoiding disposal in the aquatic environment is a primary objective.

This alternative would maximize removal of contaminated sediments and adjacent landfills from Bellingham Bay, concurrently minimizing the need for capping. With the exception of sediments located immediately adjacent to the existing G-P wastewater pipeline, dredging would be performed within all reaches of the Whatcom Waterway federal navigation channel, including the extreme head, encompassing Citizens Dock and associated mudflat areas (Figure 2.3-11). All dredged sediments would be offloaded on shore, dewatered as necessary to facilitate transport, and hauled by rail and/or truck outside of the Bellingham Bay watershed to upland disposal facilities. Approximately 740,000 CY of contaminated sediment from navigation areas within the Whatcom Waterway, along with other materials, would be dredged (Table 2.3-1). In addition, solid/wood waste in the upland and aquatic environment at the Cornwall Avenue Landfill would also be removed. Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 2,900,000 CY. In this alternative, the sediment disposal capacity would be provided by the same upland disposal facilities described for Alternative 2B.

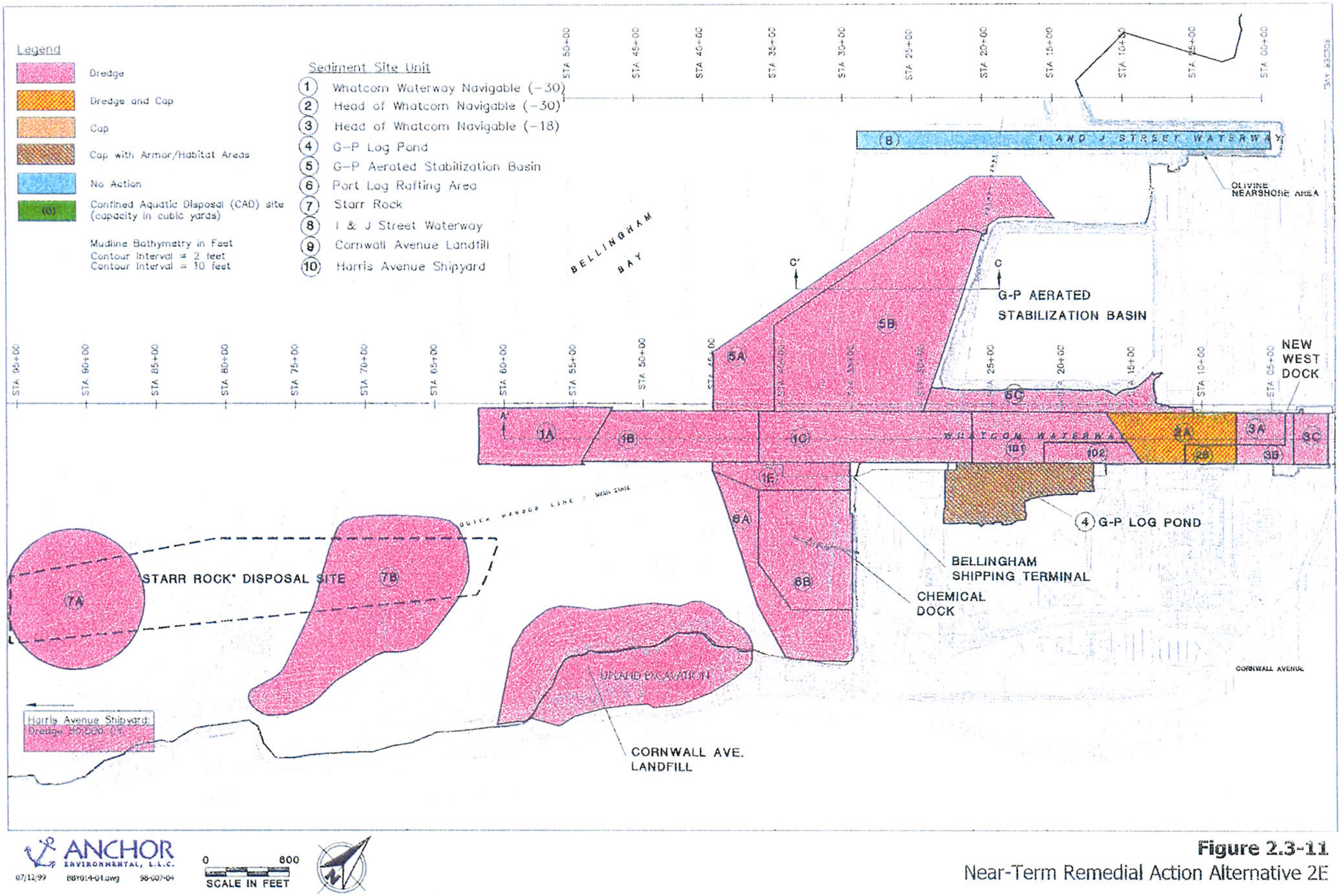


Figure 2.3-11
Near-Term Remedial Action Alternative 2E

Sediment Sites and Source Control/Sediment Disposal Siting

Alternative 2E would achieve State sediment cleanup standards and control sources of pollution at priority sites in Bellingham Bay by using a combination of dredging, upland disposal, and limited capping. Major sediment cleanup and disposal elements of this alternative are described below:

- **Whatcom Waterway Federal Navigation Channel.** Similar to Alternative 2D, except that the extreme head of the federal channel would also be dredged, encompassing Citizens Dock and associated mudflats. Where technically feasible, all contaminated sediments would be removed. The exception would be a relatively small volume of materials immediately adjacent to the G-P wastewater pipeline. The total dredge volume from the Whatcom Waterway is approximately 740,000 CY.
- **I&J Waterway.** Similar to Alternative 2A, except that potential dredge material would not be used for remediation activities within Bellingham Bay.
- **G-P Log Pond.** Equivalent to Alternative 2B.
- **G-P Aerated Stabilization Basin.** Approximately 470,000 CY of sediments that exceed SQS criteria in this area would be dredged (to the clean native layer) and disposed at an upland landfill.
- **Port Log Rafting Area.** Approximately 220,000 CY of sediments that exceed SQS criteria in this area would be dredged (to the clean native layer) and disposed at an upland landfill.
- **Starr Rock.** Approximately 480,000 CY of sediments that exceed SQS criteria in this area would be dredged (to the clean native layer) and disposed at an upland landfill.
- **Cornwall Avenue Landfill.** Approximately 400,000 CY of upland mixed solid/wood wastes and associated sediments would be excavated and/or dredged (to the clean native layer) and disposed at an upland landfill. The upland excavation would result in an additional 7 acres of aquatic habitat within the existing Cornwall Avenue landfill footprint.
- **Harris Avenue Shipyard.** Approximately 50,000 CY of sediments that exceed the SQS in this area would be dredged (to the clean native layer) and disposed an upland landfill.
- **G-P Outfall.** Equivalent to Alternative 2A.
- **Other Sediment Cleanup Sites.** This alternative includes an allowance for approximately 40,000 CY of sediments that would be dredged and disposed at an upland landfill.

Habitat

Removal of the solid waste from the upland portion of the Cornwall Avenue landfill would result in a net increase of about 7 acres of shoreline, intertidal and shallow subtidal habitat. However, overall there would be net conversion of approximately 5 acres of intertidal habitat to subtidal sediments. For example, most of the existing mudflat at the extreme head of the Whatcom Waterway, some of which is below and adjacent to Citizens Dock, would be converted to subtidal habitat. Thus, overall there would be little change in the acreage of intertidal habitat restored and/or protected in Bellingham Bay as a part of this alternative.

Land Use

Similar to Alternative 2D except excavation of the Cornwall Avenue landfill would eliminate existing upland uses at this site.

2.3.5 Preferred Near Term Remedial Action Alternative

The Preferred Near-Term Remedial Action Alternative is similar to Integrated Near-Term Remedial Action Alternative 2C and includes provisions for treatment (Figure 2.3-12). The Preferred Near-Term Remedial Action Alternative is not a cleanup decision for purpose of MTCA. Rather, the Preferred Near-Term Remedial Action Alternative can be used to inform future cleanup decisions under MTCA. The key features of the alternative are summarized as follows:

- Existing habitat at the Head of Whatcom Waterway would be protected, while accommodating public access improvements as proposed by the City of Bellingham.
- Whatcom Waterway would be dredged, including the maximum practicable removal of contaminated sediments from the federal channel, providing for future navigation flexibility. Dredging in the Whatcom Waterway would not include the 2 acres of existing mudflats at the head of the waterway. Steep slopes at Starr Rock would also be dredged.
- Treatment of at least 400,000 cubic yards of dredged sediments, contingent on the timely identification of a viable treatment technology through the MTCA process.
- Those dredged sediments that are not treated or beneficially reused would be disposed of in a CAD site located adjacent to the Cornwall Landfill. The specific layout of the CAD facility would be determined during subsequent remedial design, and would have the following general characteristics:
    - Maximum 820,000 cy disposal capacity, with a maximum 26-acre footprint, including provision to accommodate contaminated sediment disposal from the Whatcom Waterway and other sites in Bellingham Bay.
    - Retention of navigation and commerce uses within the harbor area, including shoreline access from the water to Cornwall uplands;
    - Minimization of impacts to Usual and Accustomed Tribal Fishing areas in the CAD vicinity;
    - Construction of the CAD surface as a gently sloping beach, ranging from upper intertidal to shallow subtidal elevations, with deeper subtidal berms alongside the CAD; and
    - Maintenance / provision of public access near Cornwall Avenue, including the corner shallow beach area within the Port Log Rafting Area.
- Sediments in the G-P Log Pond would be confined below a thick cap finished at elevations that convert subtidal aquatic habitat to intertidal aquatic habitat. G-P and the Port of Bellingham would also convert land use in this area from navigation and commerce to

provide intertidal habitat. Remediation of the Log Pond would be expedited to take advantage of clean dredge materials available from regional dredging projects.

- Contaminated sediments located on the Bellingham Bay side of the G-P ASB, at Starr Rock, and within those portions of the Port Log Rafting area that are not dredged, would be confined below a nominal 3-foot-thick cap. Nearshore contaminated sediments within these areas, also including areas on the Whatcom Waterway side of the G-P ASB, would have additional appropriate sediment placed to create salmonid migratory corridor habitats.
- Shoreline areas of the Cornwall Landfill that are not contained below the CAD (see below) would be capped to remediate solid waste. This work would result in an approximate 0.5-acre loss of existing eelgrass at the south side of the landfill.
- All capped and contained sediment areas would have operation, monitoring, maintenance and adaptive management commitment, with associated funding assurance.
- The proposed CAD would be removed in the future contingent upon approval from relevant regulatory agencies.

Sediment Sites and Source Control/Sediment Disposal Siting

The Preferred Remedial Action Alternative would achieve state sediment cleanup standards and control sources of pollution at priority sites in Bellingham Bay by using a combination of dredging, CAD, and capping technologies with a commitment to pursue treatment (see Section 2.1).

If a viable treatment technology were developed within the timeframe necessary for making critical decisions regarding CAD construction, some or all of the most contaminated dredged sediments would be treated. Depending on the amount of sediment treated, a CAD facility of variable size, located adjacent to the Cornwall Avenue Landfill, would be constructed. Figure 2.3-12 depicts the approximate layout of the Cornwall CAD under a reasonable range of sediment disposal capacities varying from 300,000 to 820,000 CY. In no event would the CAD footprint exceed 26 acres. Clean sediments present below the outer areas of the CAD could be excavated to provide additional confinement capacity, concurrently minimizing the CAD footprint and providing additional material for habitat restoration (see Figure 2.3-12). The final capacity and extent of the CAD would be determined during remedial design based on considerations of treatment viability, PSDDA characterization (see Whatcom Waterway discussion below), and detailed engineering designs.

Specific components of the Preferred Remedial Action Alternative include:

- **Whatcom Waterway Federal Navigation Channel.** Similar to Alternative 2C, except that portions of the extreme head of the federal channel away from existing mudflats would also be dredged to accommodate public access. Where technically feasible, all contaminated sediments would be removed. The exception would be a relatively small volume of materials immediately adjacent to the G-P wastewater pipeline. The total dredge volume from the Whatcom Waterway is approximately 700,000 CY.

  Prospective dredging areas located in the outer Whatcom Waterway navigation channel (e.g., units 1A and 1B; approximately 170,000 CY) would be evaluated during remedial design to determine whether sediments in these areas may meet regulatory criteria for unconfined, open-water disposal. Where appropriate, material passing PSDDA and SMS evaluations would be beneficially reused within the inner Bay for fills to enhance habitat function. Dredged material that does not meet these criteria would require confined disposal if treatment were not available.

- **I&J Waterway.** Similar to Alternative 2A.
- **GP Log Pond.** The G-P Log Pond would be capped with an average thickness of 5 to 10 feet of clean sediments, finished at intertidal elevations similar to elevation modifications of the area included in Alternative 2A (see Figures 2.3-13). The shoreline edge of the CAP and adjacent upland remedial activities would be designed to control low-level mercury seepage.
- **G-P Aerated Stabilization Basin.** No sediments would be dredged in this area. Sediments offshore of the G-P ASB would be contained below a 1 to 3-foot-thick cap (exact cap thickness would be determined during remedial design), similar to Alternative 2A. Nearshore sediments within this area, also including areas on the Whatcom Waterway side of the G-P ASB, would have additional clean sediment placed to create salmonid migratory corridor habitats. Target habitats are gently sloping gravel/cobble beaches transitioning into gently sloping shallow subtidal and mudflats (nominal slopes of 10H:1V).
- **Port Log Rafting Area.** Similar to Alternative 2A, except that a 1 to 3-foot-thick cap (exact cap thickness would be determined during remedial design) would be placed and nearshore sediment would have additional clean sediment placed to create salmonid migratory corridor habitats. Target habitats are gently sloping gravel/cobble beaches transitioning into gently sloping shallow subtidal and mudflats (nominal slopes of 10H:1V).
- **Starr Rock.** Relatively steep side slopes of the existing northern "Starr Rock" sediment disposal mound would be dredged to form a stable slope (nominally 10H:1V). The remainder of the existing northern "Starr Rock" sediment disposal mound and associated contaminated sediments (including subunit 7A) would be confined below a 1 to 3-foot-thick cap (exact cap thickness would be determined during remedial design).
- **Cornwall Avenue Landfill.** If treatment is not available (see introduction above), a CAD would be constructed directly off of the Cornwall Avenue Landfill. The CAD would have a maximum disposal capacity of 820,000 CY, with a maximum 26-acre footprint. The CAD surface would be constructed as a gently sloping beach (greater than 10H:1V), ranging from upper intertidal (+10 ft MLLW) to shallow subtidal (-10 ft MLLW) elevations, with deeper subtidal berms alongside the CAD no steeper than 5H:1V (see figures 2.3-12 and 2.3-13). Shoreline areas of the Cornwall Landfill that are not contained below the CAD would be capped with a 1 to 3-foot-thick layer of clean material (exact cap thickness would be determined during remedial design), to remediate solid waste. The shoreline edge of the cap and adjacent upland remedial actions would be designed to control low-level seepage discharges.
- **Harris Avenue Shipyard.** Similar to Alternative 2C except that the 2-acre capping area would be capped with a 1 to 3-foot-thick (exact cap thickness to be determined during remedial design) layer of clean material.

- **G-P Outfall.** Similar to all other Integrated Near-Term Remedial Action Alternatives.

- **Other Sediment Cleanup Sites.** This alternative includes an allowance to accommodate approximately 40,000 CY of sediments that would be dredged from other areas of Bellingham Bay and disposed of at the Cornwall CAD. These materials would come from contaminated sediment sites in Bellingham Bay that are currently undergoing Remedial Investigation/Feasibility Studies under Ecology's supervision.

Habitat

The Preferred Remedial Action Alternative converts subtidal aquatic habitat to intertidal aquatic habitat through the use of caps and a CAD. The location and design of the CAD was modified from Alternative 2A (and Alternative 2C) to avoid potential impacts to existing eelgrass and to provide materials to restore intertidal and shallow subtidal habitat. In this alternative:

- A 2-acre area of mudflat and adjacent shallow subtidal habitat that has formed naturally at the extreme head of the Whatcom Waterway would be left intact.
- An additional 5 acres of intertidal and shallow subtidal mudflat habitat would be created within this general area by finishing the surface cap of the G-P Log Pond.
- Depending on final capacity determinations (see above), construction of the Cornwall CAD site and associated habitat benches would likely convert 11 to 25 acres of deeper subtidal areas into shallower subtidal habitat in an area of the bay that historically contained shallow water habitat.
- An additional 7 acres would be brought to intertidal elevations by capping within the Port Log Rafting Area and immediately adjacent to the G-P ASB.
- Thus, a total of approximately 25 to 39 acres of subtidal habitat would be converted to intertidal habitat.

Land Use

The land use component of the Preferred Remedial Action Alternative is similar to Alternative 2A, with the exception of dredging further up to the head of the Whatcom Waterway. Dredging within this area would provide more flexibility to accommodate the navigation and public access issues associated with the Whatcom Creek Waterfront Action Program and New West Fisheries. The Preferred Remedial Action Alternative includes full removal (where technically feasible) of contaminated sediment from federal navigation channels. The Preferred Remedial Action Alternative also provides for enhanced public access onto a gently sloping habitat beach constructed at the corner shallow beach area east of the Port barge dock and north of the Cornwall Avenue landfill.

The CAD footprint would be minimized in part by excluding clean material present below the CAD footprint (see Figure 2.3-12). The location and extent of the CAD was modified from Alternatives 2A and 2C to provide a more optimal balance of the following:

- Future potential water-dependent uses;
- In-water navigation & commerce uses;
- Usual and Accustomed Tribal Fishing areas;

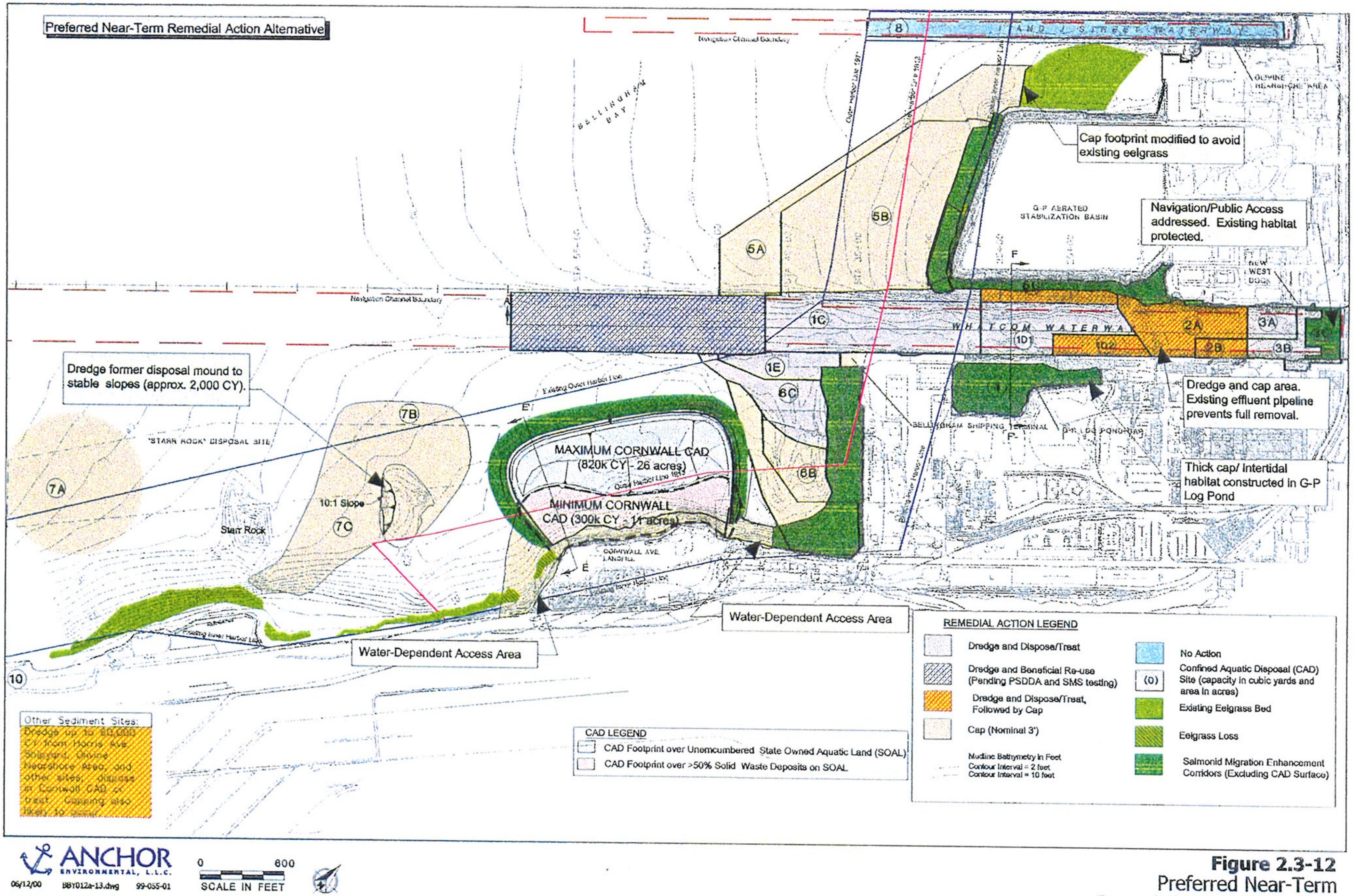
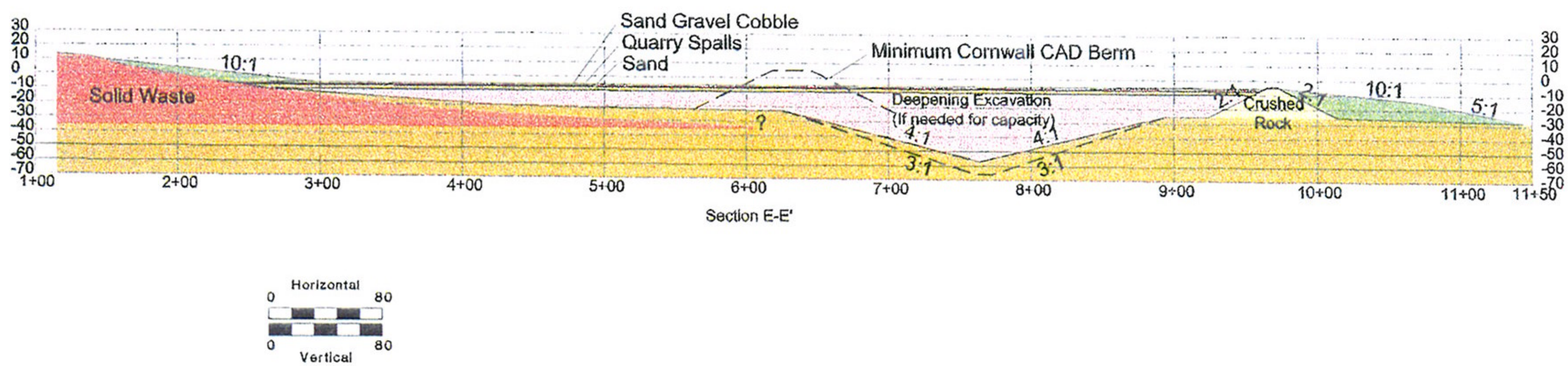


Figure 2.3-12
Preferred Near-Term Remedial Action Alternative



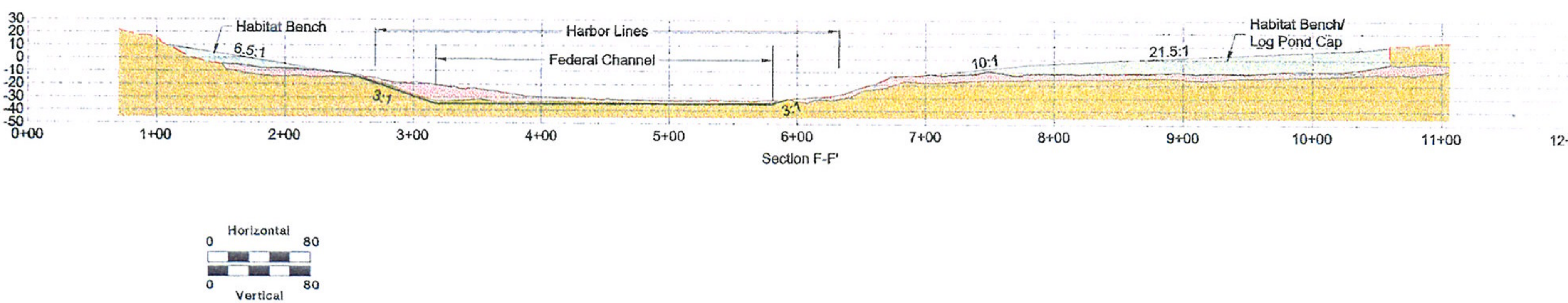


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Figure 2.3-13
Preferred Near-Term Remedial Action Alternative
Typical Cross Through Cornwall CAD & Log Pond

Table 2.3-2 Comparative Evaluation of Integrated Near-Term Remedial Action Alternatives

Pilot Goal	Alternative 2A	Alternative 2B	Alternative 2C	Alternative 2D	Alternative 2E	Preferred Remedial Action Alternative
Human Health and Safety Implement actions that will enhance the protection of human health	All near-term remedial action alternatives achieve sediment cleanup and source control objectives; the objectives are met through different strategies, but all provide protection of human and ecological health.					
Ecological Health Implement actions that will protect and improve the ecological health of the bay	All near-term remedial action alternatives achieve sediment cleanup and source control objectives; the objectives are met through different strategies, but all provide protection of human and ecological health.					
Protect and Restore Ecosystems Implement actions that will protect, restore, or enhance habitat components making up the bay's ecosystem	**High.** Provides most protection at head of Whatcom Waterway; restores intertidal connectivity with 4.4 acres at G-P log pond; enhances migratory corridor with 29.3 acres at Blvd. Park/Starr Rock CAD; possible impact to existing eel grass meadows between Blvd Park and Cornwall Landfill; potential for up to 29 acres of eel grass restoration on CAD surface.	**Low/Medium.** Provides most (same as Alt. 2A) protection at head of Whatcom Waterway; restores 0.9 acres of intertidal connectivity at G-P Log Pond.	**High.** Provides protection at head of Whatcom Waterway; restores intertidal connectivity with 4.4 acres at G-P Log Pond; enhances migratory corridor with 50 acres at Blvd. Park/Starr Rock CAD; possible impact to existing eel grass meadows between Blvd Park and Cornwall Landfill; potential for up to 50 acres of eel grass restoration on CAD surface.	**Low/Medium.** Provides protection at head of Whatcom Waterway; restores 0.9 acres of intertidal connectivity at G-P Log Pond.	**Medium.**[1] Loss of habitat at head of Whatcom Waterway; restores 0.9 acres of intertidal connectivity at G-P Log Pond; enhances migratory corridor by providing 3.4 acres of new intertidal habitat; provides 3.7 acres of new subtidal habitat	**Highest.** Provides protection at head of Whatcom Waterway; restores intertidal connectivity with 4.0 acres at G-P Log Pond and 0.8 acre adjacent to the G-P ASB; most enhanced migratory corridor with up to 31 acres at Cornwall CAD and associated habitat benches; potential for up to 25 acres of eel grass restoration on CAD surface.
Social and Cultural Uses Implement actions that are consistent with or enhance cultural and social uses in the bay and surrounding vicinity	**Medium.** Enhances public shoreline access at Blvd. Park	**Low.**	**High.** Enhances public shoreline access at Blvd Park and provides public access opportunities at head of Whatcom Waterway	**Medium.** Provides public access opportunities at head of Whatcom Waterway	**Low.**	**Highest.** Provides public access opportunities at head of Whatcom Waterway and at the south end of Cornwall Avenue; and enhances public access at the corner shallow beach area east of the Port barge dock.
Resource Management Maximize material re-use in implementing sediment cleanup actions, minimize the use of non-renewable resources, and take advantage of existing infrastructure where possible instead of creating new infrastructure	All near-term remedial action alternatives achieve this goal equally: Upland disposal alternatives would not require additional infrastructure for treatment or disposal of contaminated material. In-water disposal options would use the same existing source of fill for cap material. No new sources of material or infrastructure would be required.					
"Faster, Better, Cheaper"[2] Implement actions that are more expedient and more cost effective, through approaches that achieve multiple objectives	**High.** Achieves multiple objectives; lowest cost (capital/O&M only) of near-term remedial action alternatives.	**Medium.** More costly (capital/O&M only) than Alt. 2A without the degree of aquatic habitat gain.	**High.** Achieves multiple objectives; proportional habitat benefit with cost of additional dredging and disposal	**Medium.** More costly (capital/O&M only) than Alt. 2C; without the degree of aquatic habitat gain	**Low.** Significantly higher capital/O&M costs.	**Highest.** Achieves multiple objectives; proportional habitat benefit with cost of additional dredging; provides opportunity for treatment; highest certainty of implementation
Economic Vitality Implement actions that enhance water dependent uses of commercial shoreline property	**Low.** Current navigation needs addressed in channel; remedial action.	**Low.** Current navigation needs addressed in channel.	**High.** Current and future navigation needs addressed in channel.	**High.** Current and future navigation needs addressed in channel.	**Medium**[3]**.** Current and future navigation needs addressed throughout Whatcom Waterway and the Harbor Area.	**Highest.** Current and future navigation needs addressed in larger portion of the channel.
Evaluation Summary[4] Achieves Integration of Elements Achieves Baywide Goals	**Medium.** Emphasis on minimal disturbance in near-term; creates intertidal habitat placed on top of existing contam.; provides additional public access. Future navigation needs are not addressed.	**Low/Medium.** Cleanup activities serve limited multi-purposes (not as much habitat or public access benefit as other alts.); does not address future navigation needs.	**High.** Cleanup activities serve multi-purposes; creation of intertidal habitat placed on top of existing sediment contamination; provides additional public access; also supports future navigation needs.	**Medium.** Cleanup activities serve limited multi-purposes (not as much habitat or public access benefit as other alts.); supports future navigation needs.	**Low/Medium.** Emphasis is on removal of material from aquatic environment and enhanced navigation throughout Harbor Areas and public lands.	**Highest.** Cleanup activities serve multi-purposes; creation of intertidal habitat placed on top of existing sediment contamination; provides additional public access; also supports future navigation needs; highest certainty of implementation.

[1] The medium ranking takes into consideration the new habitat provided by removal of a portion of the upland landfill and converting it to aquatic habitat. No other alternatives provide new aquatic habitat.
[2] Cost-effectiveness considers capital and O&M costs developed in the Whatcom Waterway and Cornwall Landfill RI/FS and the ability to incorporate other elements (land use and habitat) into the overall action.
[3] The medium ranking takes into consideration the removal of the upland portion of the landfill limits future potential water-dependent land uses.
[4] The overall evaluation summary would remain the same if costs were excluded from the analysis.

- Outer boundary of encroachment into the harbor area.; and
- Recreational boater access to the Boulevard Park Dock.

Finally, G-P and the Port of Bellingham, as property owners of the Log Pond, would convert land use within this area from navigation and commerce to intertidal habitat.

2.3.6 Near-Term Remedial Action Alternatives Considered but not Evaluated

The Pilot Team considered a number of integrated near-term remedial alternatives as they developed the range of alternatives evaluated in this final EIS. Those retained for analysis best meet the goals of the project and at the same time, provide a wide range of alternatives for evaluation.

Three specific remedial technologies that the Pilot Team considered within the alternatives were nearshore fills, natural recovery, and removal of sediments at the G-P Log Pond. These technologies were generally described in Section 2.1. The rationale for not carrying them forward for evaluation is provided below.

2.3.6.1 Nearshore Fills

The Pilot Team identified nearshore fills at the G-P Log Pond and the Cornwall Avenue Landfill in the *Sediment Disposal Siting Documentation Report* that was completed in September 1998. These sites ranked relatively high at the time however, baywide information on habitat and aquatic land uses had not yet been compiled.

Since completion of the *Sediment Disposal Siting Documentation Report*, Puget Sound chinook salmon and bull trout have been listed as threatened species under ESA. Both of these species are present in Bellingham Bay.

Based on information collected since finalization of the *Sediment Disposal Siting Documentation Report*, the Pilot Team did not include nearshore fills within the Integrated Near-Term Remedial Alternatives for the following reasons:

- Existing and planned land uses do not have a defined need for additional land
- Habitat objectives developed for Bellingham Bay (see Section 3.2) call for protection and restoration of aquatic habitat. A nearshore fill would eliminate aquatic habitat (while habitat impacts could be mitigated, avoidance of the impact is preferred)
- The ESA listing of Puget Sound chinook and imminent listing of bull trout make the protection and restoration of aquatic habitat even more imperative

2.3.6.2 Natural Recovery

As discussed in the final RI/FS for the Whatcom Waterway Site, natural recovery modeling indicates that most areas of the site that currently exceed SQS or MCUL cleanup levels (based on chemical or confirmatory biological testing results) would be expected to recover to below the MCUL chemical criterion by the year 2005 (denoted $MCUL_{2005}$). However, two areas of the site are not predicted to recover to the $MCUL_{2005}$. These are the G-P Log Pond and the area immediately west of the G-P ASB.

Natural recovery was eliminated from evaluation as an alternative in the final EIS for two primary reasons. First, Ecology is concerned about the bioaccumulative nature of mercury as a contaminant and believes it warrants more immediate action than natural recovery provides. Second, several areas within the Whatcom Waterway are shoaled such that the federally authorized depths are not achieved. Natural recovery would further prevent access to the authorized depths. Based on the need to provide navigation in the federal channel, all of the alternatives evaluated in the final EIS, at a minimum, provide access to the currently authorized depths.

2.3.6.3 Sediment Removal from G-P Log Pond

While removal of contaminated sediments is an integral part of all the near-term remedial action alternatives evaluated in the EIS, removal of sediments at the G-P Log Pond was not carried forward. The Pilot Team determined that dredging of the G-P Log Pond would not be practicable for the following reasons:

- As detailed in the Whatcom Waterway RI/FS, surface and subsurface sediment within the G-P Log Pond contains the highest site-wide mercury concentrations, with subsurface concentrations ranging up to levels up to nearly 70 mg/kg, more than 100 times higher than the cleanup standard. Sediments in this area also contain relatively high amounts of wood material (greater than 50 percent by volume), along with elevated concentrations of phenol and 4-methylphenol.

  Partly because of the presence of woody debris in this area, which may prevent full closure of mechanical dredging equipment, a significant amount (up to 5 percent) of the sediments dredged from the Log Pond could be resuspended into the water column during the dredging operation. Preliminary water and sediment transport modeling indicated that such an event may result in exceedances of relevant water quality criteria, and could also recontaminate adjacent sediment areas within the Whatcom Waterway. Standard water quality controls (e.g., silt curtains) are unlikely to be sufficient to alleviate such impacts;

- The shoreline within the Log Pond consists of steep riprap and concrete debris, as well as vertical bulkheads, which currently contain contaminated sediments previously (1974) dredged from the Log Pond and contained within an existing shoreline nearshore fill. It would not be possible to remove all contaminated sediments within the Log Pond without adversely affecting this shoreline containment system; and

- Existing docks, dolphins, and shoreline structures present within or adjacent to the Log Pond would likely be adversely impacted by a full removal action.

The potential water and sediment quality, and structural impacts associated with dredging the G-P Long Pond can be avoided by utilizing effective containment methods such as CAD or capping technologies. Also, the Pilot Team did not identify navigation uses as a primary driver in this area; therefore, a CAD or cap constructed within the Log Pond would not conflict with other uses. Furthermore, based upon the habitat objectives developed by the Pilot Team, a CAD or thick cap could be constructed in such a way that historically lost aquatic habitat would be restored. For these reasons, CAD and cap technologies were considered to be the only practicable remediation methods for the Log Pond. All Integrated Near-Term Remedial Action Alternatives evaluated in this final EIS use CAD or cap remediation technologies.

2.3.7 Comparative Evaluation of Alternatives

SEPA (197-11-440) requires a comparison of the environmental impacts of the alternatives. In this section, a comparison of the programmatic-level alternatives is presented, as well as a comparison of the project-specific alternatives under the Comprehensive Strategy – the Integrated Near-Term Remedial Action Alternatives. The seven baywide Pilot goals are used as the basis for comparison between alternatives in these evaluations.

2.3.7.1 No Comprehensive Strategy Alternative vs. Comprehensive Strategy Alternative

As stated earlier in this section the primary difference between the No Comprehensive Strategy Alternative and the Comprehensive Strategy Alternative is the lack of a baywide perspective to assist with integration of regulatory requirements for actions within Bellingham Bay. Laws and regulations would stay the same under either programmatic alternative, but the Comprehensive Strategy includes activities that would address these regulations simultaneously, providing a more streamlined approach to sediment sites and source control, sediment disposal siting, habitat, and land use. Furthermore, use of the Preliminary Draft Habitat Mitigation Framework could go beyond minimum regulatory requirements for mitigation, and provide new opportunities for habitat gain.

When compared against the seven baywide goals of the Pilot, the No Comprehensive Strategy Alternative clearly would not meet the objectives. For example, under the No Comprehensive Strategy Alternative, individual cleanup efforts could work to enhance the protection of human and ecological health, but the likely cleanup delays would increase the potential exposure to contaminants. The No Comprehensive Strategy Alternative does not provide a baywide approach to protect or restore ecosystems, or promote habitat gain. The Subarea Strategies under the Comprehensive Strategy identify opportunities for enhancing cultural and social uses in the Bay and in surrounding communities. This baywide approach to community planning would not take place under the No Comprehensive Strategy Alternative. It is also very likely that cleanup costs would be higher under the No Comprehensive Strategy Alternative. A piecemeal approach to cleanup would not take advantage of the efficiency opportunities of addressing cleanup at multiple sites simultaneously.

2.3.7.2 Integrated Near-Term Remedial Action Alternatives

All of the Integrated Near-Term Remedial Action Alternatives meet the seven baywide goals of the Pilot. However, the degree to which these goals are met, and the methods used to achieve the goals vary between alternatives. Table 2.3-2 provides a comparison of the alternatives, highlighting the major differences between them, and providing a ranking against each Pilot goal. The last row of the table provides an Evaluation Summary that identifies how each alternative achieves the integration of baywide goals. Th evaluation of each alternative relative to all seven baywide goals provides the basis for identifying a Preferred Near Term Remedial Action Alternative.

As shown on Table 2.3-2, there is little difference between alternatives in meeting the baywide goals related to human health and ecological health. While there are differences between the particulars on how each alternative achieves the goals, they have all been designed to meet State sediment cleanup standards at priority sites in Bellingham Bay.

2.3.8 Benefits and Disadvantages of Delaying Implementation

The Comprehensive Strategy provides a bay-wide approach to environmental remediation, habitat restoration, and land use in Bellingham Bay. There would be no benefit from delaying implementation of the Comprehensive Strategy. The disadvantages from delaying implementation include continuing the existing relatively uncoordinated project by project approach to sediment cleanup and source control, land use and habitat restoration activities in Bellingham Bay. This scenario is essentially described under the "No-Action" alternative. Projects would still occur, however, opportunities to achieve multiple objectives may be lost, time and resources may be spent on non-priority activities or on resolving conflicting jurisdictional requirements, and decisions may not be as well informed.

Delaying implementation of any of the Integrated Near-Term Remedial Action Alternatives, including the Preferred Remedial Action Alternative, could have the benefit of the influence of natural recovery on existing contaminated sediments, thereby reducing the areal extent of contaminated sediments in the Bay. Delays may also allow further development of sediment treatment technologies, though a Preferred Alternative already includes consideration of the appropriate timing of possible sediment treatment actions (see Section 2.3.5). The disadvantages to delaying implementation include delaying cleanup actions for contaminated sediments in the Bay, which would result in continued potential adverse effects on ecosystem functions and environmental health. Further, delays would also affect habitat restoration and/or public access, as provided for in the Remedial Action Alternatives. A delay in implementation would also delay the restoration of navigation depths of the Whatcom Waterway federal navigation channel.

2.3.9 Probable, Irreversible, and Irretrievable Commitments of Resources

The purpose of this section is to determine whether substantial commitments of natural resources are being made that are not reversible or retrievable considering current technology. If the determination is positive, the next question is whether the commitment is warranted.

Implementation of any of the Near-Term Remedial Action Alternatives under the Comprehensive Strategy could have consequences that may be irreversible.

Under Alternatives 2A, 2C and the Preferred Remedial Action Alternative, CAD construction would convert existing habitats to shallow subtidal and/or intertidal habitat. The commitment of resources under these alternatives includes: (1) use of nearshore portions of the Bay for containment of contaminated sediments and (2) use of nearshore areas of the Bay for intertidal and subtidal habitat rather than for other uses, such as navigation or deep water moorage. The construction of these structures is intended to be long-term, however, the conversion/ commitment of resources is not necessarily irretrievable, as the CADs could be removed at a future date. Similarly, sediment caps constructed under all Remedial Action Alternatives could also be removed at a future date.

Alternatives 2B, 2D and 2E commit upland resources to containment of contaminated sediments, thereby affecting the storage/disposal capacity of a landfill. This action is most likely irreversible, unless the sediments are excavated at a future date.

Related to the question of probable, irreversible and irretrievable commitments of resources, is whether local, short-term uses of environmental resources are being proposed, and whether such uses are consistent with the maintenance and enhancement of long-term productivity of the environment. The Integrated Near-Term Remedial Action alternatives, including the Preferred Remedial Action Alternative, are a component of the Comprehensive Strategy for Bellingham Bay. The Comprehensive Strategy, by design, sets forth elements that are intended to protect the environment now and for generations to come. No lasting environmental losses would be incurred for the sake of short-term gains under the Comprehensive Strategy for Bellingham Bay, including the Preferred Remedial Action Alternative.

AFFECTED ENVIRONMENT

3 AFFECTED ENVIRONMENT

This section describes the elements of Bellingham Bay's environment that are likely to experience a potentially significant adverse impact from the implementation of alternatives evaluated in the final EIS. These elements are:

- Geology, Water, Sediment and Environmental Health
- Fish and Wildlife
- Land Use, Shoreline Use, and Recreation/Public Use
- Air and Noise
- Cultural Resources

Additional information on the affected environment in Bellingham Bay can be found in the *Data Compilation and Analysis* report, issued in March 1999. This report is available at the EIS repositories listed in the Fact Sheet, and is also summarized in Appendix B.

3.1 GEOLOGY, WATER, SEDIMENT, AND ENVIRONMENTAL HEALTH

3.1.1 Geology and Seismic Conditions

3.1.1.1 Geology

Various types of glacial deposits exist within the project area, derived from the advance and retreat of the Cordilleran Ice Sheet between 18,000 and 14,000 years ago. The Chuckanut Formation, consisting of sandstone and carbonaceous shale (which often contains plant fossils such as leaves and palm fronds), constitutes the eastern shore of Bellingham Bay, from Governor's Point north to Whatcom Creek. Well-sorted and stratified outwash sand and gravels are evident from the mouth of Whatcom Creek west to the edge of the Nooksack River delta, where terrace deposits associated with the Nooksack floodplain have developed (Easterbrook 1976). The project area from the western edge of the Nooksack River floodplain south to Portage Island contains Bellingham Drift sediment, a blue-gray unsorted and unstratified sandy silt and pebbly clay derived from rock debris that melted from floating ice (Easterbrook 1976).

Before humans modified the shoreline, large tidal flats were at the mouths of Squalicum, Whatcom and Padden creeks (United States Coast and Geodetic Survey 1855). In 1892, the federal government approved the construction of three waterways in the northeast portion of Bellingham Bay. Whatcom, I&J, and Squalicum Creek waterways were marked for dredging, bulkheading, and pier construction (Hitchman ca. 1970). The Corps of Engineers began dredging Whatcom Creek Waterway in 1904, and continued dredging and land modification activities until 1910. Dredged material was used as fill on the mud flats at the mouth of Whatcom Creek to provide sites for wharves, buildings, factories, and streets (United States Engineering Department 1908). Similar fill episodes using material from Whatcom Waterway and other waterways occurred along the east and southeast shore of Bellingham Bay between 1940s and 1960s. The shoreline along the industrialized portion of the Bay (the inner bay) has also be modified by rip-rap and bulkheading (Figure 3.1-1). More information on the structures in and around the shoreline of the Bay can be found in the Land Use discussion in Section 3.3.1.2.

The current shoreline of Bellingham Bay is a result of the combined effects of natural geologic and oceanographic processes, as well as the added influence of human changes. As discussed in Section 3.1.3.1, sediment material is continually deposited into the Bay as a result of tributary inputs (especially from the Nooksack River) and shoreline erosion processes.

Historical filling in Bellingham Bay has resulted in the loss of approximately 330 acres of intertidal and shallow subtidal lands. However, rising sea levels have offset the changes in habitat areas. For example, since 1855, rising sea levels apparently increased intertidal areas in the Bay by approximately 270 acres and shallow subtidal areas by about 420 acres. (Bortleson et al. 1980 and NOAA 1995). In the north Puget Sound area, sea level is increasing by approximately 1.5 to 3.5 inches/century (Beale 1990).

3.1.1.2 Seismic Conditions

Western Washington is an area of known seismic activity related to plate tectonic movement, and has a history of relatively large earthquakes. Many of the largest earthquakes have occurred in the Puget Sound region between Olympia and the Canadian border (Noson et al. 1988). More than 1,000 earthquakes occur in the state each year. In a typical year between five and 20 are severe enough to be felt.

No major fault lines have been identified within the study area, however, several small earthquakes have been centered in and around Bellingham Bay in the last century (University of Washington Geophysics Program).

3.1.2 Water

3.1.2.1 Surface Water

Bellingham Bay is approximately 12 miles long and 3 miles wide, with its opening to the south and southwest. The Bay is part of a system of interconnected bays that exchange waters with the Rosario Straits and ultimately the Pacific Ocean through a complex network of channels and passages. (Colyer 1998). Most oceanic waters enter Bellingham Bay at depth through the northern end of Rosario Strait (Figure 3.1-2). Some water also enters through Bellingham Channel. Water is exchanged between Bellingham Bay and Samish Bay to the south. Exchange of water to the west through Hale Passage is limited by a shallow sill. The residence time for water in Bellingham Bay is typically 4 to 5 days, but varies between one and eleven days.

The available data on bottom currents indicate that there is a net southward flow throughout Bellingham Bay at depth. Overall, bottom currents are relatively consistent throughout the year and typically range from 0.2 to 0.3 meters per second. In inner Bellingham Bay, deep currents vary with tidal fluctuations. These currents flow generally toward the Whatcom Waterway during the incoming tide. During ebb tides, deep currents flow generally in a clockwise direction in the inner bay.

In addition to the tidal-induced flow of water into the Bay, fresh water enters Bellingham Bay, along the northeast shore, generally flowing in a west to southwest direction. The surface water system consists of natural and constructed drainages that eventually discharge into Bellingham Bay. The major tributaries to the Bay are the Nooksack River, Squalicum Creek, Whatcom Creek, Padden Creek and Chuckanut Creek. A small area of land in the northern part of the city drains to Silver Creek, a tributary of the Nooksack River.

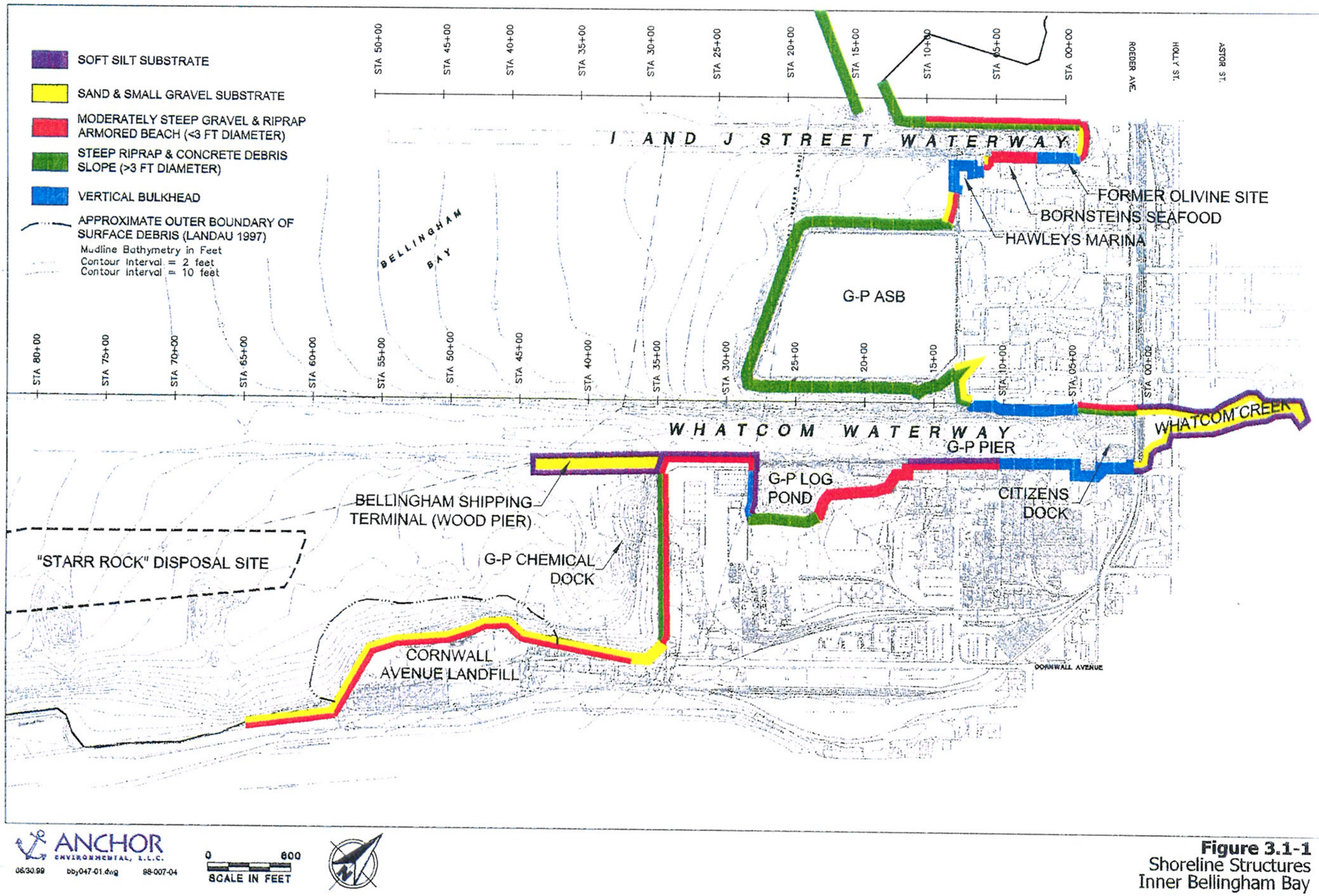

Figure 3.1-1
Shoreline Structures
Inner Bellingham Bay

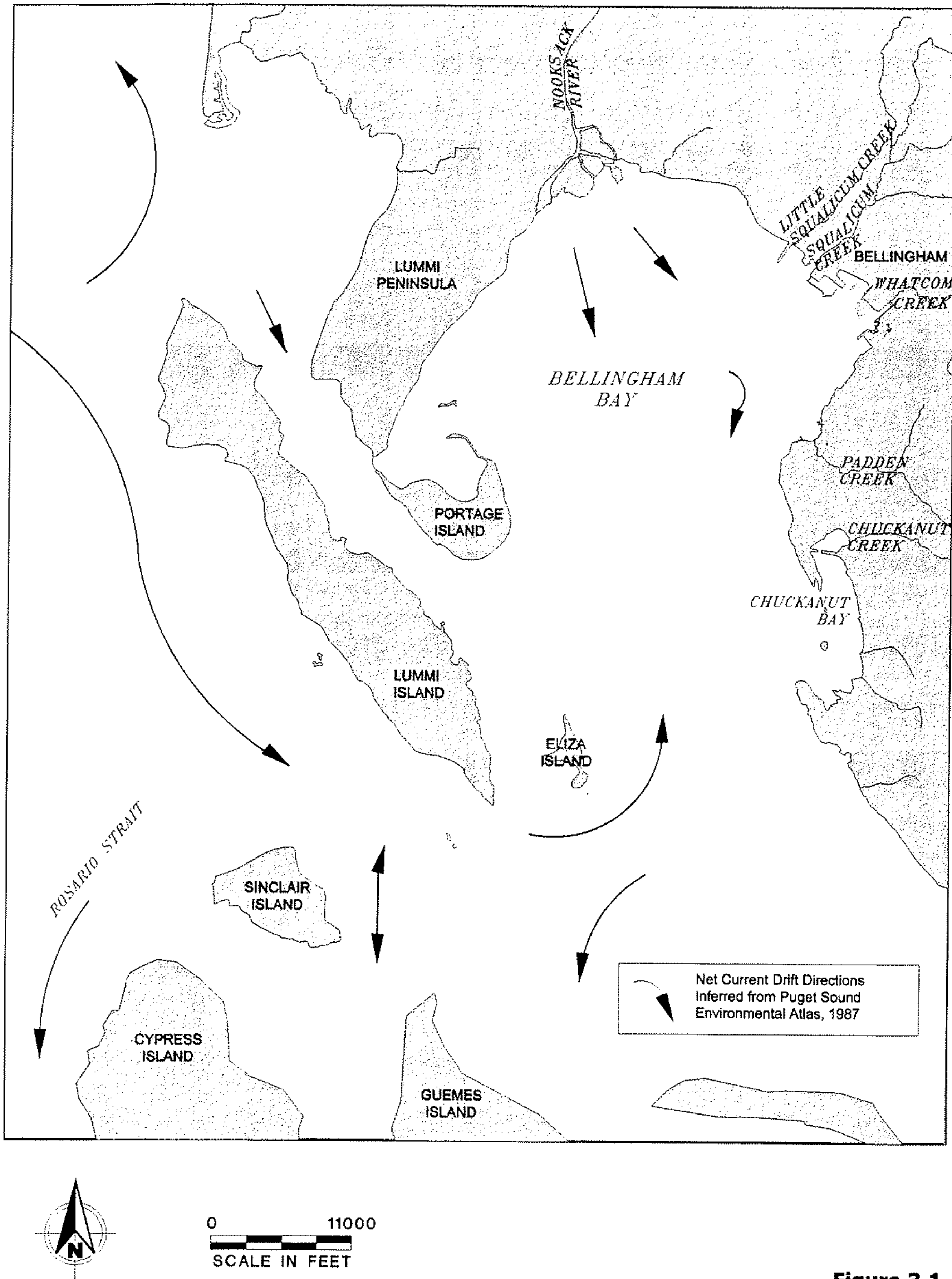

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Figure 3.1-2
Net Current Directions
in Greater Bellingham Bay

The Whatcom Creek watershed drains an area of approximately 26 square kilometers. Whatcom Creek flows from Lake Whatcom through the city to the Bay. Whatcom Creek is influenced by channelization, vegetation removal, and urban storm water runoff (PTI 1989The Squalicum Creek watershed drains an area of approximately 65 square kilometers. Squalicum Creek originates at Squalicum Lake and also flows through Bellingham. As an urban stream, the creek is influenced by channelization, vegetation removal, and urban storm water runoff (PTI 1989).

Five other smaller watersheds contribute fresh water to Bellingham Bay, including Chuckanut Creek and Padden Creek. The Chuckanut Bay watershed drains an area of 34 square kilometers via Chuckanut Creek and direct runoff into Chuckanut Bay (PTI 1989). The watershed is minimally impacted by human activities, but some residential and commercial areas are present. The Padden Creek watershed drains an area of 16 square kilometers (PTI 1989). The creek flows from Lake Padden through a largely residential area, and enters Bellingham Bay near Post Point. The creek is influenced by urban and industrial storm water runoff.

In addition to these natural discharges, the City maintains a stormwater collection and conveyance system that includes 18 storm drains that discharge to Bellingham Bay (Figure 3.1-3). As described in the next section, stormwater discharges are a potential source of water and sediment contamination in the Bay.

3.1.2.2 Water Quality

Studies performed by Ecology and others in the 1970s found that the water quality in inner Bellingham Bay was historically degraded as the result of direct discharge of municipal wastes, pulp and paper mill process water, and other point and non-point discharges to the Bay. (See *Sediment Sites and Source Control Documentation Report* for more information.) Efforts to address contamination problems in Bellingham Bay have been underway since the 1970's, resulting in substantial reductions in the amount of contaminants discharged to Bellingham Bay and corresponding improvements in water quality over time. NPDES permit requirements have led to the implementation of technology-based controls on wastewater and industrial discharges to the Bay, including the City of Bellingham wastewater treatment plant at Post Point, and G-P's ASB facilities.

Bellingham Bay is currently classified as a 'Class A' water (excellent) under WAC 173-201-140. Recently, two water quality limitations in Bellingham Bay were identified in Ecology's 1998 Section 303(d) listing of surface water quality conditions in Washington. Within Bellingham Bay, localized fecal coliform and pH concerns were identified, in addition to sediment quality impairments (see below). The existing NPDES program and other permitting authorities are currently addressing these concerns. However, outside of the immediate discharge area of several urban streams, potentially toxic substances have not been detected in Bellingham Bay at concentrations exceeding state or federal water quality criteria.

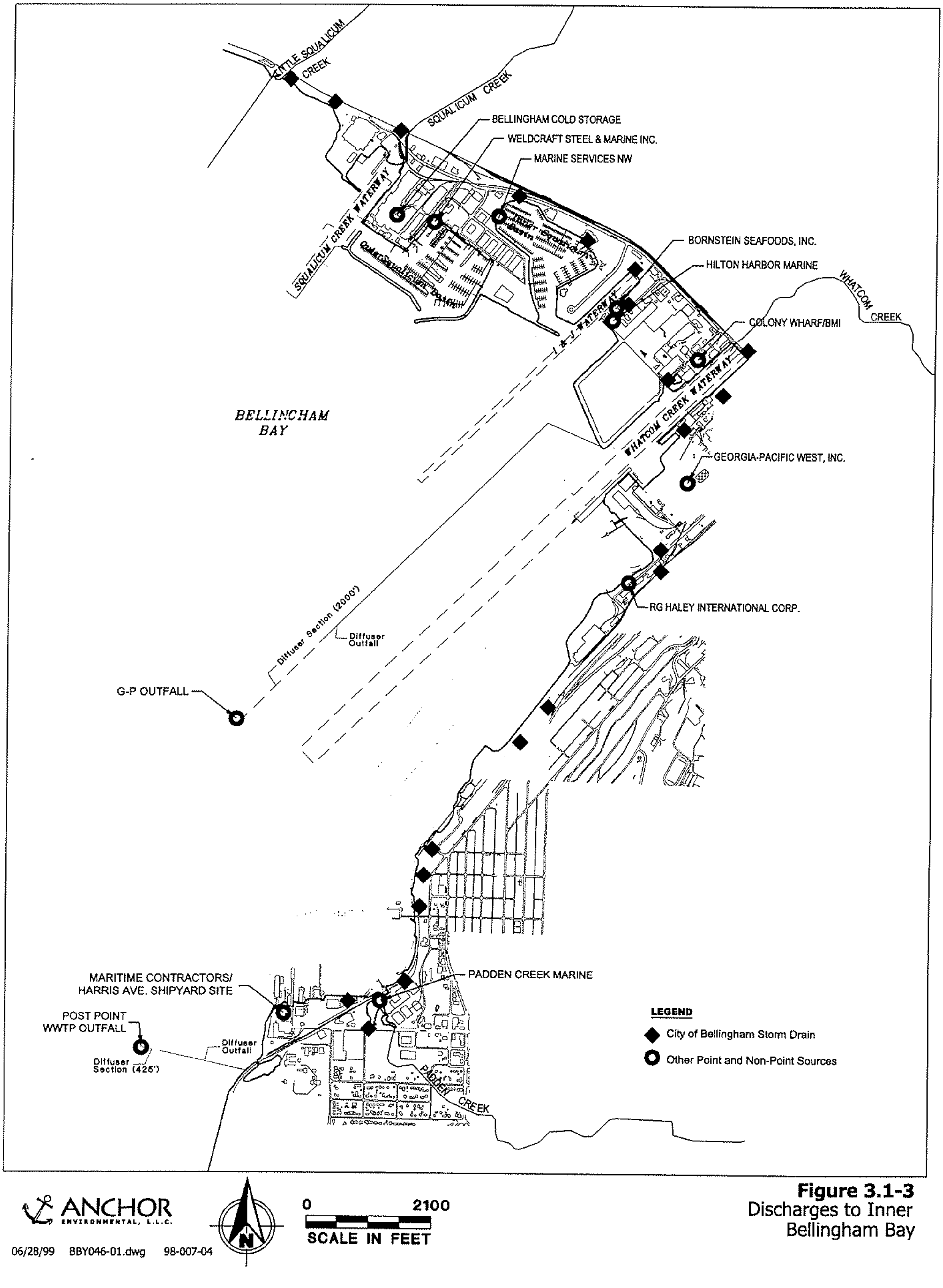

Figure 3.1-3
Discharges to Inner
Bellingham Bay

A total of 40 waterfront or surface water discharge source locations were identified that could potentially affect water and/or sediment quality in localized areas of the Bay (Figure 3.1-3). The potential sources included 10 waterfront NPDES discharges, 12 suspected or confirmed contaminated sites, and 18 surface water drainage outfalls that discharge to inner Bellingham Bay. However, no ongoing sources have been identified that have the potential to affect water or sediment quality beyond the immediate discharge zone (<100 feet).

The available monitoring data suggest that several waterfront sources may be releasing metals (arsenic, cadmium, copper lead, mercury, silver and/or zinc), or phenolic compounds to nearshore areas of Bellingham Bay at concentrations that exceed surface water quality criteria (Anchor Environmental and Hart Crowser 1999). However, preliminary modeling analysis suggest that such low-volume discharges are likely to result in only localized water quality concerns in the immediate vicinity of the discharge (i.e. typically within tens of feet of the discharge point; Anchor Environmental and Hart Crowser 1999). Nevertheless, further controls at these sources may be needed to provide additional water quality and/or sediment protection.

Potential sources of hazardous substances that could impact sediment quality are discussed further in Section 3.1.4.

3.1.2.3 Groundwater

Groundwater flows into Bellingham Bay from the surrounding uplands. Once groundwater reaches the Bay, it discharges both vertically (upwards) and laterally. As groundwater moves through contaminated upland soils, concentrations of contaminants increase. In Bellingham Bay, five areas are known to be a source of localized groundwater contamination and focused cleanup investigations have been performed or are ongoing at each of these sites. These areas and the contaminants identified in groundwater are:

- **G-P Log Pond.** Low levels of mercury have been detected in groundwater adjacent to the G-P Log Pond, downgradient of the former chlor-alkali facility (ENSR 1994)

- **R.G. Haley.** (Directly north of Cornwall Avenue Landfill). Groundwater and shoreline seepage in the vicinity of this former wood treating facility have contained detectable concentrations of pentachlorophenol, dioxins and polynuclear aromatic hydrocarbons (GeoEngineers 2000)

- **Cornwall Avenue Landfill.** Groundwater and shoreline seepage samples collected in this area have contained low concentrations of metals, and fecal coliform (Landau 1999). The Port of Bellingham is currently evaluating control measures to address these releases.

- **Roeder Avenue Landfill.** (historic municipal landfill located between the Whatcom and I&J Waterways). Groundwater quality monitoring performed next to the landfill detected elevated levels of chromium (above marine water quality criteria) migrating towards Bellingham Bay (Cubbage 1996). The Port of Bellingham is addressing control of groundwater seepage releases as a component of a RI/FS for this site.

- **Chevron Bulk Fuels Facility.** Petroleum contaminated soil and groundwater at this former fuel terminal were removed and/or treated at the site in the early 1990s. Chevron is considering further controls to address residual groundwater contamination. However, sediment samples collected immediately adjacent to the site have not exceeded SQS biological criteria (Anchor Environmental and Hart Crowser 1999).

Given the location of these known sources and the general direction of groundwater flow in the area, it is considered unlikely that groundwater contamination is a threat to drinking water supplies. Groundwater seepage from the upland area adjacent to the G-P Log Pond and from the Cornwall Avenue Landfill, and the R.G. Haley Site, are the only identified sources that may affect sediments. The potential influence of the G-P Log Pond and Cornwall seeps does not extend beyond tens of feet from the shoreline (Anchor Environmental and Hart Crowser 1999). The influence of the R.G. Haley seep will be evaluated as part of future remedial activities.

3.1.3 Sediment

Sediment is the material suspended in or settled on the bottom of a water body. It is typically a mixture of sand, silt and clay. When describing the characteristics of sediment, reference to different sediment layers is made. "Surface" sediments reside directly below the mud line and represent the "biologically active zone". The extent of the surface sediment layer can vary from site to site, and may extend to a depth between 10 and 16 centimeters below mud line within the Bay. "Subsurface" sediments reside directly below surface sediments, that is, below 16 centimeters.

3.1.3.1 Sedimentation Patterns

The Nooksack River, Whatcom Creek, Squalicum Creek, Chuckanut Creek, and Padden Creek watersheds contribute sediment to Bellingham Bay. The largest volume of water and sediment entering Bellingham Bay is the Nooksack River. As previously discussed, dredging and shoreline modifications have interrupted the natural sedimentation process in Bellingham Bay. This is particularly true in the inner bay, where industrial and commercial/shipping activities have been focused.

"Shoaling" occurs when sediment accumulates on the floor of a water body, raising the elevation of the mud line surface, and decreasing the water depth. In Bellingham Bay, shoaling is a concern in federal navigation channels, like the Whatcom and I&J waterways, and dredging is used to maintain authorized channel depths. Mud line elevations within the Whatcom Waterway navigation channel currently range from approximately +6 to -38 feet MLLW (1996 soundings). Relative to the federally-authorized channel depths of -18 feet MLLW at the head of the waterway (Station 0 to 7+50) and -30 feet MLLW for the rest of the waterway, major areas of shoaling are currently present, as depicted on Figure 3.1-4. Relatively extensive shoaling areas occur near the head of the waterway, where mud line elevations are as much as 24 feet shallower than the authorized depth of -18 feet MLLW. By comparison, only localized areas of shoaling are noted in the middle and outer Whatcom Waterway, including adjacent to the Bellingham Shipping Terminal (BST). Beyond Station 15+00, mud line elevations within the waterway range from approximately -20 to -38 feet MLLW. The northern edge of the waterway offshore of the G-P ASB is generally shallower by 5 to 15 feet then the southern edge from Stations 15+00 to the mouth. The deeper portions are generally located next to the BST pier.

The "net sedimentation rate" is a measure of the long-term burial rate of sediments beneath more recently deposited sediment materials. (Within contaminated areas of Bellingham Bay, this measurement provides an indication of how rapidly "clean" sediments are being deposited over contaminated material.) The net sedimentation rate in inner Bellingham Bay has been estimated at 1.6 cm/year. Estimates of net sedimentation rates within Whatcom Waterway has been determined by calculating net changes in the mud line elevation of the waterways between 1975

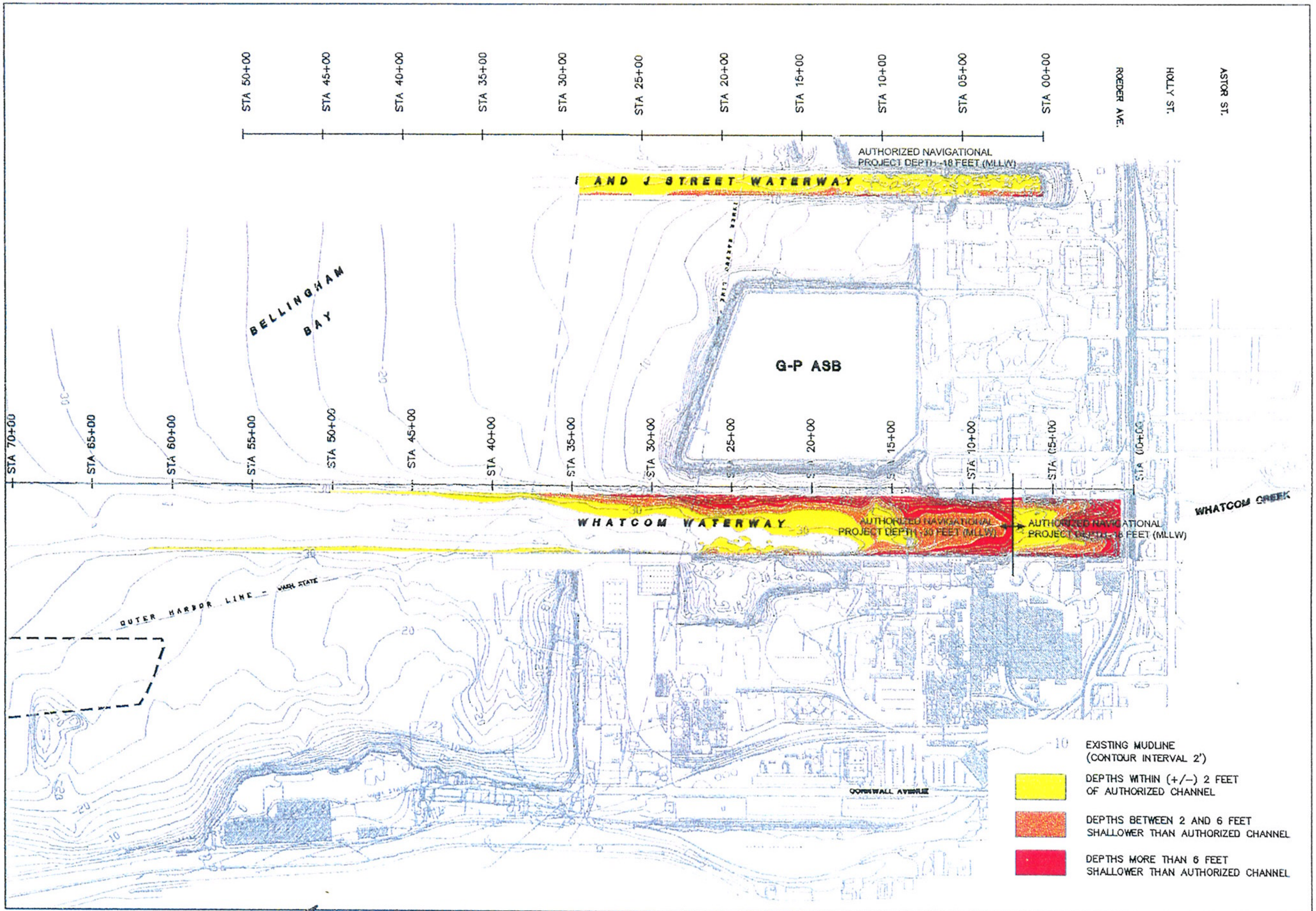

Figure 3.1-4
Shoaling in
Bellingham Bay Waterways

and 1996. These rates vary considerably within the channel area, ranging from 0 to 9.4 cm/year (Anchor Environmental and Hart Crowser 1999).

These sedimentation rates and resulting shoaling patterns are helpful in understanding the existing sediment contamination conditions that are discussed in the next section.

3.1.3.2 Sediment Contamination

As stated earlier, efforts to address contamination problems in Bellingham Bay have been underway since the early 1970s. Over these past 25 years, the amount of contaminants discharged to the Bay has been substantially reduced, which has lead to improvements in water and sediment quality. However, recent studies have found that certain contaminants continue to persist in sediments, and could pose a threat to aquatic organisms that live in these areas. Contaminated sediments occur primarily in localized areas within the northeast corner of the Bay.

The existing sediment conditions in Bellingham Bay are currently being evaluated through a number of site-specific Remedial Investigation/Feasibility Studies (RI/FS) and general status investigations. In addition, the *Sediment and Source Control Documentation Report* provides additional data on the nature and extent of sediment contamination in Bellingham Bay. This report is available at the EIS repositories identified on the Fact Sheet, and is summarized in Appendix B.

Of more than 50 chemicals analyzed, three have been regularly detected in Bellingham Bay sediments at concentrations that exceed current SQS chemical criteria. These chemicals of potential concern are mercury, 4-methylphenol, and phenol. Accumulations of woody debris exceeding 50 percent by volume have been identified within the Whatcom Waterway area, and are often associated with elevated 4-methylphenol and phenol concentrations. Solid waste accumulations have also been mapped adjacent to the former Cornwall Avenue Landfill. As described in Section 2.1, compliance with sediment cleanup standards considers potential future changes to the surface sediment layer that would result from dredging. In Bellingham Bay, subsurface contamination has been detected in the federal navigation channels (Figure 2.3-3). These sediments could potentially be exposed by dredging and become "surface" sediments.

A brief description of the contaminants of concern is provided here, followed by a description of their occurrence within the study area.

> **Mercury.** A naturally-occurring metal, mercury is ubiquitous within the environment. Elevated concentrations of mercury in the aquatic environment have been associated with chlor-alkali facilities, shipyards, mining operations, dental processes, fungicide applications, and other sources. Releases of mercury to Bellingham Bay peaked during the 1965 to 1971 period (Bothner et al. 1980), largely related to releases from the G-P chlor-alkali facility. However, this source of mercury to Bellingham Bay has been controlled for nearly 30 years.
>
> Mercury exists in many forms within the aquatic environment; the three most predominant forms are elemental mercury, inorganic mercury, and methylmercury. The high vapor pressure of elemental mercury makes it possible for this chemical to volatilize from water into the air. Inorganic mercury, which comprises the greatest fraction in sediments, is strongly adsorbed to and transported with sediment particles. Methylmercury is the most toxic and readily bioaccumulated form of mercury. Methylation of inorganic mercury by microbes occurs at or near the sediment:water

interface where oxygen has been depleted. Although methylmercury typically comprises less than 10 percent of the total mercury burden in Puget Sound sediments, more than 90 percent of the total mercury present in fish and shellfish tissue is methylmercury (Bothner et al 1980, EPA 1989). The relationship between total mercury concentrations in surface sediments and tissue in Bellingham Bay was characterized in the RI/FS for the Whatcom Waterway Site , and was used to develop site-specific sediment cleanup levels (Anchor Environmental and Hart Crowser 1999).

Phenol and 4-methylphenol. Both phenol and 4-methylphenol are also ubiquitous within the environment, and are often detected in stormwater runoff (Cubbage 1994). Phenol and 4-methylphenol are known degradation products of natural wood products (Hodson et al., 1983; Hatcher et al., 1988), and accumulations of these compounds in regional sediments is frequently associated with woody debris deposits (EPA, 1989; PTI, 1998).

Wood material. Wood material results from accumulations of bark and associated wood material from log rafts or other long-term exposures of wood material in water. Historical discharges of pulp and other materials may also have resulted in subsurface accumulations of woody debris.

A review of available data (collected over the last ten years) regarding sediment contamination in Bellingham Bay indicated that the following sites had one or more surface sediment samples exceeded SQS chemical criteria. These sites are described below and shown in Figure 2.3-3.

- Whatcom Waterway Site (includes six site units)
  - Whatcom Waterway Federal Navigation Channel
  - I&J Waterway
  - G-P Log Pond
  - G-P ASB
  - Port Log Rafting Area
  - Starr Rock

- Cornwall Avenue Landfill

- Harris Avenue Shipyard

- G-P Outfall

- Other Sediment Cleanup Sites
  - Olivine Nearshore Area
  - Taylor Avenue Dock
  - Squalicum Harbor Inner Boat Basin
  - Weldcraft Steel and Marine

Whatcom Waterway Site

The Whatcom Waterway Site consists of predominantly subtidal aquatic lands within and adjacent to the Whatcom Waterway. Since the 1960s, G-P has owned and operated a pulp and paper mill located next to the waterway. Beginning in 1965, wastewater containing mercury was discharged to the Whatcom Waterway from the mill's chlor/alkali plant. Mercury discharges from the mill have been controlled for nearly 30 years through process changes and wastewater treatment controls. Wastewater discharges from the mill to the Whatcom Waterway were eliminated in 1979. In addition, the chlor-alkali facility was closed in 1999. G-P has also implemented further mercury controls as part of voluntary remedial actions. In January 1996, G-P and Ecology entered into an Agreed Order to perform a RI/FS of the area's sediments, pursuant to MTCA. The RI/FS is a companion document to this final EIS, with the same public comment period. The RI/FS is incorporated into this final EIS by reference.

Whatcom Waterway Federal Navigation Channel (site unit within the Whatcom Waterway Site)

The chemicals of potential concern identified in surface sediments in the federal navigation channel are mercury, phenol, 4-methylphenol, and woody debris. Of these, mercury is regularly detected in surface sediments at the site at concentrations that exceed SQS chemical criteria. However, many of the confirmatory bioassay tests conducted on surface sediments did not reveal measurable sediment toxicity. In general, concentrations of chemicals of potential concern in subsurface sediments were substantially higher than levels within the surface biologically active zone (0 to -16 cm). This vertical pattern of contamination reflects both the control of sediment contamination sources over time, and the continued deposition of cleaner sediments from the Nooksack River and other tributaries (Anchor Environmental and Hart Crowser 1999). Surface sediments throughout most of the Whatcom Waterway navigation channel contain less than 2 percent wood material by volume, though some nearshore sediment areas contain more than 50 percent woody debris.

The total volume of contaminated sediments in the Whatcom Waterway federal navigation channel has been estimated at approximately 1.2 million CY (Anchor Environmental and Hart Crowser 1999).

Head of Whatcom Waterway (site unit within the Whatcom Waterway Site)

The head of the Whatcom Waterway contains relatively low concentrations of mercury that exceed SQS chemical criteria. However, much of this area did not exhibit biological effects in confirmatory bioassay tests. Compared with the relatively low surface concentrations, higher chemical concentrations and biological toxicity exists in subsurface sediments. The head of the Whatcom Waterway contains woody debris levels up to approximately 20 percent by volume. The total volume of subsurface contaminated sediment in this area is approximately 90,000 CY (Anchor Environmental and Hart Crowser 1999).

I&J Waterway (site unit within the Whatcom Waterway Site)

Low concentrations of mercury, phenol, and/or 4-methylphenol have been detected in surface sediments in the I&J Waterway. However, all confirmatory bioassays performed on sediments collected from the I&J Waterway passed SQS biological criteria. In addition, screening-level open-water PSDDA bioassays (surface and subsurface composite samples) performed in this area do not indicate exceedance of biological criteria. However, mercury concentrations exceeding the bioaccumulation screening level have been detected in subsurface sediments located several feet below the authorized channel depth. The total volume of subsurface contaminated sediment in this area has been estimated at approximately 110,000 CY (Anchor Environmental and Hart Crowser 1999).

G-P Log Pond (site unit within the Whatcom Waterway Site)

This area of the Whatcom Waterway MTCA Site contains the highest surface mercury levels in Bellingham Bay, exceeding 10 mg/kg. The sediments in the G-P Log Pond also contain greater than 50 percent wood material by volume.

The total volume of contaminated sediments in the G-P Log Pond has been estimated at approximately 105,000 CY (Anchor Environmental and Hart Crowser 1999). However, greatly elevated mercury concentrations of up to 69 mg/kg (170 times higher than the SQS) have been detected in subsurface sediments. Lower concentration sediments (to 12 mg/kg) cover the more contaminated G-P Log Pond sediments. Both surface and subsurface contamination levels exceed the mercury BSL.

G-P Aerated Stabilization Basin (site unit within the Whatcom Waterway Site)

Surface sediments located immediately offshore of the G-P ASB contain elevated mercury concentrations. Approximately 22 acres off of the southwest end of the ASB contains surface sediment mercury concentrations that exceed the site-specific BSL. The northeast portion of this area also contains an eelgrass bed where surface sediment mercury concentrations are less than the SQS. A natural sediment cap has been forming over time throughout most of the G-P ASB area. Surface and shallow subsurface sediments along the southeast and southwest periphery of the G-P ASB contain greater than 50 percent wood material by volume, gradually decreasing to less than 2 percent further offshore.

Port Log Rafting Area (site unit within the Whatcom Waterway Site)

The log rafting area ranges in elevation from 0 to -28 feet MLLW. Three of the five bioassay samples collected within and immediately offshore of the area exceeded SQS interpretive criteria. Two samples, taken from the middle of the area, also exceeded MCUL criteria. The sediments contain 20 to 50 percent wood material by volume along the southeast shoreline, gradually decreasing to 2 to 5 percent at the outer harbor line.

Starr Rock (site unit within the Whatcom Waterway Site)

In 1969, the Starr Rock site was used for the disposal of approximately 130,000 CY of sediments dredged from the Whatcom Waterway navigation channel (Hart Crowser 1996). Chemicals of potential concern identified in surface sediments at the site include mercury, phenol, 4-methylphenol, and woody debris. Two of the nine confirmatory sediment bioassay tests performed in the Starr Rock area exceeded SQS interpretive criteria. Using these data, the approximate extent of sediments exceeding SQS and MCUL criteria is 44 acres. Two sediment samples located on or immediately adjacent to the former sediment disposal mounds exceed the site-specific mercury BSL. Sediments in the Starr Rock area contain variable levels of woody debris, ranging in volume from greater than 50 percent near the southern disposal mound, to less than 2 percent at the periphery of this area. The total volume of contaminated sediments has been estimated at approximately 480,000.

Cornwall Avenue Landfill

The Cornwall Avenue Landfill accepted municipal solid waste from approximately 1953 to 1965. It is located on land that was formerly tideflats. Ecology (1992) and Landau (1998) collected five nearshore (intertidal) sediment/exposed refuse samples at the Cornwall Avenue Landfill in separate investigations. Analysis of these data indicates that elevated concentrations of several metal and organic chemical contaminants are present, generally defining a sediment "hotspot". In addition, diver reconnaissance during the Landau investigations revealed that nearshore sediments were composed primarily (greater than 70 percent) of solid waste debris. Solid waste cleanup may be regulated under the SMS, irrespective of chemical concentrations (Kendall and Michelsen 1997). The known extent of solid waste exceeding general regulatory guidelines (50 percent by volume) is approximately 3 acres of refuse in marine environment, and approximately 7 acres upland. Based on the results from the Cornwall Avenue Landfill RI/FS, a supporting document to this final EIS, chemicals of potential concern identified at the site include metals (copper, lead, and zinc), bis(2-ethylhexyl)phthalate, and polychlorinated biphenyls (PCBs). The total thickness of solid and wood waste within the Cornwall Avenue Landfill has been estimated at accumulations of up to 38 feet thick (Dames and Moore 1960). The estimated total volume of solid and wood waste at the site is 400,000 CY.

Harris Avenue Shipyard

The Harris Avenue Shipyard Site includes upland property currently owned by the Port of Bellingham and aquatic lands owned by the state of Washington, which are managed by the Port under a Port Management Agreement. The main shipyard area was used extensively during the 1940s for shipbuilding and launching activities, and has been a focus of local shipbuilding and repair operations since the early 1900s. The site is located next to relatively high-density Dungeness crab populations, and near eelgrass meadows and local fish spawning and harvesting areas (Pacific International Engineering and Anchor Environmental 1999).

Chemicals of potential concern identified at the site in recent studies include metals (arsenic, copper, lead, mercury, and zinc), phenol, bis(2-ethylhexyl)phthalate, and polychlorinated biphenyls (PCBs). The approximate extent of surface sediments exceeding SQS criteria is 4 acres. The total volume of contaminated sediments at the site has been estimated at approximately 20,000 to 50,000 CY.

Phase 2 sediment sampling has taken place at the site (ReTec 1998a) and work has begun on an RI/FS, both activities were initiated by the Port of Bellingham.

G-P Outfall

The G-P Outfall Site is located within the immediate vicinity of the G-P wastewater treatment diffuser in inner Bellingham Bay. Various source controls have been implemented at the G-P facility over the past 30 years. Surface sediment samples collected in 1999 within the 2,000-foot diffuser area were all below SQS cleanup criteria. Additional monitoring is required in five years under G-Ps NPDES permit to verify that sediment concentrations remain below cleanup criteria.

Other Sediment Cleanup Sites

Olivine Nearshore Area

Located near the head of the I&J Waterway, the Olivine Nearshore Area is adjacent to upland property currently owned by the Port and recently used by the Olivine Corporation. Prior operations at the site apparently included scrap/refuse storage and experimental incineration (Landau 1994; HLA 1995). The site currently is inactive.

Surface sediment sampling was recently conducted at the Olivine Site by the Port of Bellingham, and as part of the Whatcom Waterway RI/FS (Anchor Environmental and Hart Crowser 1999). Low concentrations of mercury, 4-methylphenol, and phenol were detected at this location, however, elevated concentrations of the plasticizer bis(2-ethylhexyl)phthalate were reported. Analysis of these data indicates that the average bis(2-ethylhexyl)-phthalate concentrations in this area constitute a sediment "hotspot", a result which has been verified with confirmatory bioassays. The areal extent of sediment contamination at the site has been estimated at roughly 1 acre. Based on the thickness of sediment accumulations observed on this area, the total volume of contaminated sediments at the Olivine Nearshore Area may be up to 20,000 CY.

This area is under the Voluntary Cleanup Program with Ecology and an RI/FS is being prepared.

Taylor Avenue Dock

The site is located in Bellingham Bay at the west end of Taylor Avenue. The existing facility includes a trestle providing access to Taylor Avenue and a dilapidated dock structure. A large number of old creosote-treated timber piles are present at the site from old dock, trestle and other historical structures. The upland area is presently undeveloped and is owned by the City of Bellingham. The Bellingham Parks Department has plans to develop the Taylor Avenue Dock site as a public park. These plans include removing an existing dock, an abandoned railroad trestle and approximately 1,000 existing piles from the site. Construction of a new over-water pedestrian walkway, dock, picnic pavilion and transient moorage is proposed.

Sediment sampling has identified contaminants of concern that are generally limited to polycyclic aromatic hydrocarbons (PAHs). The likely sources of PAH contamination at the site include historic petroleum product use, refining and off-loading activities and creosote-like coatings on existing piles at the site. The Department of Ecology is initiating contact with former operators to address this contamination.

Squalicum Harbor Inner Boat Basin

The Port constructed the inner boat basin of the Squalicum Harbor in 1981-82 by dredging existing sediments and raising the grade of adjacent upland areas. The inner basin includes marina facilities and localized boat maintenance operations.

Chemicals of potential concern identified in surface sediments at the site include copper and tributyltin (TBT) (ReTec 1998b). The areal extent of SMS exceedences appears to be limited to the immediate vicinity of the Marine Services Northwest boat lift. The areal extent of copper and TBT exceedences at the site appears limited to approximately 3 acres. The thickness of the contaminant layer has not been characterized. However, assuming a nominal thickness of up to 2 feet (based on ReTec 1998c and Whatcom Waterway sediment accumulation data), the total volume of contaminated sediments at the site has been estimated at up to approximately 20,000 CY.

An RI/FS for this site has been initiated by the Port of Bellingham.

Weldcraft Steel and Marine

The Weldcraft Steel and Marine facility is located in the outer boat basin of Squalicum Harbor. An environmental site assessment recently completed for the Port (Landau 1998) included the collection of three sediment samples. A fourth sample of waste materials was obtained from the marine railway area of the site.

Based on the available sediment quality data, chemicals of potential concern identified at the site include TBT and phenol. The distribution of these chemicals has not been characterized at this time, though the available information suggests a relatively small contaminant footprint of roughly 1-acre. Additional sediment sampling is planned by the Port of Bellingham.

Table 3.1-1 summarizes contaminated surface sediment characteristics for each of the 12 sites described above.

3.1.3.3 Sources of Sediment Contamination

Potential sources of contamination that could affect sediment quality include point sources (e.g., outfalls), surface water, groundwater, and other non-point sources. Detailed sampling and preliminary analysis of potential contaminant sources in inner Bellingham Bay shows that with the exception of low-level groundwater seepage into the G-P Log Pond, no ongoing, sources of mercury have been identified that have the potential to re-contaminate sediments (Anchor Environmental and Hart Crowser 1999). Although ongoing urban stormwater inputs of 4-methylphenol and phenol have been documented in the area, the available data suggest stormwater influences are highly localized, and do not extend beyond 100 feet of the discharge point. Further, sediment concentrations of these compounds are more closely associated with the degradation of historical woody debris deposits present in several nearshore areas of the inner bay.

Accumulations of bark and associated woody debris near the G-P Log Pond and in other areas of the Whatcom Waterway appear to be from past activities (Anchor Environmental and Hart Crowser 1999). Both phenol and 4-methylphenol are known degradation products of natural wood products (Hodson et al., 1983; Hatcher et al., 1988), and accumulations of these compounds in regional sediments is frequently associated with woody debris deposits (EPA 1989; PTI 1998). All information considered, ongoing discharges from storm drain sources do not appear to represent an important ongoing source of sediment contamination. Although relatively limited log rafting operations continue in some areas of the Whatcom Waterway site (e.g., near the former R.G. Haley site), historically there was much more extensive log rafting throughout inner Bellingham Bay (PTI 1989). In addition, historical discharges of pulp and other materials from the G-P facility are now controlled by a variety of improved handling, collection, and wastewater treatment processes, all of which are regulated under G-P's existing NPDES permit.

The source control data summarized above have not identified any ongoing, major sources of mercury, 4-methylphenol, phenol, or woody debris within the study area that would re-contaminate sediments. Although continuing decay of historical woody debris deposits may represent an "internal" source of 4-methylphenol and phenol, and may also contribute to observed sediment toxicity (see above), these concerns can be addressed through sediment cleanup.

The Cornwall Avenue Landfill is a ongoing source of solid waste in the Bay. Monitoring of this site has shown that the waste is actively eroding following storm events, and moving further into the open water of the Bay at a rate of 1-2 inches per year (Landau 1999).

Since completion of the draft EIS, free product containing PAHs, pentachlorophenol, and dioxins has been discovered seeping to Bellingham Bay from the R.G. Haley site located directly north of the Cornwall Avenue Landfill. The Department of Ecology is currently working with the property owners to conduct an emergency action to stop the discharge. Once this action is taken, a broader remedial investigation of the site will be conducted, including an evaluation of the sediments.

In June 1999, a petroleum pipeline that crosses under Whatcom Creek ruptured, causing a gasoline spill into the creek. Before the leak was detected, the gasoline was ignited, causing a large explosion and fire. A minimal release of gasoline flowed into Bellingham Bay, and the pipeline has since been repaired. Efforts are underway to replace the lost fisheries, restore impacted habitat, and assess sediment impacts.

Other programs are underway to continue source controls within the Whatcom Waterway Area. These include:

- Closure of the G-P chlor-alkali plant;
- Upland cleanup and source control actions (e.g., Olivine RI/FS; Roeder Avenue Landfill RI/FS, and Chlorine Plant RI/FS);
- Ongoing monitoring and control of NPDES permit discharges; and
- Development and implementation of a Comprehensive Stormwater Management Program by the City of Bellingham.

3.1.4 Environmental Health

Sediment chemistry and biological analyses have determined that several potentially toxic chemicals are present in the marine environment of Bellingham Bay (see Section 2.1 for information on the different sediment cleanup laws and regulations that protect human health.) The chemicals of potential concern are listed on Table 3.1-1. Concentrations of these chemicals in surface sediments within parts of inner Bellingham Bay have been observed to be toxic to marine organisms in sediment bioassay tests and may affect ecosystem functions. If the exposure is high enough, it could cause the death of an organism.

In addition to ecological health, the bioaccumulation of mercury in certain fish and shellfish populations within inner Bellingham Bay (e.g., Dungeness crab caught within Whatcom Waterway) is important to human health. Humans may be repeatedly exposed to small quantities of these chemicals by eating fish that had been exposed.

Mercury concentrations in fish tissue collected from the Whatcom Waterway are currently elevated as much as three times above regional background levels. However, the maximum tissue concentrations reported in this area are below benchmark concentrations calculated to protect tribal fishers who may consume relatively large amounts of seafood (Anchor Environmental and Hart Crowser 1999).

Table 3.1-1 Chemical Characteristics of Contaminated Sediment Sites

Chemicals of Potential Concern	Whatcom Waterway Federal Nav. Channel	Head of Whatcom Waterway	I&J Waterway	G-P Log Pond	G-P ASB	Port Log Rafting Area	Starr Rock Former Disposal Area	Cornwall Avenue Landfill	Harris Avenue Shipyard	G-P Outfall	Olivine Nearshore Area	Taylor Avenue Dock	Squal. Harbor Inner Boat Basin	Weldcraft Steel & Marine
Arsenic									■					
Copper								■	■				■	
Mercury	■	■	■	■	■	■	■		■	■				
Lead								■						
Zinc								■	■					
Tributyltin (TBT)													■	■
Benzoic Acid														
Phenol	■					■	■		■					■
2-Methylphenol														
4-Methylphenol	■					■	■			■				
2,4-Dimethylphenol														
PAHs												■		
Bis(2-ethylhexyl)phthalate								■	■		■			
PCBs								■	■					
Solid Waste														
Woody debris				■	■		■							

■ = Surface sediment samples exceeding SQS.

Source: Anchor Environmental 1998

3.2 FISH AND WILDLIFE

In reviewing the description of the existing habitats in the Bay, it is helpful to understand what conditions constitute key habitat. The Pilot Team developed habitat objectives that identify species, habitats, functions, and specific areas within Bellingham Bay that should receive priority consideration. The following list of objectives describe what constitutes critical components of healthy and productive habitats in Bellingham Bay:

- Provide clean sediments
- Restore eelgrass habitat
- Restore/enhance Whatcom, Squalicum and Padden creek estuaries
- Restore/enhance/protect intertidal and shallow subtidal connective corridors, that support salmonids during their transition from freshwater (i.e., eelgrass, sediment or gravel deposition, creek estuaries)
- Restore/enhance/protect natural processes creating and maintaining habitat
- Provide net gain in aquatic area and function of in-water habitat, salt marsh and marine buffer
- Protect and preserve existing habitat that supports sensitive life stages or concentrations of species of concern: salmonids, Dungeness crab, hardshell clams, surf smelt and sand lance, Pacific herring, flatfish, Ling cod, pandalid shrimp
- Protect threatened and endangered species (e.g., chinook salmon) and species protected under the Marine Mammal Protection Act (MMPA) such as harbor seals and gray whales
- Restore lost habitat attributes by removing existing fills and structures
- Maximize habitat opportunities/benefits in Bellingham Bay

This section describes fish and wildlife habitats in Bellingham Bay. Detailed information on habitat conditions and habitat maps can be found in the *Data Compilation Report* (Pacific International Engineering and Anchor Environmental 1999). This document is available at the repositories identified in the Fact Sheet, and is also summarized in Appendix B.

3.2.1 Habitat Strata

Throughout Sections 3 and 4 of the final EIS, reference is made to three different elevations of habitat – intertidal, shallow subtidal, and subtidal. Although separated by only a few feet, these three strata are characterized by different soil textures and support varying types of plant and animal life. Two types of substrata can be found in each layer – sand/mud/cobble and gravel/rocky shore. A brief description of the habitat generally found in these strata is provided here before moving into the more detailed descriptions of fish and wildlife habitat in the Bay.

Intertidal: -4 to +11 feet MLLW

Sand/mud/cobble. Varying degrees of rooted plants are found in this layer, with greater numbers and variety at higher elevations. Native eelgrass is most commonly found at 0 to –4 MLLW, while rushes, sedges, and pickleweed can be found at +11 to +8. The plants provide food and refuge for a variety of organisms, including juvenile salmon, shrimp, crab, and flat fish. Mudflats found in this stratum produce epibenthic prey items that are consumed by juvenile salmon migrating through the area. The eelgrass and macroalgae found in the intertidal layer may also be used by Pacific herring as spawning habitat. The finer substrate at higher elevations (+11 to +8 MLLW) provides spawning habitat for sand lance and surf smelt.

Gravel/rocky shore. At about 0 feet MLLW, native eelgrass is occasionally found in pools and channels on rocky shores. Brown, green and red algae are also found throughout the stratum. At higher elevations, this layer is affected by higher tides and plant material can consist of lichens, some flowering plants and leadwort. Animals common to this layer include crabs, shrimp, sponges, sea anemones, worms, sea stars, oysters and a variety of fish such as perch, prickleback, flat fish and some juvenile salmon. The fish use this layer for feeding, refuge and reproduction.

Shallow Subtidal: -4 to -10 feet MLLW

Sand/mud/cobble. The plant and animal communities and functions are similar to those described in lower elevations of the intertidal habitat. Mudflats found in this stratum produce epibenthic prey items that are consumed by juvenile salmon migrating through the area. The substrate within this elevation can also provide suitable habitat for Dungeness crab mating and egg brooding.

Gravel/rocky shore. Native eelgrass is occasionally found in this layer and a variety of brown, red and green algae. Animals common to this layer include crabs, shrimp, sponges, sea anemones, worms, sea stars, oysters and a variety of fish such as perch, prickleback, flat fish and some juvenile salmon. The fish use this layer for feeding, refuge and reproduction.

Subtidal: Below -10 feet MLLW

Sand/mud/cobble. Below –10 feet MLLW, native eelgrass is still relatively common, however, beyond about –20 feet MLLW, light is limited and eelgrass and macroalgae are less common. In addition, some varieties of hardshell clams are less abundant, while the geoduck clam tends to be more abundant in deeper water. The substrate within this elevation can also provide suitable habitat for Dungeness crab mating and egg brooding. The substrate and water column are used for feeding by a variety of fish species, including sub-adult and adult juvenile salmon.

Gravel/rocky shore. Larger sized fish and shellfish often occur in deeper waters. Below about –20 feet MLLW, light reaching the sea floor limits the abundance and growth of macroalgae. In addition, the occurrence of some species such as oyster is rare.

3.2.2 Biological Functions of Existing Habitat

Most of the habitat types in Bellingham Bay are used by a variety of marine and terrestrial species for feeding, reproduction, rearing, and/or refuge. For example, the eelgrass habitat around Portage Island is used as Pacific herring spawning habitat between January and June. Surf smelt and Pacific sand lance spawn on high intertidal coarse sand and gravel beaches at several locations within the Bay (see Section 3.2.3). Juvenile and young-of-year Dungeness crab use gravel beaches and eelgrass habitat for protection against predators. Several species of juvenile salmon use intertidal habitats (between about +10 and −10 feet MLLW) consisting of salt marsh and mud/sand flats that occur at the mouths of the Nooksack River, Squalicum Creek, Whatcom Creek, Padden Creek, and Chuckanut Creek for feeding and refuge as they transition from freshwater to open marine waters. These habitats also function as migratory corridors for juvenile salmon. Table 3.2-1 is a generalized list of the estuarine/marine habitat functions for a variety of fish and wildlife species that occur within or use Bellingham Bay for all or a portion of their life history.

3.2.2.1 Functional Limitations at Contaminated Sediment Sites

Existing aquatic habitat has become functionally degraded in some locations within in inner Bellingham Bay through the presence of contaminants. This degradation typically occurs in three different ways. One form of degradation occurs when contaminant levels are high enough to cause toxic effects that limit the population size and/or diversity of aquatic organism groups (e.g. the benthic community). In these population-level effects, the toxicity of the contaminants is typically high enough to cause either an acute effect (direct mortality) or a chronic effect (e.g. impairing growth) on individual organisms, but in both cases it leads to having an overall impact on the population level. The population-level effect on one organism group such as the benthic community typically has a corresponding effect on the next highest trophic level since the group being effected no longer functions as a viable healthy prey item source within the food chain.

A second type of biological function degradation related to chemical contamination occurs with compounds that tend to bioaccumulate. Bioaccumulative compounds sometimes do not have a population-level effect on the lower trophic levels where they first enter the food chain. However, as the compound is passed up the food chain it can bioaccumulate in tissues causing an effect in the higher trophic consumers of the food chain. Although this effect can take a relatively long time to manifest itself relative to a direct toxicity effect, it is still indicative of a degraded biological function.

A third type of biological function degradation occurs when the contaminant physically alters the natural habitat. This type of degradation is typically associated with deleterious substances such as woody debris or solid waste that may be present in the marine environment. In both cases, the change in substrate material affects the production of naturally-occurring benthic and epibenthic organisms.

Within the contaminated sediment sites of Bellingham Bay there is a variety of types of contamination (both chemical and physical). All three types of functional degradation described above currently exist in Bellingham Bay as a result of the contamination. The primary contaminant of concern for the Whatcom Waterway site is mercury, and it causes the bioaccumulative degradation described above. Mercury can also have a direct toxic effect. The Cornwall Avenue Landfill site has solid waste (a deleterious substance) in the sediment, causing a physical alteration of the substrate. The Starr Rock site has both mercury and wood debris. The Harris Avenue Shipyard site has metals, which at high levels can cause a toxic effect; and PCBs, which can cause a bioaccumulative type of function degradation.

Table 3.2-1 Habitat Functions for Fish and Wildlife in Bellingham Bay

Habitat Type	Feeding	Reproduction	Rearing	Refuge
Salt marsh	Aquatic birds (e.g., sandpiper, mallard, teal, great blue heron, goldeneye, geese, black brandt, bufflehead, and coot) Salmon (e.g., chinook, chum, cutthroat trout) Other finfish (e.g., stickleback, sculpin) Small mammals (e.g., raccoon, muskrat) Harbor seal	Small mammals (e.g., vole, muskrat)	Salmon	Aquatic birds Salmon
Eelgrass	Aquatic birds (e.g., Black brandt, geese, bufflehead) Salmon (e.g., chum) Other finfish Dungeness crab Harbor seal	Pacific herring		Dungeness crab Salmon (e.g., chum) Finfish (e.g., tube snout, perch)
Mudflat/ Sandflat	Aquatic birds (e.g., great blue heron, dunlin, common goldeneye, sandpiper) Salmon (e.g., chum) Other finfish (e.g. sculpin, goby) Flatfish (e.g., sanddab, sand sole, starry flounder) Dungeness crab Harbor seal Gray whale Small mammals (e.g., raccoon)		Salmon	
Sand/gravel beach	Aquatic birds (western grebe, gulls, cormorant, American widgeon, bufflehead) Salmon (e.g., coho) Other finfish (e.g., bull trout, cutthroat trout, greenling, perch, sculpin) Flatfish (e.g., starry flounder) Crab (e.g., Dungeness and red rock) Small mammals (e.g., raccoon)	Sand lance Surf smelt		Dungeness crab
Silty sand	Finfish (e.g., cod) Flatfish (e.g., flounder) Dungeness crab			
Water Column	Aquatic birds (e.g., grebe, cormorant, bufflehead) Salmon (e.g., chinook, chum, coho, pink) Other finfish (e.g., smelt, herring, sand lance, steelhead) Harbor seal/sea lion Gray whales/killer whale Harbor porpoise			
Boulder/ bedrock	Finfish (e.g., rockfish, perch)			

Source: Estuarine Habitat Assessment Protocol (Simenstad, et.al. 1991)

3.2.3 Estuarine/Marine Habitat

Estuarine and marine habitats within Bellingham Bay include unvegetated, vegetated and artificial habitats. Unvegetated habitat includes mudflat/sandflat, shallow slope mixed coarse (sand and small gravel) beach. Deeper water marine habitat consists primarily of unvegetated silt and sand. Vegetated habitat includes areas with marine vegetation such as eelgrass, algae and salt marsh. Artificial habitat includes moderately to steeply sloped rip-rap, concrete and, and vertical bulkheads.

3.2.3.1 Unvegetated Habitat

Known or documented mudflat/sandflat habitat in Bellingham Bay occurs at the mouth of the Nooksack River, Squalicum Creek, Padden Creek, and Chuckanut Creek, within the backwater lagoon areas by Padden and Chuckanut creeks, and Post Point. Smaller mudflat areas occur at low tides along the eastern shore of the Lummi Peninsula, and at the head of I&J Waterway and head of Whatcom Waterway. The Whatcom Waterway mudflat is approximately 2 acres in size and provides a substrate for epibenthic organisms that serve as prey for juvenile salmon migrating from Whatcom Creek. Mudflat/sandflat also occurs along the west and northern shore of Portage Island.

Predominately shallow-sloped, coarse beach habitat occurs along the shoreline fringe on either side of the Nooksack delta to the end of the Lummi Peninsula and east to about Mt. Baker Plywood. This beach habitat also occurs along the southeastern shore of Portage Island and north of the Cornwall Avenue Landfill to south of the Taylor Avenue Dock.

Boulders, bedrock, and mixed coarse substrates provide higher intertidal habitat along the head of Governors Island and at the southern tip of Post Point.

Artificial habitat consisting of concrete, vertical bulkheads, rip-rap occur along the central portion of Chuckanut Bay's shoreline, at the northern end of the Post Point area, and within inner Bellingham Bay from Squalicum Creek to the southern end of the Cornwall Avenue Landfill (Figure 3.1-1).

3.2.3.2 Intertidal and Shallow Subtidal Algae, Kelp, and Eelgrass

Several types of vegetated marine aquatic habitat occur in Bellingham Bay. These include: native eelgrass, the introduced dwarf Japanese eelgrass, green algae, mixed algae, salt marsh, and spit and berm habitat. Marine vegetation is an important aquatic resource – providing food and refuge for commercially and recreationally important species.

Twenty genera of phytoplankton have been identified in Bellingham Bay (CH2M Hill 1984). Phytoplankton densities are usually low from January through March and increase rapidly from April to a peak in June.

Salt marsh habitat occurs primarily in the Nooksack River delta. Smaller areas or fringes of salt marsh are located within the embayment at the mouth of Chuckanut Creek and in a small pocket along the northern shoreline of Portage Island. Salt marsh also occurs in backshore areas between Padden Creek and Chuckanut Bay that are above mean high water but still receive marine influence through spray or irregular flooding. Overall, the acreage of salt marsh habitat appears to have increased nearly 500 percent from approximately 46 acres in 1887 to approximately 272 acres in 1996. This increase has occurred primarily as the Nooksack River delta has grown.

Native eelgrass appears to be the most abundant vegetated community within Bellingham Bay. Approximately 730 acres of native eelgrass have been mapped in the Bay, representing a 156 percent increase from about 1855. Although it typically occurs from about 0 to -20 feet MLLW in Puget Sound, its lower limit in Bellingham Bay appears to be about -12 to -15 feet MLLW. Native eelgrass meadows are present along the southeastern shore of Lummi Peninsula, extending into Portage Bay and along both sides of the Portage Island spit, and in Chuckanut Bay. Smaller eelgrass meadows have been identified along the eastern shoreline of the bay near Boulevard Park, Taylor Avenue Dock, Padden Creek, and at Post Point. Eelgrass patches and smaller meadows have also been identified to the west of Little Squalicum Creek, within the Squalicum Creek Waterway, between the I&J Waterway and the G-P ASB, and along the eastern shoreline of the Bay from north of the Cornwall Avenue Landfill to south of Post Point.

Two relatively large (about 359 acres total) Japanese eelgrass beds occur slightly offshore southwest and east of the Nooksack River delta. Japanese eelgrass typically occurs above about -5 feet MLLW.

Because Bellingham Bay is comprised primarily of unconsolidated sediments, no substantial kelp beds have been identified (Sternberg 1967). Some kelp occurs between Post Point and Clarks Point, at the southeastern end of the Bay.

The only spit and berm habitat is located at the northeast end of Portage Island. A spit and berm habitat is generally defined as an area covered with plants such as dune grass, gumweed and yarrow, which generally occur above the highest tides but still receive salt influence.

3.2.4 Fisheries Resources

3.2.4.1 Surf Smelt and Sand Lance

Surf smelt and Pacific sand lance are common fish that spawn in the high intertidal portions of coarse sand and gravel beaches (WDF 1992). Surveys by WDFW have documented spawning beaches in Bellingham Bay.

Surf smelt spawning occurs over approximately 2.6 miles of shoreline and sand lance spawning occurs over approximately 3.0 miles of beach in Bellingham Bay. Some surf smelt and sand lance spawning areas overlap. Overlapping areas include the high intertidal area along the east shore of the Lummi Peninsula, along the shoreline by Little Squalicum Creek, north of Padden Creek, and along the beach at Post Point. No surf smelt or sand lance spawning has been documented in the Nooksack River delta, inner Bellingham Bay, or Chuckanut Bay, presumably because suitable substrates are not available. Other documented sand lance spawning include the southern end of Lummi Peninsula and portions of beach on the northern shore of Portage Island.

Surf smelt stocks are thought to be genetically fairly distinct, each having its own set of biological characteristics, migrations, spawning schedules, and homing cues. Current studies indicate that a number of surf smelt spawning areas, primarily in northern Puget Sound, receive spawning fish year round with an annual several month peak of activity (Dan Pentilla, WDFW, personal communication). The status of the Puget Sound surf smelt population and sand lance stock is not known.

3.2.4.2 Pacific Herring

Pacific herring spawn in inland marine waters of Puget Sound between about January and June in specific locations. There is typically a 2-month peak within the overall spawning season. Herring deposit their eggs on marine vegetation such as eelgrass and algae in the shallow subtidal and intertidal zones between +1 and -5 feet MLLW. Within Bellingham Bay, relatively low density spawning deposition occurs between about January and June over eelgrass meadows around Portage Island.

Large numbers of adult herring from a variety of places in Puget Sound congregate in a few major holding areas each winter prior to moving to their respective spawning grounds. The deeper water of Bellingham Bay is such an area.

3.2.4.3 Salmonids

Bellingham Bay is used extensively by anadromous salmon species (Shea et al. 1981). Each of the streams flowing into Bellingham Bay is used by one or more of the economically important species listed in Table 3.2-2.

Table 3.2-2 Salmonid Occurrence in Urbanized Streams in Bellingham Bay

	Stream				
Salmon Species	Whatcom Creek	Squalicum Creek	Nooksack River	Padden Creek	Chuckanut Creek
Coho	X	X	X	X	X
Chum	X	X	X	X	X
Chinook	X		X	X	
Pink			X[1]		
Sockeye	X		X		
Steelhead trout	X	X	X	X	X
Cutthroat trout	X		X		
Bull trout	X		X		

[1] Odd years only.
Source: Data Compilation Report, Pacific International Engineering 1999.

The Nooksack River has the largest salmon runs in Bellingham Bay, followed by Squalicum and Whatcom creeks. Concentrations of chum, coho, and chinook salmon along the shoreline and in offshore waters in Bellingham Bay peak annually about mid-May.

Juvenile coho and chinook salmon appear to have different migration habits. Coho remain in the Bay for approximately 30 to 35 days, while chinook remain about 20 days. More recent studies on distribution of chinook salmon (Ballinger et al. 1995) indicate relatively high numbers of juvenile chinook salmon and average numbers of coho salmon use the area between about Cornwall Avenue and the Squalicum Marina.

Chuckanut Bay appears to be an important schooling area. Other shoreline areas considered to be important schooling areas include Portage Bay and the area off Post Point.

3.2.4.4 Groundfish

Several species of groundfish occur in shallow and deeper waters in Bellingham Bay for part or all of their life. Detailed information on groundfish species and their timing and use of Bellingham Bay is not available. Key characteristics of groundfish occurring in northern Puget Sound are generally applicable to Bellingham Bay and are presented in Table 3.2-3.

Table 3.2-3 Characteristics of Groundfish Species.

Species	Relative Abundance in North Sound	Habitat	Spawning
Pacific cod	Abundant	5 to 55 meter depths on mixed substrates	January to March
Rockfish	Abundant; some species are common	Ranges from 0 to over 200 meters in depth depending on species; most species prefer rocky and kelp habitat	Depends on the species; in general from December to March, April, May, and June; pelagic larvae are released near habitat
Lingcod	Common but not considered abundant	0 to 72 meter depth in rocky kelp habitat	December to April; establish subtidal nests on rocky substrates
Rock sole	Abundant	0 to 36 meter depths on flat sand, mud, and cobble substrates	December to March
English sole	Very abundant	To 126 meter depths on flat mud substrates	January to April; documented spawning in Bellingham Bay
Starry flounder	Very abundant	0 to 36 meter depths in flat sand substrates	February to April; documented spawning in Bellingham Bay
Butter sole	Abundant	Flat mud substrates	February to April; documented spawning in Bellingham Bay
Sand sole	Abundant	9 to 54 meter depths on flat sand substrate	January to April; documented spawning in Bellingham Bay
Rex sole	Uncommon	72 meter depths	Winter; documented spawning in Bellingham Bay

Source: Data Compilation Report, Pacific International Engineering 1999.

3.2.5 Marine Invertebrate Resources

A variety of marine invertebrates occur in Bellingham Bay. They range from worms, clams, and small ghost shrimp that penetrate benthic sediments (infauna) or organisms such as very small crustaceans that move off the substrate surface (epibenthic plankters) to larger invertebrates such as oysters, crabs, and shrimp.

3.2.5.1 Clams, Geoduck and Oysters

The predominant bivalves in Bellingham Bay are intertidal and subtidal hardshell clams. Intertidal hardshell clam types include butter, littleneck, horse, and soft-shell clams and cockles. Subtidal clam resources consist of butter, littleneck, and horse clams. Native oyster and Pacific geoduck are also known to occur in Bellingham Bay (Palm 1995; WDF 1981; WDF 1992; Webber 1974).

In the Nooksack River delta, some butter clams, horse clams, and soft-shell clams can be found, but not in abundance (Webber 1974). Shellfish occur in low abundance in the western portion of

Bellingham Bay that is influenced by the Nooksack River. Intertidal hardshell clams occur primarily between the southeast end of Lummi Peninsula and the northern shore of Portage Island, and on the south side of Portage Island. Oyster and littleneck clam seed are planted on selected tideflats in Portage Bay by the Lummi Nation.

Shellfish densities are also relatively low along the eastern shore of Bellingham Bay from about Little Squalicum Creek to Post Point. Scattered oysters also occur along the shoreline of Little Squalicum Creek, Boulevard Park, Squalicum Harbor breakwater, Whatcom Creek estuary, and the Cornwall Avenue Landfill (Palm 1995). Clam densities are higher towards the southern portion (e.g., South Bay Subarea) of the Bay in Chuckanut Bay, along the western side of Govenors Point, and along the shore of Post Point. Scattered oysters also occur in this area. Geoduck distribution in Bellingham Bay is limited to the west shore of Govenors Point and a small area along the north shore of Lummi Island.

3.2.5.2 Shrimp

Seven species of Pandalid shrimp including, pink, coonstripe, dock, and spot shrimp occur in nearshore and deeper waters of Bellingham Bay. For example, coonstripe shrimp have been observed in intertidal areas immediately offshore of the Cornwall Avenue Landfill, and this species is common around piers and floats. Dinnel et al. (1988) and Webber (1977) reported high numbers of shrimp (especially coonstripe, pink, and dock) in otter trawls catches in spring in Bellingham Bay. The highest shrimp densities occur along the shoreline just south of Post Point, east of Portage Island, and in relatively deep (>40 feet MLLW) water offshore from Boulevard Park. Moderate densities of shrimp occur in the central and southeastern portions of Bellingham Bay. Lower densities of shrimp occur in the northern portion of Bellingham Bay in waters generally shallower than about +40 feet MLLW, and off of Governors Point.

3.2.5.3 Crab

Crab trawls conducted for PSDDA investigations indicate the predominate crab resources in Bellingham Bay are the non-edible purple or graceful crab, the edible red rock crab and the edible Dungeness crab. The highest densities of rock crab occur in relatively shallow (-30 to -45 feet MLLW) water near Portage Island, from the Lummi Peninsula to inner Bellingham Bay, and from Post Point to Chuckanut Bay. Moderate densities occur in deeper water and the lowest densities occur in the central portion of Bellingham Bay. Rock and Dungeness crab are likely to occur in shallower waters of Bellingham Bay not sampled as part of the PSDDA investigations.

Dungeness crab is generally abundant in most areas of Bellingham Bay. Dinnel et al. (1988) found that Dungeness crab averaged about 83 crab/hectare in spring. The highest crab catches were consistently made at -30 to -60 feet MLLW depths near Post Point and Portage Island. The lowest catches were generally in the mid-central portion of the Bay. Female crabs were more abundant in the catches than males, and females favored the Post Point and Portage Island locations while they carried eggs.

The northern and eastern shorelines of Bellingham Bay serve as nursery/rearing areas for juvenile Dungeness crab. A shell substrate is a preferred habitat for the first 8 to 10 weeks after larvae settle. However, other substrates such as small cobbles and gravel, algae, and eelgrass are also recognized as important rearing habitat for juvenile crab. It is likely that juvenile Dungeness crab occur seasonally in these types of habitat in Bellingham Bay.

3.2.6 Sea Birds

The greater Bellingham Bay area (including Chuckanut and Portage Bays) and its shallow estuarine habitats support a number of birds at all seasons. Although Bellingham Bay is not used extensively by large populations of waterfowl, wintering populations tend to be 10 to 15 times higher than summer populations for migratory species (Manual et al. 1979). The Bay is located on the flight path between the Fraser River estuary and Skagit Bay and is used as a stopover for seabirds and waterfowl migrating between these two areas. Waterfowl sited in Bellingham Bay include brant, snow geese, mallard, widgeon, green-winged teal, and pintail. Bellingham Bay is also used as an overwintering area for diving birds such as scoter and golden eye. A variety of both natural and man-made habitats (see Section 3.2.2) provide protection from winter storms habitat to migrant and wintering birds.

Glaucous-winged gulls use inner Bellingham Bay for resting and foraging. Pigeon guillemonts use the shoreline area between the Squalicum Harbor Subarea and the Fairhaven Subarea for nesting and foraging. A rock promentory within Chuckanut Bay is used for nesting by glaucous-winged gulls, pigeon guillemonts, and black oyster catchers. Open water concentrations of marbled murrelets occur in the central portion of the Bay. The *Habitat Restoration Documentation Report* (Pacific International Engineering 1999) describes the individual bird species and their use of Bellingham Bay by season.

3.2.7 Marine Mammals

Limited information is available on the presence and residence time of marine mammals in Bellingham Bay (PTI 1989). Four species have been reported – the harbor seal, killer whale, gray whale and harbor porpoise. These mammals are not threatened or endangered species under the Endangered Species Act, but they are protected from hunting under the Marine Mammal Protection Act.

Other marine mammals that may occur in the Bay on rare occasions include the California sea lion, Northern sea lion – a threatened species, Dall's porpoise, and Minke whale. Pinnipeds (primarily harbor seals) haul out on a small island north of the Portage Island spit and southeast of Lummi Peninsula. Table 3.2-4 summarizes information on the marine mammal species reported within Bellingham Bay and others that may rarely occur.

Table 3.2-4 Marine Mammals Life History Information

Species	Feeding	Habitat	Status
Harbor Seal	Opportunistic and eats a wide variety of schooling fish, flatfish, crustaceans, and squid.	Near-coastal and estuarine. May be seen mile up rivers. Haul out on intertidal sandbars and rocky shores	Healthy throughout its range
Killer Whale	Marine mammals, shark, birds, squid, turtles; has very diverse diet	Coastal waters to 500+ miles offshore	Population probably stable
Gray Whale	Dredge through mud and use baleen to filter out bottom-dwelling amphipods and crustaceans	Coastal, shallow waters over continental shelf	Removed from endangered species list; numbers have increased to record high of 21,000+
Harbor Porpoise	Schooling fish including herring, mackerel, smelt, and squid, and invertebrates	Coastal waters, usually in waters less than 300 ft deep	No current abundance estimates
California Sea Lion	Opportunistic; eat schooling fish, squid, rockfish, flatfish, hake, salmon, lamprey, dogfish	Coastal; remote sandy island beaches used for rookeries; haul out on shore, buoys, docks, rafts, etc.	Numbers are increasing. Minimum estimate from California to Washington is 67,000+
Northern Sea Lion	Opportunistic; eat fish, squid, and shrimp	Primarily coastal; use secluded rocks for haul outs and rookeries	Threatened; no critical habitat (i.e., rookeries) occur in state of Washington
Dall's Porpoise	Squid and variety of fish	Pelagic and coastal in cool temperate to cold waters	Seasonally common in some areas
Minke Whale	Feed primarily in summer on schooling fish and zooplankton	Pelagic and common in bays and shallow coastal waters	Status is unknown

Source: Data Compilation Report, Pacific International Engineering 1999.

3.2.8 Threatened, Endangered, Sensitive, and Candidate Species

Under the Endangered Species Act, a species likely to become extinct is categorized as "endangered". A species likely to become endangered within the foreseeable future is categorized as "threatened". This section provides information on the occurrence of threatened and endangered bird and fish species in Bellingham Bay.

3.2.8.1 Birds

The bald eagle (federally listed threatened species), the peregrine falcon (federally listed threatened species), the marbled murrelet (federally listed endangered species), and great blue heron (state sensitive species), use upland, shoreline, and in-water habitat in Bellingham Bay.

Bald Eagle

The majority of bald eagle nest sites occur in the eastern portion of Bellingham Bay, primarily in the Nooksack River delta, along the shoreline and in inland areas of the Lummi Peninsula. There are also some nests along the shoreline of Portage Island and Chuckanut Bay. Marine and freshwater fish are their preferred prey; birds contribute a smaller proportion of the eagle diet. Prey may also include small mammals. Nesting eagles generally forage within10 square miles of their nest site.

Typically, eagles perch on exposed trees or driftwood near the shoreline searching for prey in the water. Courtship activities in the vicinity of the nest site begin in November, breeding occurs from about December through March with egg laying and incubation occurring during March. Eggs usually hatch in April with brooding occurring through June. Eaglets generally fledge in June and July. Adults often depart from the nesting area in August and may not be present for one to several months. Nest trees in the Pacific Northwest are typically tall conifers located in forested or semi-forested areas within about 1 mile of large bodies of water with adequate food supplies, such as the Nooksack River delta.

The bald eagle was proposed for delisting as of July 6, 1999 due to apparent recovery of the species in the U.S. (Federal Register 50 CFR Part 17). No action has yet been taken on this proposal. However, even if the USFWS removes the bald eagle from the list of threatened and endangered species, the bird would still be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. If the bald eagle were de-listed, USFWS would also work with state wildlife agencies to monitor the status of the species for a minimum of five years, as required by the Endangered Species Act.

Peregrine Falcon

Peregrine falcons also occur in Bellingham Bay. They feed almost exclusively on birds captured in flight, especially waterfowl, shorebirds, and game birds. Peregrines watch prey from a perch tree such as Douglas fir and western red cedar. Peregrine falcons typically nest on cliff ledges greater than 150 feet in height that are close to the water. Chuckanut Bay is a peregrine falcon nest area.

Marbled Murrelet

Open water concentrations of marbled murrelets have been recorded in the central portion of Bellingham Bay. They forage in the marine environment typically up to 2 miles near a coastline. The species forages year round in waters generally less than 90 feet deep, sometimes congregating in well-defined areas where food is abundant. These birds generally do not occur in shallower waters less than 30 feet deep. The species is reported to feed on a wide variety of prey including sand lance and Pacific herring; and other marine taxa such as crustaceans. Murrelets require old growth or mature forest composed of conifers, including douglas fir, western red cedar, Sitka spruce, and western hemlock. There are no known nest sites along the shoreline of Bellingham Bay.

Great Blue Heron

Great blue heron occur near all types of fresh and marine water areas. They are found at most elevations, but are more common in the lowlands. Herons are colonial breeders, generally nesting in tall deciduous or coniferous trees near wetlands. A great blue heron rookery has been documented inland along the Lummi Peninsula. Colonies usually exist at the same location for many years, but some heron may relocate their colonies in response to increased predation on eggs and young by mammals or other birds, or declines in food availability.

Heron feed on aquatic and marine animals found in shallow water. Foraging ranges can extend from 2.5 to 18 miles from a herony, but most are located within a radius of about 2.5 to 3 miles. Feeding territory can vary from year to year with respect to size and location.

3.2.8.2 Fish

Salmon

On March 16, 1999, NMFS added nine West Coast salmon to the Endangered Species List. Of the nine listed species, one occurs within the project area - the Puget Sound chinook salmon. The chinook was listed as a threatened species.

Two races of chinook salmon are found in Bellingham Bay, spring and fall chinook. Their occurrence differs by when adults migrate to freshwater and these runs overlap in terms of timing of the return of adult fish, spawning, and emigration of juveniles. Fall chinook is the most common run of chinook salmon observed in Puget Sound. Juvenile fall chinook generally emigrate to the estuary between February and August as sub-yearlings (within the first year after being spawned) or as yearlings. Individual fish may only use Bellingham Bay for a period of days to a few weeks before into the greater Puget Sound estuary. They may use the estuaries and intertidal areas between April through November for further rearing and growth. Food preference in estuaries includes emergent insects and epibenthic crustaceans in salt marsh habitat or decapod larvae, larvae and juvenile fish and other prey as juveniles move into neritic habitats (Simenstad et al. 1991).

Bull Trout

Bull trout, proposed for listing as a threatened species under the ESA by the USFWS, are a member of the North American salmon family. Bull trout occur in the Nooksack River, and presumably spend some time in Bellingham Bay. Many are resident to a single stream; others migrate on a fluvial (i.e., spawn in headwaters streams and live downstream in larger rivers) or adfluvial basis (spawn in streams but live in lakes), and one population in Washington in known to be anadromous (Knowles and Gumtow 1999). Bull trout tend to prefer cold, clear waters – no more than 64 degrees Fahrenheit. They live up to 10 years and are sexually mature after 4 years. Presumably, the various types of trout (i.e., fluvial, anadromous) interbreed at times. They spawn every year or every other year in the late summer and early fall and require particularly clean gravel bars for nests. The anadromous life form may be in saltwater areas as many as 30 to 40 kilometers from the river mouth in spring and have been documented to move as much as 200 kilometers upstream of the river mouth during spawning migrations (Kraemer 1994).

3.3 LAND USE, SHORELINE USE, AND RECREATION/PUBLIC USE

Land uses in Bellingham Bay vary substantially from one area of the Bay to another. This section describes the existing and planned uses for the Bay that will be important factors when considering potential impacts of the final EIS alternatives. Following the description of historical and current land uses in the Bay, a brief review of land use planning programs from the City, County, Port and Lummi Nation is provided. The section concludes with a discussion of the Harbor Areas and waterways in the Bay, including information on navigation and commerce. Additional information on land use can be found in the *Aquatic Land Use Documentation Report*, located at the repositories identified in the Fact Sheet, and also summarized in Appendix B.

3.3.1 Land and Shoreline Use

3.3.1.1 Historical Background

During the 19th century, Bellingham Bay became one of the first industrial areas in Washington. The inner regions of the Bay have been the most urbanized and industrialized. In the 1850s, a sawmill and a coal mining business began operating at the mouth of Whatcom Creek. In 1871, a landfill, now known as the Holly Street Landfill, was established on the tidal flats at the mouth of Whatcom Creek. It became a disposal site for discarded creosote pilings, building materials, automobile parts, and raw sewage for approximately 60 years (Hart Crowser 1996).

Dredging and filling of the inner bay tidelands have occurred since the beginning of the 20th century. In 1904, the Whatcom Waterway was first dredged and a navigational channel created. By 1910, much of the area around the head of the waterway had been modified for street development. In 1920, the area now occupied by G-P was filled and a port commission created to manage development of the waterfront. By the late 1920s, the Squalicum Creek Waterway was first dredged and wharves built to accommodate fishing vessels.

In 1953, the City of Bellingham opened a municipal solid waste landfill, now known as the Cornwall Avenue Landfill, on the tide flats. It was used for approximately 12 years, and upon closure the landfill was covered with a layer of soil (Landau 1998).

In 1963, G-P purchased Puget Sound Pulp and Timber Company, which had previously combined tissue and pulp manufacturing at the plant on Whatcom Waterway (Hart Crowser 1996). At the time of purchase, the operation included calcium-based bleached sulfite pulp production, alcohol production, lignin by-product manufacture, and paperboard and tissue production. In 1965, G-P established a chlor/alkali plant using the mercury cell process and a sodium chlorate facility. Wastewater from the chlor/alkali plant was initially discharged to a log pond connected to the Whatcom Waterway. In response to concerns about mercury discharges to the log pond, process changes and waste handling improvements were implemented in 1970. By 1979, direct wastewater discharge to the log pond was entirely eliminated (Ecology 1980).

By 1970, the Port of Bellingham owned one-quarter (approximately 2,000 acres) of the city shoreline, of which 500 acres were available for industrial development. From 1965 to 1974, Roeder Avenue Landfill, a municipal and wood waste landfill (created by the City and G-P) on the western side of the Whatcom Waterway, was filled and a diked lagoon was added to treat effluent from the G-P mill located across the waterway. In 1981, the Port expanded the Squalicum Harbor Marina by dredging and filling tidal areas (PTI 1989).

3.3.1.2 The Bay Today

Today, a wide variety of land use activities are evident along the shoreline. Key land use features are identified on the subarea maps provided in Appendix A. This section briefly describes the features of each subarea.

West Bay

This subarea extends from Portage Island, along the east side of the Lummi Peninsula, past the Nooksack delta, to the beginning of the current Harbor Area designation that starts west of Little Squalicum Creek. The shoreline is predominantly undeveloped in this area. The water/land interface from the eastern end of the subarea to the west side of the Nooksack River delta is generally gently sloped beach consisting of sand, gravel, and cobble with boulders at the landward edge. The Nooksack River delta is predominantly sand and mudflat and saltmarsh. From the western edge of the Nooksack River delta to the southern end of the Lummi Peninsula, the shoreline is relatively gently sloped gravel and cobble beach with rip-rap at the landward edge. The majority of this subarea is designated as Conservancy under the County SMP, and the Nooksack River delta and Lummi Peninsula are Tribal Trust lands. Some homes have also been built along the Lummi Peninsula shoreline.

Squalicum Industrial

This subarea extends from the beginning of the existing Harbor Area designation west of Little Squalicum Creek to the change in shoreline designation from Maritime Multi-Use to Maritime at the eastern boundary of the Weldcraft site. The shoreline along this subarea is predominantly developed for commercial and industrial uses. The shoreline (roughly 800 feet) east of the Cement Plant Dock is gently sloped sand and gravel beach with boulder at the landward edge. The shoreline in the remainder of the subarea is primarily artificial (i.e. bulkheads, rip-rap). The Little Squalicum and Squalicum creeks drain into the Bay in this subarea. The shoreline is designated as Conservancy west of the Cement Plant Dock, where the shoreline is relatively undeveloped. East of the Cement Plant Dock, there are two shoreline designations: public and maritime. Key features in this subarea include:

- Harbor area designation
- Cement Plant dock
- Public trail system
- Mt. Baker Plywood
- Federal navigation channel
- Bellingham Cold Storage
- Weldcraft sediment site

Squalicum Harbor

This subarea extends from the change in shoreline designation from Maritime Multi-Use to Maritime at the eastern boundary of the Weldcraft site, to the head of the I&J Waterway. Nearly the entire shoreline along this subarea is developed for commercial and industrial uses, and consists of artificial (i.e. bulkheads, rip-rap) substrate. The shoreline is designated primarily as Maritime Multi-Use and a small area around Zuanich Park is designated as Public. Key features in the Squalicum Harbor Subarea include:

- Harbor area designation
- Inner and outer Squalicum basins
- Public boat launch
- U.S. Coast Guard Station
- Zuanich Park

- Bellwether on the Bay
- Port of Bellingham offices
- Federal navigation channel

Central Waterfront

This subarea extends from the head of the I&J Waterway to the northeast side of the Whatcom Waterway at the point where the authorized navigation depth in Whatcom Waterway changes from – 18 to –30 feet MLLW. Nearly the entire shoreline along this subarea is developed for commercial and industrial uses, and consists of artificial substrate (i.e. bulkheads, rip-rap). Whatcom Creek drains into the Bay in this subarea. The shoreline is designated as Maritime. Key features in this subarea include:

- Harbor area designation
- Federal navigation channels
- Hilton Harbor marina
- Bornstein Seafood
- G-P ASB
- Citizens Dock
- Central waterfront properties

Whatcom Industrial

This subarea extends from the Whatcom Waterway, where the authorized navigation depth in Whatcom Waterway changes from – 18 to –30 feet MLLW on the northeast side of the waterway, to the south end of the Cornwall Avenue Landfill. Nearly the entire shoreline along this subarea is developed for commercial and industrial uses, and consists of artificial substrate (i.e. bulkheads, rip-rap). Seaward of the rip-rap shoreline at the Cornwall Avenue Landfill, the beach is primarily large cobbles and gravels with some sand. A pocket sand/mudflat occurs north of the Cornwall Avenue Landfill in the location of a potential public access beach. The shoreline is designated as Maritime. Key features of the Whatcom Industrial Subarea include:

- Harbor area designation
- Federal navigation channel
- G-P facilities including log pond
- Bellingham Shipping Terminal
- Cornwall Avenue landfill

South Hill

This subarea extends from the south end of the old Cornwall Avenue Landfill to just south of the Taylor Avenue Dock (Douglas Avenue right-of-way). The shoreline in this area is predominantly undeveloped. The water/land interface from the south end of the Cornwall Avenue Landfill to the north end of Boulevard Park is gravel, cobble, and sand with rip-rap. Rip-rap extends along the shoreline of Boulevard Park. At the southern end of the subarea, the shoreline is cobble and gravel with rip-rap armoring at the landward edge of the rail lines. No creeks drain into this subarea. This subarea is designated as Public. Key features in this subarea include:

- Harbor area designation
- Southern end of Cornwall Avenue landfill
- Boulevard Park
- Boulevard Park sediment site
- Starr Rock sediment and disposal site

Fairhaven

This subarea extends from just south of the Taylor Avenue Dock (Douglas Avenue right-of-way) to the north boundary of Marine Park. The shoreline from south of the Taylor Avenue Dock to the public boat launch ramp consists primarily of cobble, gravel, and sand with rip-rap armoring at the landward edge along the rail lines. The lagoon embayment (Padden Creek lagoon) is an intertidal mudflat with rip-rap along the eastern shore and vegetated park along the western shore. South of the public boat launch ramp, the shoreline is artificial (i.e. bulkheads, piers, and rip-rap). Padden Creek drains into this subarea. The shoreline in this subarea supports a variety of commercial and industrial uses, and is designated as Maritime Multi-Use and Maritime. The State of Alaska Bellingham Cruise Terminal, located off Harris Avenue, has 500 feet of berth space, with depths of 33 to 36 feet. Key features of the Fairhaven Subarea include:

- Harbor area designation
- Padden Creek dock
- BNSF over-water rail lines
- Public boat launch
- Barge stub pier
- Bellingham Cruise Terminal
- Bellingham Bay shipyard

South Bay

This subarea extends from the northern boundary of Marine Park to Governor's Point. The shoreline in this subarea is relatively undeveloped and is primarily used for public access and residential development. The water/land interface consists primarily of cobble, gravel, and sand with boulders and rip-rap. There are three pockets of mudflat lagoons, the largest being the Chuckanut Creek lagoon. Chuckanut Creek drains into this subarea. The shoreline in this area is designated as Edgemoor Bluff, Clarks' Point, Lagoon Conservancy, and Chuckanut Bay. Key features in the area include:

- Harbor area designation
- Marine Park
- City of Bellingham Post Point waste water treatment plant
- Railroad over water and along the shoreline

Marine

This subarea consists of the deeper subtidal waters of Bellingham Bay, encompassing the Bay bottom in those areas below about – 40 feet MLLW contour. Key features in this subarea include:

- G-P outfall
- PSDDA disposal site
- Commercial, tribal, and recreational fishing
- Commercial shipping and recreational boating navigation

3.3.2 Land Use Planning

Four different jurisdictions govern land uses on the shoreline of Bellingham Bay – the City of Bellingham, Whatcom County, Port of Bellingham, and Lummi Nation. Through comprehensive plans and shoreline master programs, these organizations determine what activities and facilities are approved within the shoreline of their jurisdiction. Implementation of activities under the Comprehensive Strategy must be in accordance with land use regulations.

3.3.2.1 City of Bellingham

Shoreline Master Program

The City of Bellingham's Shoreline Master Program (SMP) regulates and manages uses and activities within 200 feet of the shorelines within the City. In doing so, the SMP attempts to create an appropriate balance between economic development, water quality, conservation, and public uses.

As described above, from the southerly city limits near Chuckanut Bay to the northerly city limits near Squalicum Creek, Bellingham Bay represents a wide range of physical characteristics and development patterns. The SMP manages this range of environments through the use of shoreline designations. These designations include broad goals for the area within each respective designation and actions the City will undertake to help achieve those goals. Through the public participation and review process, these designations also reflect the community vision for how that section of Bellingham Bay shoreline should develop.

The existing SMP was adopted in 1989, and the City is presently updating it. The new SMP will have new environmental designations, goal statements and action strategies for accomplishing those goals and a set of environmental expectations. The purpose of the new SMP is twofold: (1) to promote the public's health, safety and welfare along the shorelines, and (2) to encourage redevelopment, increase public access, improve water quality and enhance habitat within the shoreline jurisdiction. The Bellingham Planning and Community Development Department is working with a Citizen and Technical Advisory Committee to update the SMP.

There has been a purposeful delay in the adoption of the new program in order to integrate it with the Comprehensive Strategy of the Pilot. The Comprehensive Strategy makes recommendations for desirable land and aquatic uses within Bellingham Bay according to existing zoning, development patterns and the goals and action strategies within the draft SMP. The new SMP will facilitate these recommendations as well as provide opportunities for those unforeseen land and aquatic uses in the future.

City of Bellingham Comprehensive Plan

The Bellingham Comprehensive Plan is an integrated statement intended to promote economic vitality, the wise use of land, and to protect the health, welfare, and safety of all residents of the city. The plan comprises neighborhood plans for 22 different neighborhoods throughout the city, and seven elements that address issues relevant to future development.

Within each neighborhood plan there are sections devoted to neighborhood character, open space, public facilities, and land use. The land use classification system for each subarea includes a general use type to group common land uses together and use qualifiers that focus more specifically on what exactly are the allowable uses within the subarea. A zoned area may be further modified by conditions peculiar to the site or neighborhood. The two primary elements that affect the Pilot project are (1) Land Use and (2) Open Space, Parks and Recreation.

Seven of the 16 zoning designations in the Comprehensive Plan are represented along the shoreline. These are: Waterfront Commercial, Planned Commercial, Light Industrial, Marine Industrial, Heavy Industrial, Residential Single, Residential Multi-Multiple and Public.

3.3.2.2 Whatcom County Shoreline Master Program

The overall goal of the Whatcom County Shoreline Master Program is to achieve rational, balanced, and responsible use of the County's irreplaceable shorelines. To achieve that goal, the program strives to promote the public health, safety, and general welfare by providing long range, comprehensive policies and effective, reasonable regulations for development and use of Whatcom County shorelines.

There are seven elements in the County's shoreline program – Economic Development, Public Access, Recreation, Circulation, Shoreline Use, Conservation, and Historic-Cultural. The purpose of the designations is to provide a systematic, rational, and equitable basis upon which to guide and regulate development within specific shoreline reaches.

3.3.2.3 Port of Bellingham

Master Plans & Scheme Of Harbor Improvements

The Port of Bellingham is responsible to the citizens of Whatcom County for providing shipping and marine cargo facilities, general boating and maritime industry facilities, as well as assisting in maintaining and developing a healthy regional economy. The Port has a series of Master Plans for areas within their jurisdictions. These areas are Fairhaven, the Bellingham Shipping Terminal, and the Squalicum Harbor area. These Master Plans identify the goals and policies the Port will use to manage development in the area.

The Bellingham Shipping Terminal Master Plan is currently being updated by the Port. The Port Commission is evaluating four alternative development scenarios for the area from the Whatcom Waterway to the Cornwall Avenue Landfill site with the goal of ensuring that water-dependent commerce activities are not precluded from the waterfront. The Master Plan is scheduled to be submitted to the City in mid-1999 after public review.

The Port is also beginning a process to clean up and redevelop the Central Waterfront area. The Central Waterfront Redevelopment project will consist of two primary components: (1) waterfront planning and development, and (2) environmental remediation. The project will evaluate options for accommodating a range of commercial and industrial uses adjacent to federal navigation channels and state harbor areas, determine infrastructure requirements and costs for those uses including public use and waterfront access, determine the economic feasibility of implementing such a redevelopment plan, and remediate contaminated industrial properties, sediments, and waterfront parcels undergoing redevelopment or property transfer. The Port's Central Waterfront Redevelopment Plan, which includes a site characterization and land use report, was issued in January 2000, following a number of community meetings. The City Planning Commission conducted a public hearing on proposed land use changes articulated in the plan on February 10th, 2000. Land use issues are currently under consideration by the Planning Commission. Following zoning decisions by the commission, the Port will hold additional public meetings

Port Management Agreement

The Port of Bellingham and DNR entered into a cooperative agreement in September 1997 to allow the Port to manage state-owned aquatic lands through a Port Management Agreement (PMA) (RCW 79.90.475). The Port is responsible for managing the aquatic lands covered under the PMA consistent with federal and state regulations and laws, and DNR's aquatic land management goals of fostering water-dependent uses, ensuring environmental protection, encouraging public use and access, promoting production on a continuing basis of renewable resources, and generating income from the use of aquatic lands consistent with the goals.

The Port currently has three aquatic areas covered under the PMA: (1) the area near the Squalicum Harbor, (2) an area from the Whatcom Waterway to the Cornwall Avenue Landfill site, and (3) an area at Fairhaven from Douglas Street to Post Point. The term of the leases covered under the PMA extend for thirty years to the year 2027.

3.3.3 Lummi Nation Zoning Ordinance

The Lummi Nation has a zoning ordinance in place which provides regulations and land use designations for areas on the reservation. This ordinance includes land use designations such as residential, commercial, industrial, forest, marine natural, and Tribal fishing. Proposed developments are evaluated against the existing zoning ordinance and require permits from the Tribe. Permit applications are reviewed by a technical review group comprising people with different expertise. The Lummi Nation is currently developing a comprehensive plan for the reservation and is updating their zoning ordinance. Both actions are anticipated to be complete by 1999.

3.3.4 Harbor Areas and Waterways

State-owned lands in Bellingham Bay include bedlands, tidelands, filled tidelands, and designated Harbor Areas across those lands. Bedlands are those lands lying waterward of the extreme low tide mark, or the outer arbor line. There are approximately 23,000 acres of bedlands in the planning area. Roughly 10 percent of the tidelands are state-owned and are managed by DNR. The remaining 90 percent are private, port, city/county and tribal.

Harbor areas are the area of navigable waters which "shall be forever reserved for landings, wharves, streets and other conveniences of navigation and commerce" (RCW 79.90.020). Harbor areas are administered by DNR or by Port Districts under Port Management Agreements and provide a means of protecting the public interest by ensuring state ownership and control of state-owned aquatic lands in front of and near the commercially important waterfronts of cities. State law guides development within harbor areas and gives preference to water-dependent commerce over other uses.

The Bellingham Harbor Area was originally established by the state of Washington as two separate harbor areas – New Whatcom and Fairhaven – on September 1, 1891. Three waterways were also added established at that time. Harbor areas exist between the inner and outer harbor lines as established by the state harbor line commission (Figure 3.3-1).

The Bellingham Harbor Area encompasses 620 acres and stretches from near the northern city limit south into Chuckanut Bay. The Bellingham Harbor Area is cut by three waterways platted across aquatic lands to provide access between uplands and open water, or between navigable bodies of water. DNR has 16 leases and easements in the Bellingham Harbor Area, covering approximately 129 acres.

DNR also establishes waterways to protect access to the water for commerce and navigation. All waterways are reserved from sale or lease and are to remain as public highways for watercraft. Whatcom, I&J, and Squalicum waterways were established as waterways by the State in 1891.

3.3.4.1 Federally-Authorized Navigation Channels

Whatcom, I&J, and Squalicum waterways are federally-authorized channels for navigation and commerce (Figure 3.3-1). The United States Congress' authorization of Corps of Engineer channel deepening projects established the current depths of the three navigation channels in Bellingham Bay. The Whatcom Waterway was initially authorized for dredging by the River and Harbors Act of June 15, 1910. Public Law 86-645, Section 7 (May 5, 1965) first authorized the I&J Waterway. And the River and Harbors Act of July 3, 1930 first authorized the dredging of the Squalicum Creek Waterway.

The authorized depth for the Whatcom Waterway navigation channel is –18 feet MLLW at the head of the waterway, and –30 feet MLLW for the rest of the waterway. The authorized depth for the I&J Waterway is –18 feet MLLW. The I&J Waterway is 100 feet wide, and the Whatcom Waterway is 363 feet wide. As described in Section 3.1.3.1, substantial shoaling has decreased the navigable depths in these channels, particularly at the head of the waterways. Any future modification to the federal navigation channels requires approval by both Congress and the Corps. The Corps will survey the local sponsor if a proposed channel modification could affect the channel's use. If the sponsor, a landowner or local user objects, the Corps will typically not support the modification.

3.3.4.2 Navigation and Commerce in Bellingham Bay

The Port of Bellingham operates a year-round marine shipping facility. The Bellingham Shipping Terminal plays an integral role in the economy of Whatcom County. Main products moving through the terminal include wood pulp and aluminum ingots from two local industries with a combined employment of more than 2,500 people.

A Burlington Northern-Santa Fe main line runs adjacent to the BST. A rail spur runs from the terminal to the main line; a rail barge transfer span is on site. Rail lines connect with Canada's CN, CP, and BC Rails.

Table 3.3-1 provides a review of the navigation and commerce uses of the sediment cleanup sites in the Bay.

Table 3.3-1 Navigation and Commerce Uses at Sediment Cleanup Sites

Site	Current Uses
Whatcom Waterway	Federally-authorized navigation channel providing access for deep draft ship traffic to the Port's shipping terminal, the G-P facility, and other water-dependent industry and commerce. Marine traffic includes break bulk ship cargo, barge access to the central waterfront, delivery of commercial fish catch, and access to boat repair yard.
I&J Waterway	Federally-authorized navigational channel providing access for moderate draft ship traffic to Squalicum Harbor, U.S. Coast Guard Station, and fish processing operations.
G-P Log Pond	Shared ownership by the Port and G-P. The area has been used for small vessel moorage rather than log rafting in recent years.
G-P ASB	State designated Harbor Area intended to support navigation and commerce by providing access to upland facilities. Since upland area is fully dedicated to waste water treatment, used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.
Port Log Rafting	State designated Harbor Area with aquatic land leases to the Port and G-P for log rafting, navigation and commerce, including access to the Port's Chemical Dock facility leased to G-P for export (lignins, caustics) and import (chlorine).
Starr Rock	State designated Harbor Area used primarily for shallow draft recreational boating and traffic along the shoreline. Some tribal/commercial fishing. Adjacent upland use is primarily City park.
Cornwall Avenue Landfill	State designated Harbor Area with aquatic land lease to G-P for in-water log rafting. Upland long storage and warehouse. Beach and shoreline access is prohibited because of uncontrolled landfill waste. Tribal/commercial fishing and recreational boating traffic along the shoreline.
Harris Ave. Shipyard	Shipyard activities including the operation of a drydock.

3.3.4.3 Traffic Routes, Volume and Sailing Schedules

Bellingham Harbor has a deep water approach ranging from 96 feet in depth in the outer portion to 24 feet near the shore, except in the northerly portion, where tide flats extend about a quarter to half a mile from the shore. These tidal flats merge with the delta of the Nooksack River at the north end of the Bay (Navigation Data Center 1998). The mean range of tide is 5.9 feet; the diurnal and extreme ranges are 9.5 and 17.0 feet respectively (Navigation Data Center 1998).

Deep-draft vessels approaching Bellingham Bay from the north use the channel between Lummi and Sinclair Islands. Vessels approaching from the south generally use the Bellingham Channel that leads eastward from Rosario Straight. Shallow-draft vessels proceeding to Bellingham from the south frequently use Swinomish Channel and Padilla Bay, and from the north, Hale Passage. (Navigation Data Center 1998)

The Port of Bellingham conducted an assessment of the three waterways in 1998 (BST Associates 1998). This assessment examined the changes to the shipping fleet over the past twenty to thirty years. The study found a marked increase in the use of deeper draft vessels during this time period. Vessels with drafts from 37 to more than 45 feet seek to call on ports throughout the Pacific Northwest. The report notes that:

"The depth of the channels are currently insufficient to accommodate full loads (breakbulk vessels) in Bellingham. As a consequence, carriers must shift their traffic pattern and call Bellingham before the ship becomes fully loaded. This is inefficient and requires approximately 1 to 2 days of additional sailing time per trip, which could add between $10,000 and $20,000 additional cost per sailing. In addition to meeting design drafts of vessels, an underkeel clearance of between 2 and 5 feet is also required as a safety factor for operators, especially for scheduled breakbulk operators who must meet their schedule and cannot sail with the tides." (BST Associates 1998).

Turning Basins, Anchorages

Two federally designated anchorage areas have been established in the Bay as shown on Figure 3.3-1. The bottom of these areas consists of a thin accumulation of mud over hardpan forming rather poor holding ground in heavy weather. General Anchorage has a circular radius of 2,000 yards, and Explosives Anchorage has a circular radius of 1,000 yards (Navigation Data Center 1998). Several natural anchorages also exist within the Bay, as shown on Figure 3.3-1.

Berthing Areas and Current Facilities

The National Data Center (NDC) compiles information on the navigation practices in Bellingham Bay by pier, wharf, and dock. General cargo facilities include the Bellingham Shipping Terminal Wharf with usable berthing space of 1,370 + 500 (feet) and a current depth of 26 to 31feet. There are six dry bulk handling facilities including Port of Bellingham Barge Wharf and Georgia Pacific West's 1,400-foot berth. Products conveyed include seafood, salt, wood chips, chemicals, cement and logs. Bellingham has two waterfront shipyards and several boat yards.

3.3.5 Recreational/Public Use

3.3.5.1 Parks, Trails and Waterfront Access

A variety of parks are found in the area, including 23 neighborhood parks, 8 community parks, 18 special use areas and 24 natural open space areas owned by the State, County, Port, Bellingham School District and City (Bellingham 1995). Some of the larger parks along the shoreline include Little Squalicum Park, Maritime Heritage Center Park, Boulevard Park, and the Port of Bellingham Marine Park.

A few non-motorized trails exist along the shoreline, however, the City Parks and Recreation Department's Open Space, Parks, and Recreation Plan indicates the number of trail miles available to the local population is a slightly below the recommended standard. Accordingly, the Parks and Recreation Department is interested in adding to their existing trail system. Potential trail corridors have been identified by the City along the entire shoreline of the inner bay.

While the City owns land along major stream corridors in the Bay, they do not provide much saltwater shoreline access. Most of the shoreline is developed and in private ownership. The City is pursuing development of the Whatcom Creek Waterfront Action Program, Taylor Avenue Dock project, and is interested in adding public access and shoreline trail features along the shoreline.

3.3.5.2 Tribal, Commercial and Recreational Fishing

Within Bellingham Bay there are two tribal groups with fishing rights: the Lummi Nation and Nooksack Tribe. They use and enjoy a variety of fisheries resources from Bellingham Bay and surrounding streams and rivers for subsistence, ceremonial, and commercial purposes. These resources include a wide variety of salmon, other fish, crab, and clams, which have varying harvest times:

- Salmon – July 15 through January 31
- Crab – July 1 through April 15
- Clams – March 1 through June 30

Major tribal shellfish areas are found in and around Portage Bay and Portage Island, and along the Lummi Peninsula. Primary species harvested by the Lummi Nation include Pacific oysters, native littleneck clams, and Manila clams. Clam harvests, primarily from the Lummi Nation, have increased considerably over the past 25 years. During the last 5 years, the annual baywide harvest of clams has averaged approximately 117,000 pounds per year (tribal and commercial landings). Tribal commercial harvest of Manila clams on tidelands of the Lummi Reservation has grown rapidly in recent years. In 1988, over 162,000 pounds were harvested by tribal diggers (Cochrane and MacKay 1989). Oyster and littleneck clam seed from the Lummi Nation Shellfish Hatchery are planted on selected tideflats on the north side of Portage Island in Bellingham Bay. Crab landings have remained stable over the past 25 years, at an annual baywide harvest of approximately 233,000 pounds per year (tribal and commercial landings).

The only commercial shellfish harvesting area in Bellingham Bay is the Portage Island area. The Washington Department of Health (WDOH) decertified a portion of the commercial harvest area due to high fecal coliform counts in routine samples (WDOH 1997).

WDOH is considering approving an area for recreational shellfish harvest north of the spit on Portage Island. Although a public shellfish beach is located in the Post Point area, the majority of inner Bellingham Bay is either uncertifiable or decertified, or an advisory against shellfish harvest has been issued by WDOH. All of Chuckanut Bay is closed to recreational shellfish harvest.

Tribal and non-tribal commercial salmon fishing occurs throughout Bellingham Bay. Sport fishing is generally restricted to an area south of Post Point to Chuckanut Bay and off Governors Point. Table 3.3-2 identifies the timing of salmon and trout fisheries.

Table 3.3-2 Salmon and Trout Fisheries in Bellingham Bay.

Species	Fishery
Coho	mid-September to mid-November
Chum	early November to mid-December
Chinook	late July to mid-September
Pink	July in odd years
Sockeye	no fishery
Steelhead	mid-December to January
Cutthroat	no commercial fishery
Bull trout	no fishery

The most lucrative fisheries in Bellingham Bay are the chinook, coho, and chum salmon. Although there are no targeted fisheries for pink and sockeye salmon, these species are incidentally caught in the Bay. Sockeye salmon are also caught incidentally in the Nooksack River fisheries. Over the past 15 years, salmon have represented the largest portion of total catch from Bellingham Bay.

Several groundfish species occur in Bellingham Bay. These species are used by the Tribes and are harvested by other users of the Bay, and are considered to be economically and ecologically important. These species include but are not limited to:

- Pacific cod
- Rockfish
- Lingcod
- Rock Sole
- English sole
- Starry flounder

Except for inner Bellingham Bay, the entire bottom of the Bay is considered part of the recreational fishery for marine fisheries resources (CH2M Hill 1984). Commercial fishing for these species occurs primarily in the deeper water of the central part of the Bay.

Prior to about 1984, there was a relatively large herring fishery. However, declines in the length and age of fish were observed by WDFW in 1980. These data, along with uncertainties regarding the origin of local stock, prompted closure of the fishery in 1984.

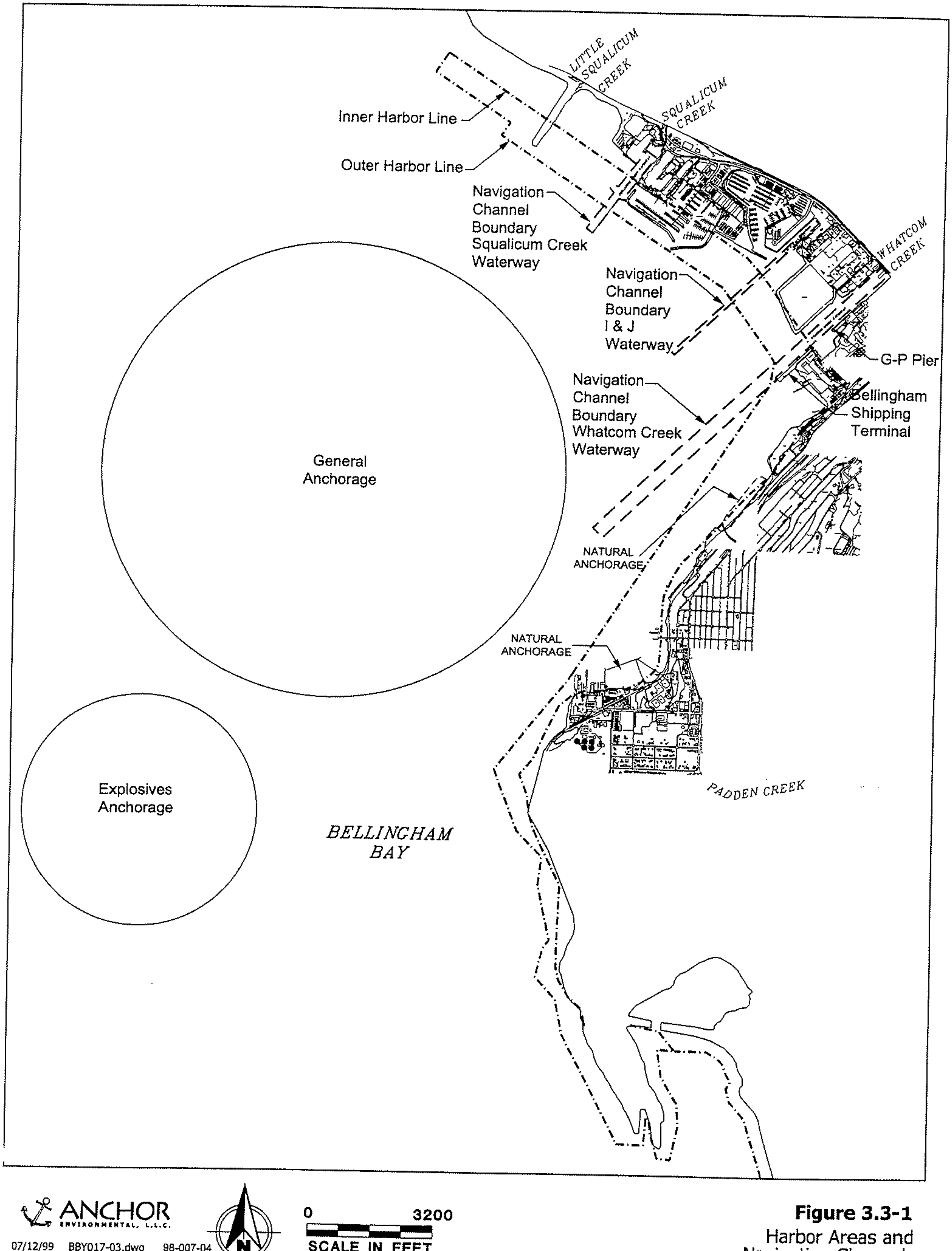

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Figure 3.3-1
Harbor Areas and Navigation Channels

3.4 AIR AND NOISE

3.4.1 Air Quality

3.4.1.1 Air Quality Standards

Air quality in the Bellingham Bay study area is regulated by EPA, Ecology and the Northwest Air Pollution Authority (NWAPA). Each agency has its own role in regulating air pollution. NWAPA has local authority for regulation and permitting of stationary sources and construction emissions. Ecology regulates mobile sources. The EPA sets national standards and has oversight authority over NWAPA and Ecology.

Under the 1970 Clean Air Act, EPA established air quality standards for six pollutants. These standards, known as National Ambient Air Quality Standards (NAAQS) specify maximum allowable concentrations over varying time periods. For regional air quality to remain in attainment with these standards, they cannot be exceeded more than a given number of times per year over a given time period. The major airborne pollutants of concern are:

- Particulate Matter (PM_{10})
- Particulate Matter ($PM_{2.5}$)
- Lead (Pb)
- Sulfur dioxide (SO_2)
- Carbon Monoxide (CO)
- Ozone (O_3)
- Nitrogen Dioxide (NO_2)

Under the Clean Air Act, EPA develops two standards for each pollutant of concern – a primary standard for protection of public health, and a secondary standard for protection of public welfare. Public welfare includes effects on soils, water, crops, vegetation, buildings, property, animals, wildlife, weather, visibility, transportation and other economic values, as well as personal comfort and well-being.

3.4.1.2 Sources of Air Pollutants

Primary sources of pollutants in the study area are automobile traffic, marine activities and industrial activities. Fueling and operation of gasoline-powered automobiles and boats generate CO. However, periodic monitoring of CO levels indicates that levels are low and this pollutant is not presently a concern in the study area (Keel and Franzman 1999).

The G-P pulp and paper mill is the primary industrial source of air pollutants in the study area. Other nearby industrial sources of air pollutants include Intalco Aluminum and the Tosco and Arco oil refineries. Sulfur dioxide emissions are monitored at all of these industrial facilities, and an unusually high concentration is periodically measured. However, these occurrences are rare in the study area, and temporary exceedences have been within the allowable standards set forth by EPA. Within NWAPA's jurisdiction, most of the industrial emissions of SO_2 come from petroleum refining and aluminum production.

Ground-level ozone is a key ingredient of urban smog, formed by the reaction of gases (nitrous oxides and hydrocarbons) in the presence of heat and sunlight. These gases are emitted from combustion sources such as motor vehicles and power plants. Ozone concentrations are measured on a regional basis and monitored by NWAPA. In general, the prevailing winds common to Bellingham Bay help to keep ozone concentrations within EPA standards.

3.4.1.3 Existing Air Quality in Bellingham Bay

The three pollutants most likely to be of concern in the study area are sulfur dioxide (SO_2), particulate matter and ozone (Keel 1999). NWAPA operates several air quality monitoring stations within its jurisdiction. Ten stations at industrial facilities monitor concentrations of SO_2, three stations monitor PM_{10}, and one station in Lynden monitors ozone. Monitoring results show that air quality in Bellingham Bay is good, and is currently in attainment with all air quality pollutant criteria.

3.4.2 Noise

3.4.2.1 Measuring Noise

The unit used to measure noise is the decibel (dB). The A-weighted decibel scale (dBA) was developed to better approximate the sensitivity of the human ear to sounds of different frequencies. The A-weighted scale is used in most noise ordinances and standards. Decibels are measured logarithmically. An increase of 10 decibels means that the sound is 10 times as loud. Thus, 80 dB is 10 times louder than 70 dB and 90 dB is 100 times louder than 70 dB. Light traffic generates a decibel rating of 50 dB, while truck traffic, rates around 90 dB.

3.4.2.2 Noise Regulations and Impact Criteria

Washington State noise standards (WAC 173-60-040) identify the maximum permissible noise levels for three classes of land use:

Class A: Residential, multi-family, recreational and entertainment (parks, camping facilities, resorts), and community service facilities (hospitals, correctional facilities).

Class B: Commercial & retail uses, banks, office buildings, recreational and entertainment (theaters, stadiums, fairgrounds), community service facilities (schools, churches, government and cultural facilities).

Class C: Industrial, agricultural, storage and distribution facilities

The zoning or land use of both the source of noise and the receiving property are considered in the state noise standards. Sounds originating from temporary construction sites as a result of construction activity are exempt from the state rules, except for the provisions for Class A properties between 10 p.m. and 7 a.m.

The City of Bellingham municipal code includes a section on Public Disturbance Noise (10.24.120). This section provides general description of sounds that are considered a public disturbance, without establishing minimum standards or specifying decibel levels. For example, construction and industrial noise in residential areas, between the hours of 10 p.m. and 7 a.m. is considered unlawful. This is consistent with the Washington State noise limitations. In the absence of a specific local noise ordinance in Bellingham, Washington State limitations apply within city limits.

3.4.2.3 Existing Noise Sources

Land uses around Bellingham Bay are a mixture of open space, residential communities, and marine/industrial operations. Noise in the study area is caused by airplanes, vehicular traffic, ferries, trains, and commercial/industrial activities. Sensitive noise receptors (Class A land uses) include residential communities on Lummi Nation Tribal lands along the north side of the Bay, in Bellingham, just north of the central business district and in the South Hill and Fairhaven neighborhoods on the south side of the Bay. Several parks along the Bay are also considered sensitive receptors, including Little Squalicum Park, Maritime Heritage Center Park, Boulevard Park, and the Port of Bellingham Marine Park.

3.5 CULTURAL RESOURCES

The project area is part of an active marine shoreline that has undergone many changes since the glaciers retreated from the area approximately 8,000 years ago. Sea level fluctuations associated with glacial retreat and sea level rise submerged parts of the Bellingham Bay shoreline that may have been exposed and habitable at approximately 5,000 years ago. The level did not stabilize to the current level until approximately 2,250 years ago (Williams and Roberts 1989). Sand spits and small embayments or coves such as those found on Portage Island and in the Fairhaven area may contain submerged archaeological sites that were inundated over time by the rising sea level. The identification of shell midden sites along the shore of Bellingham Bay from Portage Island to Chuckanut Bay reveal the likelihood for hunter-fisher-gatherer deposits.

3.5.1 Previous Cultural Resource Studies

A review of existing literature was conducted to provide an overview of cultural resources in the project area. This review was conducted to determine the probability for hunter-fisher-gatherer and historic archaeological resources, and historic structures within or adjacent to the project area that are listed in the National Register of Historic Places (NRHP), or are eligible for listing in the NRHP. The review included consultation with state and county agencies responsible for maintaining inventories of archaeological sites, including shipwrecks and historic structures, to locate recorded sites and structures within or adjacent to the project area, and to determine their evaluation status. Background ethnographic and historic information was acquired through review of ethnographies, local histories, previous cultural resource studies, historic maps, and geologic and soil surveys.

Cultural resource investigations in and near the project area vicinity have included overviews, field surveys, and testing projects (*Bellingham Bay Demonstration Pilot Project, Whatcom County Cultural Resources Overview Report, LAAS, 1999*). Twenty-four hunter-fisher-gatherer archaeological sites along the shore of Bellingham Bay have been identified during previous cultural resource studies and archaeological investigations in the project area vicinity.

3.5.2 Tribal Consultation

The Pilot project area is within the territory of the Nooksack and Lummi tribes. Territorial divisions were described by Suttles (1951), who placed Lummi territory within the San Juan Islands and along the mainland shoreline from Point Whitehorn to Chuckanut Bay. Nooksack territory extended inland along the Nooksack River basin as far south as Lake Whatcom (Suttles 1951). European explorers arriving in the area in the late eighteenth century, however, encountered both tribes in the project area (Salo 1993).

The Lummi Nation and Nooksack Tribe were contacted through a letter describing the project and asked for information pertinent to the project area followed by phone calls. Harlan James, a member of the Lummi Nation, stated that Bellingham Bay was good fish habitat and that "fish are culture and culture is fish." He emphasized that the entire west side of Bellingham Bay and the mouth of the river are culturally important to the tribe. Other parts of Bellingham Bay were taken from the Lummi Nation through their exclusion from the reservation. Mr. James specifically noted that a Lummi canoe landing area in the Old Town district near the mouth of Whatcom Creek has been filled but that it is culturally important to the Lummi people. He also stated that they fished the entire Bay and that Lummi elders remember octopi, sole, and other fish in Bellingham Bay that are no longer available. These marine resources were different than those outside Bellingham Bay. Mr. James concluded that the entire Bay was of cultural significance to the Lummi Nation.

3.5.3 Archaeological Resources

As described in this section, the study area has areas with low, moderate, and high probabilities for cultural resources.

3.5.3.1 Hunter-Fisher-Gatherer Archaeological Sites

Bellingham Bay provided a wide variety of marine and terrestrial resources that were collected by hunter-fisher-gatherers of the area and processed at seasonal and long-term camps along the shore of the Bay. Hunter-fisher-gatherer deposits within these areas would be associated with fishing, seasonal and long-term camp occupations, shellfish and salmon processing, and terrestrial resource collecting and processing. Out of the 24 hunter-fisher-gatherer archaeological sites recorded in the project area, 17 are shell middens, six are lithic scatters, and one is a possible petroglyph. All the sites are on sand spits, along beach terraces and embayments, or on bluffs or ridges overlooking Bellingham Bay. Shell midden and lithic sites recorded in the project area vary in size and integrity. Cultural deposits identified at shell midden sites consist of whole and fragmented shell, fire modified rock, bone and stone tools, and faunal remains. Cobble choppers, cores, fire modified rock, scrapers and utilized flakes were identified at the lithic sites.

Historic development in the project area has most likely adversely affected hunter-fisher-gatherer shell midden deposits and lithic sites. A possibility does exist, however, that submerged sites or intact subsurface deposits are along the east side of Portage Island and the Lummi Peninsula, under fill deposits at the mouth of Whatcom Creek, in Fairhaven, and along the shores of Chuckanut Bay. Other areas of the Bay also have a probability for submerged prehistoric sites, including the mouths of other major drainages into Bellingham Bay, and the paleoshorelines of the major drainages covered by sea level rise in the last 8,000 years.

Of the 24 hunter-fisher-gatherer archaeological sites identified within the project area, only one has been evaluated for significance (45WH111). The site is on the southern tip of the Lummi Peninsula at Portage Point and was tested by Grabert and Griffin (1983) as part of mitigation measures related to the construction of 31 miles of sewer pipeline through the Lummi Reservation. The site contained archaeological deposits that could provide information important to regional prehistory. Grabert (1983) recommended that the site be nominated for inclusion in the National Register of Historic Places.

3.5.3.2 Historic Archaeological Sites

Historic archaeological resources expected in the study area include items associated with early settlement and industry around Bellingham Bay, primarily in the Fairhaven section. Bottles, cans, machine parts, and remnant pilings associated with the Pacific American Fisheries (PAF) complex may be present in the sediments around the Harris Avenue Shipyard. Domestic items such as vessel glass, ceramics, bricks, or metal objects relating to early occupations may also be present in the Fairhaven section around the shores of Padden Creek.

Historic archaeological resources may also be present in the project area primarily within the Central Waterfront area surrounding Citizen's Dock, Fairhaven, and South Bay subareas. Archaeological deposits associated with early industry in the Bellingham area such as the Roeder-Peabody Mill site, located at the mouth of Whatcom Creek within the Central Waterfront and Whatcom Industrial subareas, and the PAF complex in the Fairhaven Subarea may be present under fill deposits. Other mid-19th century and later structures of interest include the Sehome Dock (the Bellingham Bay Coal Company's Wharf); Colony Wharf (Fairhaven Land Company's Wharf); Geltrec Improvement Company's Wharf and Saw Mill; Citizen's Dock; Taylor Street Dock (Hill and Welbors); and the Fairhaven Land Company's Wharf. The Taylor Street and Citizen's Docks are still standing, but are in unsafe condition and are planned for demolition by the City. Because Bellingham went through a period of "wharfing out" just before the Constitutional convention in the late 1880's, there were likely other structures built along the shoreline in addition to those listed above. Surface scatters of historic artifacts relating to early settlements and the Chinese labor force employed at the PAF complex have been identified during archaeological reconnaissance of the Fairhaven Subarea (Hicks 1992). Historic refuse dumps and house or business foundations related to early settlement of the Fairhaven Subarea may also be in the project area.

A low probability for significant historic archaeological resources exists within the project area since much of the project area is fill deposits from the 1900s. These fill deposits were placed over tidal flats that did not contain structures during historic times. Isolated artifacts would probably not retain integrity of location and cannot answer research questions pertaining to the history of the area.

One historic site, Fort Bellingham (45WH185H), was recorded in the vicinity of the project area. The site is on a high bluff on the north shore of Bellingham Bay. The fort was constructed in 1856 in response to the Indian Wars of 1855-1856. Fort Bellingham was a palisaded fort containing a store, mess hall, headquarters, barracks, and two blockhouses. A large wharf was also constructed at the foot of the bluff directly below the fort and extended into the Bay (Schneider 1969). The fort was in operation until 1861 and then was abandoned. The land was returned to the original property owners in 1868 (Schneider 1969). Nothing remains of the site today and only a few artifacts related to the occupation are present in the collections at Whatcom Museum of History and Art (Schneider 1969). The site was nominated for inclusion in the NRHP in 1969. Fort Bellingham was not accepted for listing in the NRHP, but was placed in the Washington State Register (now the Washington Heritage Register) in 1971.

3.5.4 Historic Structures

A review of the National Register of Historic Places Register, the Washington Heritage Register, and the Whatcom County Historic Property Register indicated that three historic structures are recorded within the project area. However, only one of these – Citizen's Dock – is included in the NRHP.

National Register of Historic Places.

Citizen's Dock. Citizen's Dock was inventoried and nominated to the NRHP by Michael Sullivan in 1980 (Sullivan 1980a, b). The dock was constructed as a passenger terminal and freight warehouse in 1913 on pilings above the tidewaters at the mouth of Whatcom Creek (Sullivan 1980b). The dock was modeled after the Coleman Dock in Seattle and provided Bellingham with a link to Puget Sound's Mosquito Fleet (Sullivan 1980b). A large wooden building was constructed on top of the dock to serve as the passenger waiting area, warehouse, baggage space, ticket sales area, and offices (Sullivan 1980b). The dock was used for public transportation and as a freight warehouse until 1938. After 1938, passenger steamship service was terminated and the dock was used solely for freight service until 1971 (Sullivan 1980b). Currently the dock is used by tugs and barges. Citizen's Dock was sold to the City of Bellingham in 1980 and may be incorporated into a planned Maritime Heritage Waterfront Park (Sullivan 1980b). Citizen's Dock was placed in the NRHP in 1981. Due to its unsafe condition, the City of Bellingham plans to demolish the dock.

Other Historic Structures

Warehouse 19. Theodore Catton, Historical Research Associates, Incorporated, inventoried Warehouse 19, a historic box factory built in 1925 along the northeast portion of Bellingham Bay. The box factory was built by Bloedel Donovan Lumber

Mills Company and produced the "shooks," a term for the flat sides, ends, tops and bottoms, for boxes (Catton ca. 1990). Currently, the building is a warehouse that has fallen into disrepair. Multiple changes in the building's original size and shape have affected the structure's historic integrity. The building has not been formally evaluated for inclusion in the NRHP but Catton (ca. 1990) concluded that Warehouse 19 is probably not eligible for inclusion because it lacks historical integrity.

PAF Warehouses. Dames and Moore (ca. 1989) evaluated two PAF warehouses in Fairhaven, to determine their eligibility for nomination to the NHRP. The two warehouses, an office building, and remnants of the pier were all that remained of the PAF complex at that time. Warehouse No. 7 was built in 1913 and has been modified several times since the warehouse's original construction. The building has not been maintained and has been deteriorating for some time. Warehouse No. 10 is a five-sided building built in 1943. The warehouse was constructed east of Warehouse No. 7 where the solder house was located. Warehouse No. 10 has also undergone modifications since its original construction. The buildings have not been formally evaluated for inclusion in the NRHP, but Dames and Moore (ca. 1990) concluded that Warehouses No. 7 and 10 are probably not eligible for inclusion in the NRHP because they lack historical integrity.

Environmental Impacts and Proposed Mitigation

4 ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION

This section describes the potential environmental impacts of the alternatives relative to the elements of the environment presented in Section 3, along with measures to avoid, minimize, or mitigate these impacts. The section is organized as follows:

> **Section 4.1**: The environmental impacts and potential mitigation measures associated with implementation of Alternative 1 – No Comprehensive Strategy.
>
> **Section 4.2**: The environmental impacts and potential mitigation measures associated with implementation of Alternative 2 – the Comprehensive Strategy (Preferred Alternative).
>
> **Section 4.3**: The environmental impacts associated with implementing the Integrated Near-Term Remedial Alternatives under the Comprehensive Strategy (Alternatives 2A through 2E and the Preferred Remedial Action Alternative).

Effectiveness of Remedial Technologies

The Integrated Near-Term Remedial Action Alternatives evaluated in Section 4.3 include the application of different types of sediment remediation techniques. All of these techniques are demonstrated methods of dealing with contaminated sediment. The final EIS assumes that the design and construction methods used for remediation will meet the required design and operation criteria for these technologies.

4.1 ALTERNATIVE 1 – NO COMPREHENSIVE STRATEGY

Implementation of the No-Action Alternative means that the Comprehensive Strategy would not be implemented and decisions regarding sediment sites and source control, sediment disposal siting, habitat, and land use in Bellingham Bay would continue to be made on a case-by-case basis without a baywide context. In other words, there would be no long-term baywide-planning context to inform and/or integrate future actions. Coordination of multi-agency efforts would occur only when required under existing laws.

The case-by-case approach does not facilitate the ability to develop a cooperative vision for the entire Bay, to establish methods of defining and measuring its implementation, or to identify its successes or failures.

Specifically regarding remedial actions at priority cleanup sites, the absence of the Comprehensive Strategy does not mean that sediment remediation would not happen in the future. Rather, it means that decisions would be made on a site-by-site basis without an understanding of how the cleanup relates to source control, habitat, and land use on a baywide scale. This relatively uncoordinated approach would likely result in decisions that are delayed and not as well informed. By focusing on short-term decisions, long-term opportunities may be precluded.

Relative lack of coordination would also likely mean that the Preliminary Draft Habitat Mitigation Framework would not be used. Cleanup projects would likely only design habitat mitigation that addressed the impacts of the projects themselves without considering what would be of the most benefit to the broader bay. This could lead to a patchwork of restored and degraded habitat with little or no connection between the restored sites. This situation would likely provide greater benefit to fish and wildlife as compared to existing conditions, but not as much as could be expected from use of the Preliminary Draft Habitat Mitigation Framework.

The following sections discuss the environmental consequences associated with not implementing the Comprehensive Strategy. The analysis focuses on the impacts of delay of action.

4.1.1 Geology, Water, Sediment, and Environmental Health

Under the No Comprehensive Strategy Alternative, contaminated site cleanup and associated source control within Bellingham Bay would be implemented on a site-by-site basis.

During the protracted cleanup period associated with the No Comprehensive Strategy Alternative, possible contaminant effects on ecosystem functions and environmental health would continue. Surface sediments within parts of inner Bellingham Bay that have been observed to be toxic to sensitive marine organisms in sediment bioassay tests would continue to affect ecosystem functions until they are addressed by natural recovery processes (primarily burial under cleaner sediment deposited in the Bay by the Nooksack River). Impacts to water quality would likely be minimal. Water quality in Bellingham Bay is relatively good and could be expected to stay that way (see Section 3.1.2). However, a number of small point and non-point sources currently affect water quality within localized areas immediately adjacent to individual discharges (see the *Sediment Sites and Source Control Documentation Report* for more information). These sources would continue to be addressed under a range of federal, state, and local regulatory programs.

In addition to ecological risks, bioaccumulation of mercury in certain fish and shellfish populations within inner Bellingham Bay (e.g., Dungeness crab caught within the Whatcom Waterway) may also have potential human health implications. However, the available tissue monitoring data (see Section 3.1.4) has not verified such risks. The general degradation of baywide environmental health (as it is related to contaminated sediment) would continue to exist. At individual sites, degradation would be improved as cleanup occurs.

4.1.2 Fish and Wildlife

The delay of cleanup actions associated with the No Comprehensive Strategy Alternative would likely mean that aquatic organisms would be exposed to the impacts associated with construction (temporary increases in turbidity and dissolved oxygen, possible exposure to contaminant releases, possible mortality) repeatedly but for shorter periods of time. Multiple projects coupled with the lack of a habitat vision for the Bay (i.e., the Preliminary Draft Habitat Mitigation Framework) would likely be relatively detrimental to fish and wildlife.

A protracted cleanup period would mean that aquatic organisms would continue to be exposed to contaminated surface sediments for a longer period of time. While it seems reasonable to assume that prolonged exposure would be an adverse impact, the precise nature of the impact is not known.

4.1.3 Land Use, Shoreline Use, and Recreation/Public Use

Under the No Comprehensive Strategy Alternative, land and shoreline use decisions would continue to be made on a case-by-case basis. Delay of cleanup actions that could occur under the No Comprehensive Strategy Alternative could delay needed maintenance dredging activities in the federal channel of the Whatcom Waterway, thus prolonging constraints on the Bellingham Shipping Terminal. Delays would also affect land and shoreline use decisions by potentially delaying redevelopment of contaminated sites.

Under the No Comprehensive Strategy Alternative, navigation or maintenance dredging proponents would likely continue the regional pattern of limited or no dredging of contaminated sediments wherever practicable. As a result, continued shoaling would occur in navigable waterways, and there would likely be more areas that would be shallower than the authorized navigation depths.

4.1.4 Air and Noise

Impacts to air quality and noise would be primarily associated with construction activities for cleanup actions. Under the No Comprehensive Strategy Alternative, cleanup actions in the Bay would likely occur sporadically and potentially span a longer timeframe than actions that take place under the Comprehensive Strategy. Short-term impacts during construction would occur during individual cleanup actions, and would have to be evaluated separately with regulating agencies to minimize and mitigate adverse effects.

4.1.5 Cultural Resources

As with Air and Noise, impacts would occur during individual cleanup actions, and would have to be evaluated separately with regulating agencies to minimize and mitigate adverse effects.

4.2 ALTERNATIVE 2 – BELLINGHAM BAY COMPREHENSIVE STRATEGY (PREFERRED ALTERNATIVE)

As discussed in Section 2, the proposed approach to achieving the goals for Bellingham Bay integrates a variety of baywide issues into one coordinated strategy, creating a clear context for decisions within the Bay. This context would allow decision-makers to consider how cleanup relates to source control, habitat, and land use on a baywide scale. The likely result would be better-informed decisions that did not lose long-term opportunities by focusing on short-term issues. The Comprehensive Strategy includes recommendations for active sediment cleanup and control of contaminant sources, habitat restoration, and makes suggestions to help facilitate future commerce, navigation, and shoreline uses. It recommends both near-term and long-term actions to achieve the seven goals listed in Section 1. The potential environmental consequences of implementing the Comprehensive Strategy are identified here. More detail on the specific impacts and proposed mitigation measures associated with the Integrated Near-Term Remedial Alternatives (Alternatives 2A through 2E and the Preferred Remedial Action Alternative) is in Section 4.3.

4.2.1 Geology, Water, Sediment, and Environmental Health

Impacts

The majority of impacts to these elements of the environment under the Comprehensive Strategy would be expected as a result of implementing the Integrated Near-Term Remedial Action Alternative. Implementing dredge and disposal activities under the Comprehensive Strategy would create the likelihood that some contaminants from the sediment material would be lost to the environment in particulate or dissolved form. Released contaminants could affect water and sediment quality in the vicinity of dredge and disposal sites.

Implementation of the Comprehensive Strategy would result in the eventual remediation of all of the Bay's known sediment contamination sites (cleanup of the Whatcom Waterway, Cornwall Avenue Landfill, and Harris Avenue Shipyard sites are included in the Integrated Near-Term Remedial Action Alternatives). There would likely be a greater tendency to use removal and confined disposal technologies (either upland or in-water) as preferred remedial alternatives under the Comprehensive Strategy, as opposed to natural recovery. The expedited approach to cleanup and dredging activities would also likely result in consolidation of confined disposal sites to one or two higher priority facilities, rather than multiple sites.

The Comprehensive Strategy provides opportunities to improve water quality and sediment quality via source control. The Comprehensive Strategy inventories sources and identifies numerous source control opportunities (see the *Sediment Sites and Source Control* Documentation Report). Future activities could take advantage of the Comprehensive Strategy's inventory by integrating the source control opportunities into the activities.

Mitigation

Design and construction methods would be used that minimize the potential for contaminant releases to the environment. Contingency plans would be prepared and monitoring conducted to ensure the performance of the remedial actions.

4.2.2 Fish and Wildlife

Impacts

Impacts to fish and wildlife under the Comprehensive Strategy would occur in both the near- and long-term. Adverse impacts would be felt in the near-term, during cleanup activities. Many of these near-term impacts have correlating benefits. For example, the loss or disruption of the existing benthic community would be expected in dredging areas during and after dredging operations. A potential benefit of the loss of benthic communities is that this pathway for contamination would be reduced or eliminated. Another example of the impact/benefit tradeoff is illustrated by cleanup activities that convert habitat from one type to another (e.g. subtidal to intertidal). These habitat conversions would displace certain fish species, while creating new habitat for others. Birds and mammals that live and forage in the Bay would also be impacted by construction activities associated with near-term cleanup activities. These impacts are expected to be short-term, and not have a lasting negative impact on their habitat. Implementing the Comprehensive Strategy has the potential to restore habitat in Bellingham Bay beyond minimum mitigation requirements.

Each of the nine Subarea Strategies identifies specific habitat restoration and protection opportunities. Implementation of these opportunities is expected to provide beneficial impacts to fish and wildlife habitat in Bellingham Bay consistent with the habitat restoration vision and objectives outlined in Section 3.2.1. Critical habitat areas would be protected and specific enhancement opportunities would be pursued, either through restoration initiatives or mitigation associated with new development (see Table A-1 in Appendix A for a list of these opportunities).

The Subarea Strategies, which are a part of the Comprehensive Strategy, can be used to inform regulators in identifying habitat restoration/protection opportunities as mitigation requirements or as other habitat initiatives emerge.

Mitigation

Through use of the Preliminary Draft Habitat Mitigation Framework developed under the Comprehensive Strategy, fish and wildlife habitat impacts could be addressed holistically, throughout the Bay. The Framework could be used to develop individual mitigation strategies and ratios in advance of cleanup or development activities. The Framework could be applied to both the Integrated Near-Term Remedial Action Alternative ultimately selected by Ecology through the MTCA process and to future implementation of the Subarea Strategies.

4.2.3 Land Use, Shoreline Use, and Recreation/Public Use

Impacts

Land use impacts associated with implementation of the Comprehensive Strategy would occur over time, as initiatives identified in the Subarea Strategies are carried out. The Comprehensive Strategy may alter potential future aquatic land uses, depending on the Integrated Near-Term Remedial Action Alternative ultimately selected by Ecology through the MTCA process. However, whatever impacts or changes occur (for example, a CAD site in a currently designated Harbor Area) they would be consistent with the Subarea Strategies. The Comprehensive Strategy identifies future uses for the Bay that are consistent with protecting habitat areas, promoting navigation and commerce in existing federal waterways and providing increased public access to the shoreline. For example, no industrial development would occur in the West Bay; land uses in this subarea would focus on recreation, spiritual/tribal, and fishing activities. No additional public access, marina development or commerce/navigation related development is proposed that would have an adverse impact on habitat. Changes to land use under the Comprehensive Strategy would also be consistent with local Shoreline Management Plans.

Marine transportation facilities are not expected to experience impacts during construction activities associated with the Integrated Near-Term Remedial Action Alternative. Depending on the alternative chosen, additional capacity in navigation channels would be provided and an increase in marine transportation would be expected.

Mitigation

Coordination with tribal groups would occur to mitigate potential impacts to tribal land uses from near-term cleanup activities or future development. The timing of cleanup operations relative to tribal fishing activities would be coordinated with the tribes. Dredging operations would normally not be allowed during any period of major tribal fishing activity within the dredging area.

Although no significant transportation impacts are expected, it would be important to coordinate construction schedules with the Port, City, Coast Guard, and other affected parties particularly during sediment cleanup activities to ensure potential conflicts with marine traffic are avoided.

4.2.4 Air and Noise

Impacts

Implementation of the Comprehensive Strategy is not expected to have significant adverse effects to these elements of the environment. Some short-term air quality impacts may occur during construction activities associated with the Integrated Near-Term Remedial Action Alternative. However, these impacts are not expected to exceed standards for air quality. The potential increase in noise levels from construction activities would comply with local noise restrictions.

Mitigation

Potential mitigation measures are associated with short-term impacts during sediment cleanup construction activities. Best management practices would be implemented that would minimize the potential for air quality impacts, such as dust and odor control measures.

4.2.5 Cultural Resources

Impacts

Some impacts to cultural resources could occur during sediment cleanup and future development activities. For example, habitat restoration areas that include sediment, fill, and natural debris removal along the West Bay Subarea may disturb both unidentified and previously recorded archaeological sites along the shore. Habitat restoration within the Central Waterfront, Fairhaven, and South Bay subareas may also disturb unidentified, submerged or previously recorded archaeological sites. The depth and extent of fill at the mouth of Whatcom and Padden creeks, and in the Fairhaven and South Bay subareas is unknown, therefore proposed fill removal and habitat restoration activities may disturb archaeological deposits present under existing fill. Hunter-fisher-gatherer sites identified in the Fairhaven and South Bay subareas may extend under current fill deposits.

Depending on the Integrated Near-Term Remedial Action Alternative that is ultimately selected by Ecology through the MTCA process, there is a possibility that a cap or a CAD could be placed over an area that contains unidentified cultural resources.

Mitigation

The Comprehensive Strategy does not specifically call for protection of historic and/or archaeological resources. However, state and federal regulations for protection and management of cultural resources would be followed during implementation of the Comprehensive Strategy.

4.3 INTEGRATED NEAR-TERM REMEDIAL ACTION ALTERNATIVES

The Integrated Near-Term Remedial Alternatives, including the Preferred Remedial Action Alternative, were devised to address the contamination issues at priority cleanup sites in Bellingham Bay. Specifically, the alternatives address cleanup actions at the Whatcom Waterway, Cornwall Avenue Landfill, and Harris Avenue Shipyard sites. The alternatives include enough capacity at the proposed disposal sites to accommodate the currently estimated needs of other sediment cleanup sites in the Bay. The following sections describing the potential impacts of the alternatives focus primarily on the potentially significant adverse impacts. Table 2.3-1 presents (for each Integrated Near-Term Remedial Alternative) the beneficial impacts associated with implementation. These benefits include control of ongoing sources of pollution and the protection of human and ecological health.

Figure 4.3-1 shows known contaminated sediment sites before and after implementation of any of the Integrated Near-Term Remedial Alternatives.

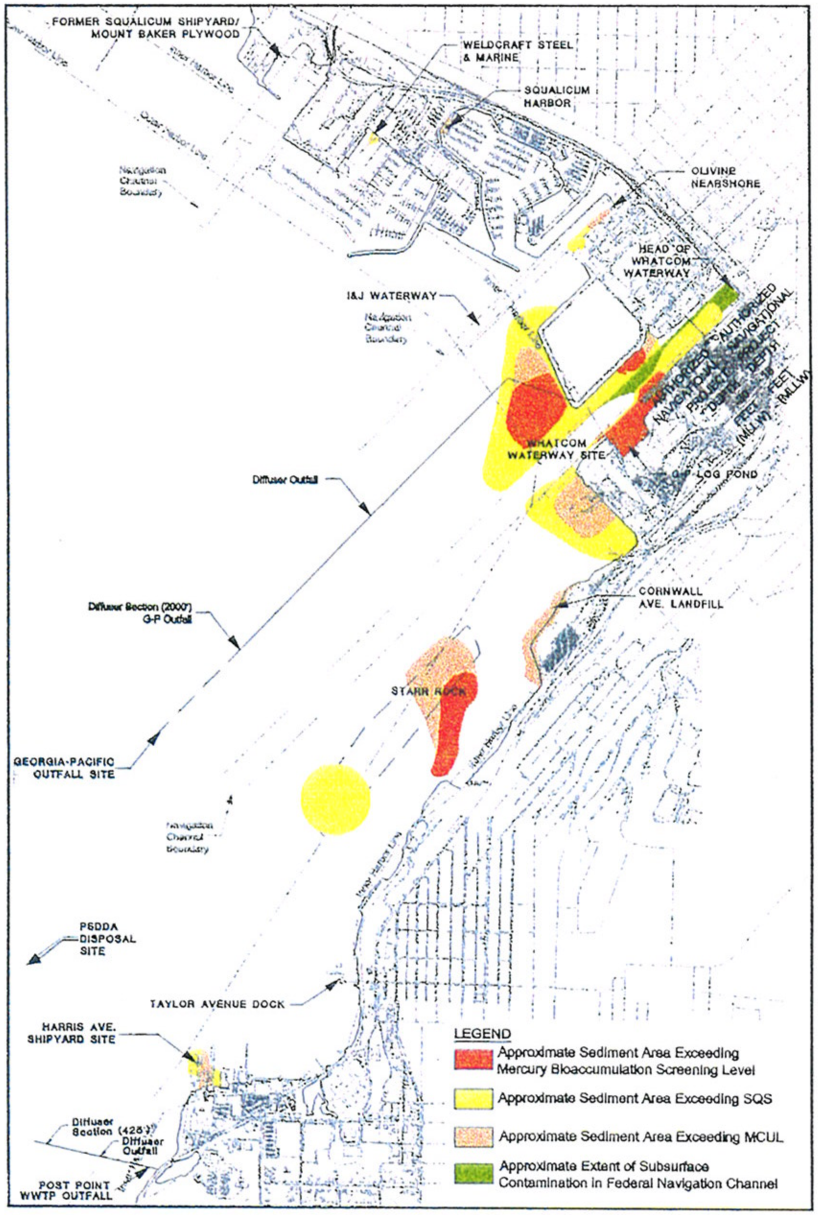
4.3.1 Alternative 2A - Removal & Capping to Achieve Authorized Channel Depths (CAD Disposal)

Approximately 420,000 CY of sediments (380,000 CY from the priority sites [Whatcom Waterway, Cornwall Avenue Landfill and Harris Avenue Shipyard] and 40,000 CY from other known sites) would ultimately be dredged and disposed of under Alternative 2A (see Figure 2.3-4). Contaminated sediments in this area would be dredged to 5 feet below the currently authorized channel depths. In those areas of the waterway where contaminants are still present below this dredge depth, the dredge cut would be capped with a clean sediment layer, resulting in a final channel elevation at least 2 feet below the authorized depth. This dredge-and-cap action would leave sufficient tolerance to allow future maintenance dredging of the authorized federal channel, considering typical overdredge allowances. No further action would be undertaken in the outer Whatcom Waterway reach where surface sediments currently meet state standards and where channel depths are consistent with the federally-authorized elevations. Similarly, the head of the waterway would be dredged only on the northwest side near the New West Fisheries facility, with the remaining adjoining habitat area left intact. Relatively smaller dredging operations would be performed within the Port Log Rafting Area, and the Harris Avenue Shipyard.

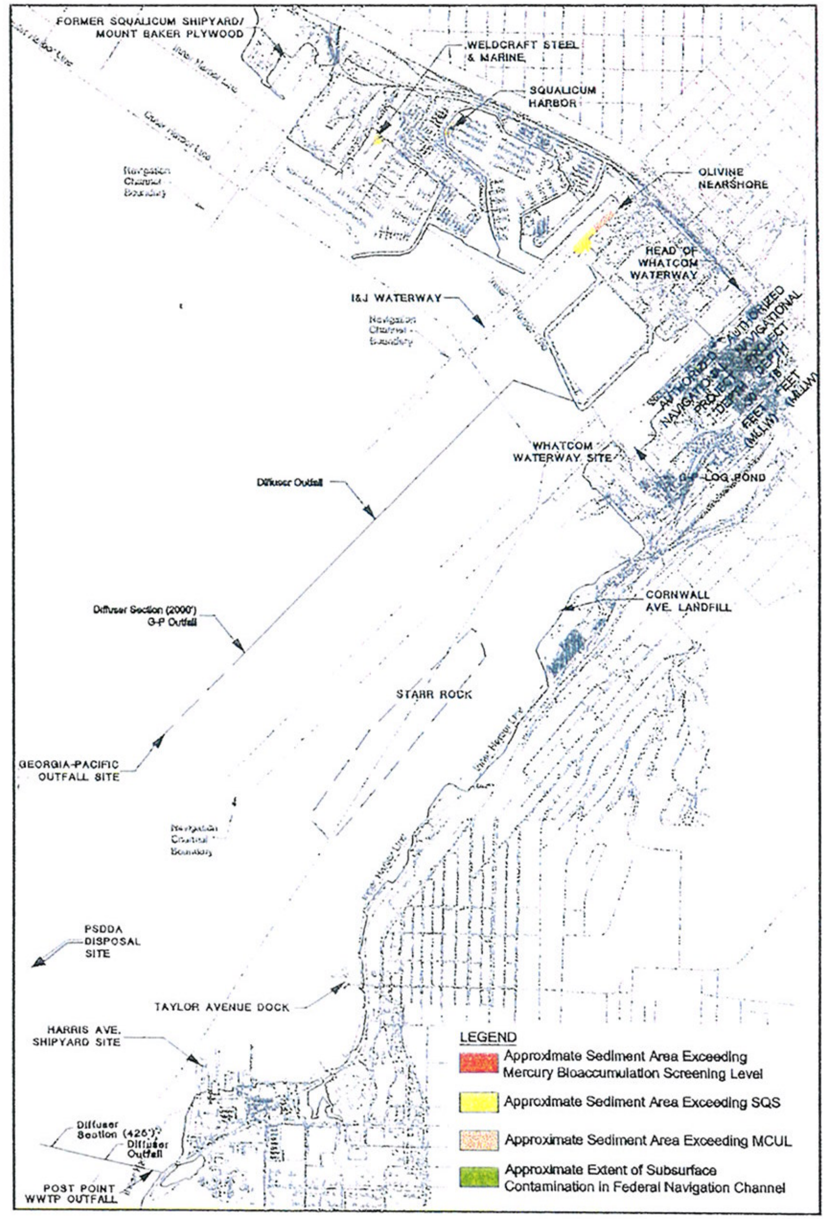
Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 500,000 CY. In this alternative, the sediment disposal capacity would be provided by two CAD facilities:

- A small (up to 50,000 CY) CAD in the G-P Log Pond
- A larger 500,000 CY CAD in the Starr Rock/Cornwall area

In addition to CADs, Alternative 2A includes engineered caps over approximately 120 acres of inner Bellingham Bay. The shoreline and subtidal areas of the Cornwall Avenue Landfill would be capped with clean material that would provide concurrent source control (Landau 1999). The upland portion of the site would be graded and existing storm water systems repaired. Intertidal zones of the landfill cap/shoreline may be armored, as determined by final design analyses.



Existing Conditions
Bellingham Bay



Following Implementation of Any
Near-Term Remedial Action Alternative

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SCALE IN FEET

Figure 4.3-1
Existing and Anticipated (2003/2004)
Surface Sediment Quality Conditions

4.3.1.1 Geology, Water, Sediment, and Environmental Health

Impacts

Potential adverse impacts to geology, water, sediment, and environmental health associated with implementation of Alternative 2A are mainly associated with (1) dredging and transport, (2) cap and CAD construction and disposal of dredged material in the CADs, and (3) the long-term operation and effectiveness of the CADs. Much of the information presented in this section is drawn from the Puget Sound Confined Disposal Site Study Programmatic EIS (Corps of Engineers 1999).

Dredging and Transport

Approximately 420,000 CY of sediments exceeding SMS would be dredged under Alternative 2A. Loss of some contaminants to the environment in particulate and/or dissolved form during the dredging operations is an unavoidable adverse impact associated with dredging. Released contaminants could affect water quality and sediment quality in the vicinity of the dredge site.

Dissolved and suspended sediment-bound contaminants could be released at the point of dredging and during transport to the sediment disposal site. Contaminant loss characteristics could differ depending on the method of dredging, as follows.

- **Mechanical Dredging and Transport**. Typical Puget Sound mechanical dredging involves the use of a clamshell bucket on a derrick barge. Given the prospective dredging volumes in Bellingham Bay, a contractor would most likely use a 7 to 10 CY bucket. The dredged material would be placed on a 2,000 to 6,000 ton flat deck barge or 1,500 to 3,000 CY split hull dump barge depending on the disposal site.
- **Backhoe Dredging and Transport**. Backhoes have been used in some regional sediment removal projects, though their use is limited to nearshore sites in shallow water. Compared to mechanical dredges, backhoes generally have higher turbidity and much slower production rates. However, use of backhoe equipment could limit handling of sediments to a single combined dredging and loading operation.
- **Hydraulic Dredging and Transport**. For the Bellingham Bay area, a contractor could use a hydraulic cutterhead dredge to dredge and deliver contaminated sediments to the disposal site. However, because of the excess water generated as part of the dredging operation and associated water quality control requirements, hydraulic dredging would be problematic for delivery to either an upland or CAD facility (Anchor Environmental and Hart Crowser 1999). Hydraulic dredging also results in greater mixing/bulking of sediments, thereby increasing the volume of material that may require dewatering, transport, and/or disposal. Finally, hydraulic dredging can result in greater oxidation of contaminated sediments, potentially increasing contaminant mobility. For these reasons, hydraulic dredging was not considered representative of prospective dredging operations within Bellingham Bay.

Mechanical dredging with a clamshell, cable arm, or backhoe equipment typically results in sediment release to the entire depth of the water column, as a result of resuspension during clamshell bucket impact, closure, withdrawal, and lift to a haul barge. Overflow from the haul barge is also possible, although it is normally prevented in contaminated sediment remediation projects. Excluding barge overflow, estimates of sediment release at the point of dredging commonly range from 0.8 to 1.2 percent of the total mass of dredged material removed by standard clamshell methods (for more information, see the RI/FS for the Whatcom Waterway Site). Use of a watertight bucket such as a cable arm apparatus would reduce suspended sediment in the water column by approximately 50 percent. However, the possible presence of woody debris within the prospective dredge areas may interfere with full closure of the watertight bucket and thus may preclude the use of this equipment in part of inner Bellingham Bay.

In areas like inner Bellingham Bay (including the Whatcom Waterway) that are characterized by relatively low currents and net sediment deposition, much of the sediment resuspended by mechanical or hydraulic dredging would settle close to the point of dredging. The majority of these materials would likely be removed by subsequent dredging operations. However, some of the resuspended sediments would be transported by tidal currents and turbulent diffusion to locations removed from the point of dredging.

A detailed water quality assessment at the point of dredging is normally performed during remedial design, using the results of the Corps sediment elutriate testing that simulates reasonable worst-case conditions expected during dredging. The Corps has also developed and verified computer models that can be used to predict contaminant releases that may occur during the dredging operation. These evaluations would assess both dissolved and suspended sediment-bound contaminant losses, and would also evaluate the need for and scope of operational controls to ensure water quality protection.

Cap and CAD Construction/Disposal of Contaminated Sediment in CAD

There are short-term impacts associated with cap and CAD construction and disposal of contaminated sediments within CADs. These impacts include short-term releases of particulates and dissolved contaminants to the water column.

Capping would result in temporary unavoidable increases in suspended solids concentrations and associated turbidity during and immediately following cap placement. Although capping material size would be specified to minimize such turbidity, suspended solids increases cannot be avoided.

Construction of a CAD facility would also generate short-term releases of particulates and dissolved contaminants. However, unlike a cap where only one event (cap placement) produces these effects, a CAD has two events: (1) at the point of dredging the contaminated material and (2) at the point of placing the material in the CAD. The released contaminants could affect water quality and sediment quality by temporarily increasing total suspended solids and turbidity. Dissolved oxygen levels may also temporarily decrease, and water column nutrient and contaminant concentrations temporarily increase in the immediate vicinity of the CAD.

As material is transported to the disposal facility by barge, birds can come in contact with the contaminated sediment by landing on the piles of exposed sediment.

Based on regional applications of predictive models developed by the U.S. Army Corps of Engineers Waterways Experiment Station (WES), loss of material beyond the limits of the disposal site boundaries is typically less than 1 percent of the total mass of dredged material released at the site (Port of Tacoma 1992; City of Tacoma 1998).

Long-Term Cap and CAD Operation

The long-term performance of disposal facilities is evaluated by the following criteria:

- Stability of the containment berm and CAD facility
- Isolation and long-term integrity of the capping system
- Water quality protection provided by the caps and the CAD

Stability Of The Containment Berm

Information concerning the magnitude, accelerations and impacts associated with design level seismic events in Puget Sound is well established. Major marine structures must be able to withstand, with possible damage but without failure, an earthquake that has an approximate 500-year recurrence interval (i.e., 10 percent chance of being exceeded in 50 years). In-water disposal facilities should also be designed to prevent a breach of the CAD during a less frequent event (e.g., 10 percent chance of being exceeded in 250 years). To further minimize the potential risk, high seismic hazard areas such as sites along major known fault lines were not considered as possible sediment disposal sites in the initial Pilot alternatives screening (see Appendix B, Page 9).

CAD facilities must be designed to satisfactorily perform during and after a design-level seismic event. For this reason, contaminated sediments are contained within buttress fills or berms of selected imported fill that has a higher strength than the native sediments. This imported fill is typically a mixture of clean sand and gravel armored with light rip-rap. This buttress is designed to maintain the stability of the fill during construction and during strong seismic shaking.

The size and thickness of the berm and cap are designed to prevent "failure" of the system. In the case of a CAD, failure is defined as a breach in the berm and/or the cap that causes contaminants to be released. By matching the required size and thickness of the berm/cap system, the anticipated amount of deformation can be accommodated so that contaminated dredged material does not become exposed following an earthquake. Using flatter slopes, constructing the berm material out of coarser material, over-excavating beneath the berm, and/or slowing the construction process can further address stability concerns.

Isolation and Long-Term Integrity of the Capping System

Isolation refers to the long-term integrity of the capping system in the marine environment. Factors that can affect integrity of the cap are burrowing aquatic organisms (known as bioturbation), wave erosion, propeller wash, and anchor drag. Similar to the seismic design practice outlined above, engineering is performed to ensure isolation and integrity of the cap and/or CAD at a selected risk level (e.g., 100-year storm event). The selection of appropriate containment material for isolation and erosion protection is developed to protect to the specified design level.

Determination of cap thickness is normally based on a combination of laboratory tests, mathematical models of the various processes that could influence cap integrity, field experience, and monitoring data. The design approach presently used in the Puget Sound region and elsewhere is based on the conservative premise that cap thickness components are additive (e.g., a certain thickness to provide protection from erosion, plus a certain thickness to provide water quality impacts, plus a certain thickness to account for the effects of bioturbation, etc).

The material that would be confined within proposed CADs range from fine sandy silt to silty sand. To stabilize the sediments and to prevent resuspension, the capping material must be of a similar or slightly coarser grain size. A fine to medium sand applied at a slow rate confines the underlying sediments, preventing upward migration of the contaminated sediments. If a coarser material is needed for erosion protection, then a bed of fine to medium sand may be required below the coarser material and above the confined sediments to serve as a barrier to migration (the specifics are refined during remedial design).

Another important consideration in the long-term evaluation of capping systems is the potential for bioturbation and/or exposure of deep burrowing aquatic life to subsurface contaminants. Cap design procedures developed by the Corps and EPA (Palermo et al. 1998a and 1998b) have been developed to ensure that organisms are not able to burrow through the cap. These final design procedures are based on site-specific measurements of a range of environmental characteristics. For example, within Puget Sound, most (typically more than 99 percent) sediment-dwelling organisms occurs within the top 12 inches of the sediment. Although certain species such as horse clams and geoducks can potentially penetrate to depths of 2 or more feet (e.g., see Harbo 1997), these organisms more typically reside in the upper surface layer. However, they are not active burrowing organisms that consistently rework the sediment. Rather, they are a sessile organism that feeds and circulates water through a siphon from the sediment surface. Detailed sediment core analyses performed within Bellingham Bay suggest that no discernable bioturbation occurs below a depth of approximately 0.5 feet (Officer and Lynch 1989). This is based on the mixing layer defined by the core, not the presence (or absence) of burrows or organisms. In consideration of these data, a sediment capping thickness of 1 to 3 feet is expected to provide protective isolation from deep burrowing aquatic organisms. However, final determination of cap thickness would be made during final design and may need to be adjusted to address the possibility of exposure to the deeper burrowing organisms.

The CAD facilities must be designed to satisfactorily resist a range of erosive forces. For example, the cap design must withstand peak waves or tidally-induced currents. Cap material has a critical value, called the critical shear stress for initiation of motion, where the particles would start to erode under this applied force. EPA and the Corps (Palermo, et al. 1998a, b) present design procedures and several references for assessing the critical shear stress under different conditions. Knowledge of design waves, as well as current conditions at the proposed CAD site, is required to complete this analysis. Design data (waves, currents, sediment strength, etc.) for a potential CAD site can be obtained from field measurements and numerical models; these data are normally evaluated in detail during remedial design.

One important consideration in the long-term evaluation of capping is protection from erosion by wave action or propeller wash. For reasonable worst-case vessels and vessel operating conditions examined in these areas, and given water depths within the prospective Bellingham Bay sediment cleanup areas, these modeling studies suggest that a 6- to -12-inch-thick sand cap would provide adequate armoring to resist potential future vessel prop wash. Final cap thickness would be determined during final design. Material meeting this specification is readily available from regional dredging projects and commercial sources. Modeling would be performed during remedial design to finalize capping specifications and ensure the integrity of caps placed in the area.

Boat moorage in CAD areas can possibly lead to cap erosion. As anchors are dropped onto the cap and dragged they can plow the cap. Site use above the CAD facility for recreational boating is normally associated with limited anchor drag depths (i.e., less than 1 to 2 feet). Coarser cap material or an intermediate armor layer can also be used to resist anchor impacts. See Section 4.3.1.3 for a discussion of potential impacts to navigation from Alternative 2A.

Potential sediment capping material sources include local and regional upland quarries and material obtained from maintenance or deepening dredging projects within Puget Sound. For example, more than 200,000 CY of fine to medium sand and silty sand material is available every 1 to 2 years from Corps maintenance dredging of the Snohomish River and Duwamish River waterways and the Swinomish Channel. Subject to more detailed scheduling and engineering analyses that would be performed during final design, sediments obtained from maintenance and deepening dredging projects may provide a practicable source of capping materials for Bellingham Bay. This use of material is consistent with guidelines that encourage clean dredged material to be reused for beneficial purposes. Alternatively, upland sources of clean material could be used if clean dredged material could not be acquired.

Habitat Integration

Depending on the site conditions, habitat functions could be integrated into the surface substrate of the cap design. In low energy environments, such as the G-P Log Pond, a fine-grained substrate could be used on the final cap surface to provide a mudflat function. A coarser-grained material would be placed under the fine-grained material to serve as an initial confining layer. In higher energy environments, such as the G-P ASB or Starr Rock areas, a coarser substrate could be used on the surface that would withstand erosive forces and at the same time provide suitable bed material for eelgrass production. Offshore reef structures could also be integrated into the alternatives to provide further confinement protection and habitat diversity.

Water Quality Protection

The procedures developed by the Corps, EPA, and others to ensure that capping systems provide permanent containment of contaminated sediments also address long-term water quality protection requirements (Palermo et al. 1998a, b). The Clean Water Act and other federal and state authorities require that discharges from a CAD site must not result in exceedence of water (or sediment) quality criteria at the point of discharge into the receiving water (i.e., in seeps that discharge through the berm and/or cap sections). A combination of laboratory tests, mathematical models of the various processes involved (e.g., chemical attenuation and dispersion), field experience, and monitoring data are used during design to meet this condition.

Cap and CAD Construction/Disposal of Contaminated Sediment in CAD

The following measures could be used to mitigate the impacts associated with cap and CAD construction:

- Use watertight buckets and mechanically dredge
- Site the cap and/or CAD in a low current environment
- Use bottom-dump barges
- Use a downpipe
- Place interim caps four weeks after disposal
- Optimize tidal currents
- Leave ponded water on top of sediment during transport to discourage birds

A sediment cleanup project typically includes monitoring to make sure that cleanup standards are met. Monitoring plans may also include contingency plans for handling problems that may arise during the cleanup or in case the cleanup does not work as expected. MTCA requires all cleanups to show that cleanup standards have been met. Compliance monitoring includes:

- Protection monitoring, which makes sure the environment is protected while the cleanup is occurring
- Performance monitoring which confirms that the cleanup has met standards

Long-Term Cap and CAD Operation

Confirmational monitoring, conducted at prescribed intervals over a period of years, would be required to determine if the site remains cleaned up and if the containment facility is operating as planned.

If monitoring finds that standards are not being met, a contingency plan would be implemented. For example, if compliance monitoring indicated that water quality criteria were not being achieved at the Cornwall Avenue Landfill, contingent actions could include construction of a low permeability upland cap and/or groundwater interception trench upgradient of the site to further reduce groundwater and contaminant flux. The intent of the contingency approach in this case is to ensure that cleanup standards are achieved, while at the same time limiting the cleanup action to necessary components. As another example, if it appeared that boat anchors were affecting the integrity of the cap and/or CAD, navigation restrictions could be imposed. Contingencies could be implemented after construction of the original cleanup action.

4.3.1.2 Fish and Wildlife

Impacts

Aquatic Habitat/Resources

Adverse and beneficial impacts for aquatic habitat, fish, shellfish, and benthic/epibenthic organisms are listed in Table 4.3-1. Section 3.2 includes a discussion of the habitats and aquatic organisms associated with different tidal elevations.

Table 4.3-1 ...ernative 2A: Summary of Aquatic Resource Adverse Impacts and Benefits

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Mid/Outer Whatcom Waterway: 30' Federal Channel	▪ Conversion of 0.5 acres of shallow subtidal habitat (-4 to -10) to 0.5 acres of intertidal habitat (+4 to 0), and 0.7 acres of shallow subtidal habitat to deep water habitat (below -10). ▪ Dredging of 24.2 acres (total habitat area in site) would result in a temporary loss (2-3 years) of benthic infauna and a temporary loss (months) of epibenthic invertebrate over 4.2 acres of shallow subtidal habitat.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate. ▪ Increased epibenthic production from converting 0.5 acres of subtidal to intertidal.	▪ Minor conversion (less than 1 acre) of habitat types is occurring.
Head of Whatcom Waterway: 30' Federal Channel	▪ No habitat type conversion. ▪ Dredging shallow subtidal habitat would result in a temporary loss (months) of epibenthic invertebrates over 0.1 acres, and a temporary loss (2-3 years) of benthic infauna over 7.1 acres of total aquatic habitat.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate.	▪ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 18' Federal Channel	▪ No habitat type conversion. ▪ Dredging would result in a temporary loss of epibenthic invertebrates over 0.5 acres, and a temporary loss (2-3 years) of benthic infauna over 3.3 acres.	▪ Restores biological function of chemically degraded habitat in the area where removal (dredging) of contaminated sediments would occur. ▪ Other shallow areas where the surface sediments are currently clean would remain intact, continuing to serve a shallow nearshore estuary habitat function consistent with the Pilot's habitat objectives developed by the Pilot Team (see Section 3.2).	▪ No conversion of habitat types is occurring. Existing clean shallow-water habitat remains intact.
I&J Waterway	▪ No changes	▪ No changes	▪ No changes
G-P Log Pond	▪ Conversion of 2.2 acres of deep-water (below -10) and 2.2 acres of shallow subtidal (-4 to -10) to intertidal habitat (between 0 and -4). ▪ Loss of rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 4.6 acres due to CAD construction. ▪ Temporary loss (2-3 years) of benthic infauna over 7.8 acres.	▪ Restores and improves biological function of chemically and physically degraded habitat via capping with clean sediments (as part of CAD). ▪ Increased epibenthic production from converting 4.4 acres of subtidal to intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 4.4 acres of subtidal to intertidal. ▪ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift to intertidal habitat. ▪ To further enhance the productivity and diversity of the site, areas of the cap could be modified to include large cobble material to provide macroalgae attachment sites.
G-P Aerated Stabilization Basin	▪ Conversion of 3.4 acres of deep-water (below -10) to 3.4 acres of shallow subtidal (-4 to -10), and 3.1 acres of deep-water (below -10) to 3.1 acres of intertidal (+4 to -4). ▪ Loss of 6.5 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. Temporary loss (months) of epibenthic invertebrates over 14.8 acres. ▪ Temporary loss of benthic infauna over 45.8 acres.	▪ Restores biological function of chemically degraded habitat via capping with clean sediments over 45.8 acres of currently contaminated bay bottom. ▪ Increased epibenthic production from converting 6.5 acres of subtidal to intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 6.5 acres of subtidal to intertidal. ▪ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift in habitat function consistent with the habitat objectives developed by the Pilot Team. ▪ To further enhance the productivity and diversity of the site, areas of the cap could be enhanced with eelgrass restoration, particularly adjacent to the area near I&J Waterway where there is an established existing eelgrass bed.

Table 4.3-1 Alternative 2A: Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Port Log Rafting Area	▪ Conversion of 0.4 acres of deep-water (below -10) and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4). ▪ Loss of 1.2 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. Temporary loss (months) of epibenthic invertebrates over 5.7 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 24.7 acres.	▪ Restores biological function of chemically and physically degraded habitat through removing (via dredging) the contaminated sediment or capping over the area with clean sediments. ▪ Increased epibenthic production from converting 0.4 acres of deep-water and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4). ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 1.2 acres into intertidal.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay, although the increases are minimal because only 1 acre of subtidal habitat is converted to intertidal.
Starr Rock	▪ Conversion of 25 acres of deep-water habitat (below -10) and 4.3 acres of shallow subtidal habitat (-4 to -10) to 29.3 acres of intertidal habitat (0 to -4). ▪ Loss of 29.3 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 9.2 acres. Temporary loss (2-3 years) of benthic infauna over 92.2 acres.	▪ Alters and improves the biological function of existing degraded habitat through filling and capping (via constructing a CAD site) over 45 acres of currently contaminated sediment. ▪ Increased epibenthic production from converting 25 acres of deep-water (below -10) and 4.3 acres of shallow subtidal (-4 to -10) to 29.3 acres of intertidal (0 to -4). ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp through converting 29.3 acres to intertidal habitat. ▪ Enhanced migratory corridor and the potential for eelgrass restoration are both consistent with the habitat objectives developed by the Pilot Team.	▪ Proposed actions eliminate the exposure pathway for contaminants into the food chain that currently exists at 48 acres within the overall site. ▪ The additional filling/capping acreage on clean sediments is necessary to create a confined disposal site for sediments being removed from elsewhere in Bellingham Bay. ▪ The CAD would increase habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay through the shift to intertidal habitat that is consistent with the habitat objectives developed by the Pilot Team. ▪ Habitat enhancement measures for this site include the potential for eelgrass restoration.
Cornwall Avenue Landfill	▪ Conversion of 2.7 acres of deep-water habitat (below -10) and 0.6 acres of shallow subtidal habitat (-4 to -10) to 3.3 acres of intertidal habitat (+8 to -4). ▪ Loss of 3.3 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 6.2 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 13.6 acres. ▪ Constructing a cap over the existing solid waste substrate would result in a loss of 0.5 acres of existing eelgrass. Preliminary evaluations suggest that CAD construction would not adversely impact adjacent eelgrass; however, this would need to be evaluated in more detail during remedial design.	▪ Restores and improves biological function of physically degraded habitat exposed to deleterious substances typical of solid waste landfills through filling and capping over 13.6 acres of currently contaminated sediment. ▪ Increased epibenthic production from converting 2.7 acres of deep-water (below -10) and 0.6 acres of shallow subtidal (-4 to -10) to 3.3 acres of intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp through converting 3.3 acres to intertidal habitat. ▪ Enhanced migratory corridor and the potential for eelgrass restoration are both consistent with the habitat objectives developed by the Pilot Team.	▪ Proposed action would eliminate the exposure of aquatic organisms to deleterious substances. ▪ Extending the CAD and capping over the Cornwall Avenue Landfill would increase habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay. ▪ Loss of 0.5 acres of existing eelgrass ▪ Habitat enhancement measures for this site include the potential for eelgrass restoration.
Harris Avenue Shipyard	▪ No habitat type conversion. ▪ Dredging of 4 acres of deep-water habitat would result in a temporary loss (2-3 years) of benthic infauna over 4 acres.	▪ Restores biological function of chemically degraded habitat through dredging and possibly capping.	▪ No conversion of habitat types is occurring.

See Appendix "E" for the following additional habitat impact information:

- summary of habitat modifications,
- simplistic representation of a marine food web,
- Bellingham Bay habitat strategy objectives alternative assessment, and
- Bellingham Bay general ecology relative to tidal elevation

Upland Habitat

This alternative would not alter any functional upland habitat, and no impacts to terrestrial wildlife are expected.

Seabirds

Dredging, capping, and CAD construction would temporarily disturb seabirds. Glaucous-winged gulls use beaches along the shoreline from the G-P ASB to the G-P Log Pond for nesting, resting, and foraging. These areas would be directly disturbed by project construction activities. The mudflat area at the head of Whatcom Waterway that is used by a variety of seabirds would be left intact, and a 5-acre mudflat would be developed in the G-P Log Pond that would provide foraging opportunities for seabirds. Dredging and capping at the Harris Avenue Shipyard would temporarily disturb beaches used by seabirds.

Other habitat used by aquatic birds, including eelgrass present at the Cornwall Avenue Landfill and Starr Rock sites, would be temporarily disturbed as a result of cap placement and CAD construction. Following construction, the physical elevations will be appropriate for the potential development of 30+ acres of eelgrass habitat, which, if successful, could provide substantial benefits for black brant, geese, and other aquatic birds that feed on species that use eelgrass beds.

Marine Mammals

No haul out sites or pupping areas occur at or near the sites affected by dredging, capping, and CAD construction. Gray whales typically occur far offshore of the Harris Avenue Shipyard site and generally should not be affected by this alternative. However, recent (Spring 2000) sightings of gray whales in inner Bellingham Bay suggest that this species may occasionally enter the project area. Accordingly, cap designs would need to consider possible exposure/bioturbation by whale activities.

Harbor seals may also occur in the Whatcom Waterway, and may use the mudflat habitat at the head of the waterway. Seals and other marine mammals that may be present would likely avoid sites where dredging, capping, and other construction activities are occurring. The preservation of the mudflat at the head of Whatcom Waterway and the potential development of additional mudflat and eelgrass habitat as a result of restoration actions could benefit harbor seals.

Threatened and Endangered Species

Activities such as dredging, cap placement, and sediment disposal are not expected to adversely affect listed juvenile chinook and candidate coho salmon or the anadromous form of bull trout, because the project would adhere to in-water work timing limitations. However,potential adverse impacts could include entrainment and avoidance as a result of elevated turbidity.

NMFS has not yet designated what will be considered critical habitat for chinook salmon. It is expected that, at a minimum, intertidal and shallow subtidal habitat will be designated critical habitat for this species. Juvenile salmon, including chinook, should benefit from habitat restoration actions under Alternative 2A as there would be a substantial increase in the available area of intertidal mudflat within the Whatcom Waterway (up to an additional 4.4 acres at the G-P Log Pond) and shallow subtidal habitat with the potential for eelgrass enhancement.

The anadromous form of bull trout is likely to be present in the Nooksack River and they also likely use marine waters in Bellingham Bay for a portion of their life.

Federally-listed threatened and endangered bird species present in the area include the bald eagle, marbled murrelet, and peregrine falcon. The great blue heron, a state-listed sensitive species, is also present in Bellingham Bay.

No known nesting areas used by the bird species would be affected under Alternative 2A. The sites proposed for dredging, capping, and CAD construction do not contain habitat suitable for bald eagle, peregrine falcon or marbled murrelet nesting. The nearest known heron rookery is located approximately 3 miles northwest of Whatcom Waterway.

Birds may temporarily avoid areas where construction activities are occurring, and the project would affect areas that may be used by these species for foraging. However, bald eagles, peregrine falcons, and great blue herons occupy large feeding territories, and it is not expected that foraging opportunities would be impaired. Marbled murrelets forage primarily on waters greater than 30 feet in depth, and are not likely to use areas that would be disturbed by project construction. All of these species may indirectly benefit from habitat restoration actions under Alternative 2A, as these actions would be expected to increase production of prey over the long term through protecting existing intertidal habitat and creating new intertidal habitat.

No direct mortality of threatened, endangered, candidate or sensitive species would be expected as a result of the project.

Mitigation

To protect critical life-cycle periods of key resources from possible exposure to contaminant releases and other potential water quality impacts resulting from dredging operations, such operations are prohibited during some portions of the year. For example, WDFW does not allow dredging between March 15 and June 15 each year to protect outmigrating juvenile salmon and steelhead trout populations. This closed dredging window would also apply to the Bellingham Bay cleanup actions. Additional closures or restrictions may be identified by WDFW during the Hydraulic Project

Approval process that occurs near the end of remedial design. For example, the listing of chinook salmon as a threatened species under the ESA may lead to additional temporal dredging activity restrictions (e.g., to protect returning adult salmon in late summer and fall).

Although adult and sub-adult chinook and coho (and limited numbers of juveniles) may be present during construction, it is expected that construction impacts would be avoided and minimized by adhering to the requirements of CWA Section 401 for protection of water quality and aquatic species, and through the development of habitat conservation measures identified through Section 7 consultation with NMFS. The same potential protection measures identified for juvenile salmonids would also be protective of juvenile bull trout.

Although this alternative results in a loss of 0.5 acres of existing eelgrass, due to the increase in shallow subtidal/intertidal habitat occurring under alternative 2A, it is not clear at this time if mitigation would be required. The need for mitigation would be determined during remedial design and permitting, also considering possible off-site eelgrass impacts resulting from CAD construction. At the discretion of the relevant regulatory agencies, the Preliminary Draft Habitat Mitigation Framework (described in Section 2.3.3) could be used during future permitting activities to quantify mitigation requirements.

4.3.1.3 Land Use, Shoreline Use, and Recreation/Public Use

Impacts

Navigation and Commerce

The impacts of Alternative 2A are summarized in Table 4.3-2. In addition, there would be short-term impacts during construction. CAD disposal of 420,000 CY would require operation of one dredge and two barges. This amount of barge traffic is not expected to significantly impact Bellingham Bay harbor operations. The cap and CAD areas will have some Restricted Navigation Areas (RNAs) as noted in Table 4.3.2. These RNAs will limit the anchorage associated with commercial shipping operations due to concerns about anchor scour on the cap/CAD surface. The RNA designation will also cause controls and/or limits to be placed on piling construction and/or removal in those areas.

Tribal and Commercial Fishing

It is possible that project construction activities and the resulting changes in the shoreline configuration could interfere with or displace tribal fishing and crab harvesting from certain areas historically used by tribal fisherman. During construction activities fishing activities would be disrupted. Changes in elevations at the Starr Rock CAD/cap site and immediately in front of the G-P ASB may preclude fishing with nets or crab pots. The Restricted Navigation Area designation may limit net fishing due to anchor scour concerns, depending on final design of the cap surface. However, the habitat improvements are expected to provide habitat that is important to long-term fisheries production and sustaining fisheries resources harvested by the Tribes. Clam and other shellfish harvesting should not be affected, as the major tribal shellfish areas are located in the western portions of Bellingham Bay.

No dredging is proposed in the I&J Street Waterway, and vessel traffic entering and leaving Squalicum Harbor (where a majority of fishing vessels are moored) should not be affected by project construction.

Recreational Uses and Public Access

A 2-acre area of intertidal and shallow subtidal habitat at the extreme head of the Whatcom Waterway would not be dredged to the authorized navigation depths, which would leave the existing mudflat and shallow subtidal area intact. However, Alternative

Table 4.3-2 Potential Navigation and Commerce Impacts Associated with Alternative 2A

Site (potential area impacted)	Current Uses	Navigation & Commerce Impact
Whatcom Waterway (58 acres)	Federally-authorized navigation channel providing access for deep draft ship traffic to the Port's shipping terminal, the G-P facility, and other water-dependent industry and commerce. Marine traffic includes break bulk ship cargo, barge access to the central waterfront, delivery of commercial fish catch, and access to boat repair yard.	Much of this area would either be dredged to clean sediments (11 acres) or dredged and capped (18 acres) to regain authorized depths of -30 and -18 MLLW (incorporating 2-ft overdredge allowances). 25 acres that are currently below -32 feet MLLW and have naturally clean surface sediments would be left in place. 2 acres at the extreme head of the waterway are currently shallower than the -18 MLLW authorized depth and would not be dredged. This alternative would complicate the ability to achieve deeper than currently authorized navigation depths in the future by leaving subsurface contamination in place. Future deepening projects would then need to identify a method of managing dredged materials.
I&J Waterway (9 acres)	Federally-authorized navigational channel providing access for moderate draft ship traffic to Squalicum Harbor, U.S. Coast Guard Station, and fish processing operations.	No change in current use.
G-P Log Pond (8 acres)	Shared ownership by the Port and G-P. The area has been used for small vessel moorage and periodic large vessel moorage rather than log rafting in recent years.	Conversion to an intertidal CAD facility would prevent continued use of the area for small vessel moorage and restricts future water dependent uses.
G-P ASB (43 acres)	State-designated Harbor Area intended to support navigation and commerce by providing access to upland facilities. Since upland area is fully dedicated to waste water treatment, the adjacent aquatic area is used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.	This area would be capped, with the exception of 2 acres near the shoreline and the Whatcom Waterway federal channel that would have complete removal. Water depths would be reduced by approximately 2 feet. Recreational boaters could continue to traverse the area as a 2-foot shift in elevation does not affect the navigability of the area for recreational vessels. An engineered berm may be constructed near the shoreline to protect the shallow-water portions of the cap and concurrently improve habitat. This berm may present a navigational hazard at some tidal conditions. To reduce the risk of navigational accidents a Restricted Navigational Area (RNA) may be established. Depending on cap design, anchorage limitations may be necessary to protect cap integrity.
Port Log Rafting (24 acres)	State-designated Harbor Area with aquatic land leases to the Port and G-P for log rafting, navigation and commerce, including access to the Port's Chemical Dock facility leased to G-P for export (lignins, caustics) and import (chlorine).	Remediation includes a combination of capping and dredging in this area. The dredging would occur over 9 acres and provide a clean-bottom navigation corridor to the Chemical Dock. If future uses at the Chemical Dock require deeper draft vessels, the channel could be deepened, as all contaminated sediments would be removed from the corridor. The cap (over 15 acres) would not affect current log rafting uses but may limit future uses.
Starr Rock (69 acres)	State-designated Harbor Area used primarily for shallow draft recreational boating and traffic along the shoreline. Tribal/commercial fishing. Adjacent upland use is primarily recreational park.	This area would be either capped or included as part of the CAD, and elevations would shift to intertidal and shallow subtidal, limiting the use of the area for boating during low tide periods. The conversion to shallow water would preclude use of the existing Natural Anchorage designation in a portion of the site or would displace it farther offshore. To reduce the risk of navigational accidents a Restricted Navigational Area (RNA) may be established. Future uses of the site (e.g., net or crab pot fisheries, anchoring, construction of future structures. etc.) may be limited during certain tidal conditions. Beach access would improve along portions of the Boulevard Park adjacent to the CAD.
Cornwall Avenue Landfill (14 acres)	State-designated Harbor Area with aquatic land lease to G-P for in-water log rafting, upland log storage and warehouse. Beach and shoreline access is prohibited because of uncontrolled landfill waste. Some tribal/commercial fishing and recreational boating traffic .	This area would be either capped or included as part of the CAD. Reduced navigational access and potential maritime uses would result at the south end where the CAD facility would occupy 4 acres and shift existing bathymetry to intertidal and shallow subtidal elevations. The capping at the north end of the site would have some limitations on future maritime uses (e.g., net or crab pot fisheries, anchoring, construction of future structures, etc.) due to limited navigation access. However, a barge access corridor could still be created to the north of the capped area, and capping could still provide adequate depths for some maritime uses of the uplands such as dry-stack storage. Existing beach access restrictions would likely be removed following site remediation.
Harris Ave. Shipyard (4 acres)	Shipyard activities including the operation of a drydock	This area would likely be dredged. Some areas outside the vicinity of the drydock may be suitable for capping, provided the shallower water depths do not affect current site uses. Increasing bottom depths as a result of dredging would provide additional flexibility for future maritime uses.

2A would not facilitate community efforts to develop the Maritime Heritage Park/Citizens Dock area for public use and access through the Whatcom Creek Waterfront Action Program. By not dredging this area, future water-dependent activities in this portion of the waterway may be limited by the shallower depth.

This alternative would improve beach access north of Boulevard Park.

Mitigation

Measures may be necessary to ensure that the integrity of caps and/or CADS is not threatened by future activities. For instance, depending on the specific capping area and final cap design, Restricted Navigation Areas (RNAs) may be necessary to ensure the integrity of capped areas and the CAD facilities. As another example, any proposed pile driving in a cap or CAD would have to be assessed to determine if it could be done in a way that would not cause confined contaminants to become re-exposed to the aquatic environment.

Mitigation measures may include the development of recommendations to the Harbor Line Commission on the reconfiguration of the Bellingham Harbor Area. All such recommendations must be consistent with (1) maintaining or enhancing the type and amount of harbor area needed to meet long-term needs of water dependent commerce; (2) maintaining adequate space for navigation beyond the outer harbor line; and (3) any other relevant harbor area statutes, regulations or policies.

Coordination with tribal fishing activities would be conducted. Dredging operations would normally not be allowed during any period of major tribal fishing activity within the dredging area. Mitigation for impacts to tribal fishing activities would be identified by the Lummi and Nooksack tribes prior to permitting.

4.3.1.4 Air and Noise

Impacts

Short-term impacts to air quality caused by emissions from construction equipment may occur, but these emissions are likely to remain within limits of current air quality standards.

Noise generated by construction equipment is not expected to exceed existing noise standards.

Mitigation

Although air quality should not be significantly affected, measures to minimize construction-related impacts could include monitoring of noise and/or emissions at construction sites to ensure compliance with standards.

4.3.1.5 Cultural Resources

Impacts

This alternative minimizes dredging and disposal volumes. Isolated historic artifacts associated with the PAF complex may be unearthed during dredging activities at the Harris Avenue Shipyard. However, historic artifacts from this area would lack integrity and would therefore not likely contribute information important to the history of the area. There is a possibility that a cap or a CAD could be placed over an area that contains unidentified cultural resources.

Mitigation

No mitigation measures are anticipated to be required for this alternative. However, in the event that cultural artifacts are uncovered during the remedial design phase of the CAD, or during construction, coordination with the Washington State Office of Archaeology and Historic Preservation and potentially the National Advisory Council on Historic Preservation would be necessary to ensure that impacts to cultural resources are identified and mitigated appropriately.

4.3.2 Alternative 2B - Removal & Capping to Achieve Authorized Channel Depths (Upland Disposal)

Like Alternative 2A, implementation of Alternative 2B would minimize dredging, transport, and disposal of contaminated sediment, while maintaining existing navigation channel depths. As in Alternative 2A, approximately 420,000 CY of material would ultimately be dredged. Unlike Alternative 2A, the dredged material would be removed from the aquatic environment and taken to upland disposal facilities.

All dredged sediments would be offloaded on shore, dewatered as necessary to facilitate transport, and hauled by rail, truck, and/or barge outside of the Bellingham Bay watershed to upland disposal facilities. Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 500,000 CY. A relatively large capacity Subtitle D Landfill facility, such as the Roosevelt Regional Landfill or an equivalent facility could provide sediment disposal capacity. Other prospective suitable upland disposal sites may become available as final design is completed. The capacity and availability of these upland sites would be subject to final permitting of the disposal facility(ies).

Alternative 2B includes engineered caps over approximately 143 acres of inner Bellingham Bay (Table 2.3-1).. The shoreline and subtidal areas of the Cornwall Avenue Landfill would be capped with clean material that would provide concurrent source control (Landau 1999). The upland portion of the site would be graded and existing storm water systems repaired. Intertidal zones of the landfill cap/shoreline may be armored, as determined by final design analyses.

4.3.2.1 Geology, Water, Sediment, and Environmental Health

Impacts

Impacts to geology, water, sediment and environmental health would be as described for Alternative 2A with the following exceptions:

- Potential short-term water quality impacts associated with sediment dewatering
- Potential longer-term impacts associated with the stability, isolation, and water quality protection performance of the upland disposal facilities

Because dredged sediments contain water, they would be transported by barge to a waterfront facility for water removal (dewatering) prior to transport and/or disposal at the prospective upland facility. A clamshell is normally used to transfer sediments from the barge to a hopper assembly and conveyor belt at the dewatering facility. Incidental spillage and release of contaminants to adjacent soils, surface water, sediments in the transfer area could occur as a result of these operations.

Several dewatering methods could be used. The most common dewatering facilities are constructed of paved and lined cells with drainage and runoff collection systems to discharge decanted water. These systems use a combination of passive gravity settling and active filtration to remove solids prior to discharge. Alternatively, more active dewatering systems using hydrocyclone, vacuum extraction, belt press, and/or centrifuge equipment could be used. Design, construction monitoring, and corrective measures would be implemented, as necessary, to minimize contaminant releases from the dewatering facility. Nevertheless, dissolved and suspended contaminants contained in the effluent from the dewatering facility could potentially be discharged to adjacent surface waters, with resultant water quality impacts.

Following dewatering, the sediment would be transported by truck, rail, or barge to the upland disposal site. Appropriate upland disposal facilities for Alternative 2B include existing Subtitle D landfills designed to the requirements of the Minimum Functional Standards (MFS) for Solid Waste Handling, Chapter 173-304 WAC. These existing facilities (e.g., Roosevelt Regional Landfill) have been designed and approved for use in consideration of long-term static and seismic stability.

As discussed in the final RI/FS for the Whatcom Waterway site, four SBLTs were performed on one composite sediment sample collected from the central Whatcom Waterway. The SBLT results can be used to assess potential long-term water quality impacts of various disposal options and possible design engineering controls necessary to meet applicable water quality criteria. Results of the SBLT studies are presented in the final RI/FS for the Whatcom Waterway site. The preliminary results of these tests indicated that a leachate collection and treatment/disposal system would likely be required at an upland disposal site to ensure water quality protection (the Roosevelt Regional Landfill has such a system).

A potential environmental health impact of disposing contaminated sediments at upland disposal sites, including existing landfills, is the possible uptake of contaminants by plants and animals near the facility. Birds such as gulls and crows frequently congregate near landfills and could come in contact with contaminated material (Corps of Engineers

1998). Small mammals also visit the site and could come into contact with the sediments.

Mitigation

Mitigation measures for dredging and cap construction/operation would be the same as those described for Alternative 2A. Measures related to the dewatering facility include:

- Exclude environmentally sensitive areas
- Use treatment technologies
- Inspector oversight

Measures related to leachate control at upland landfills include:

- Avoid areas with less than 10 feet between the bottom of the landfill and the groundwater table
- Exclude areas over sole source aquifers and/or public drinking water supplies
- Install liners and a leachate collection and removal system
- Monitor groundwater quality via monitoring wells

Measures related to uptake of contaminants by plants and animals include:

- Place interim covers (if warranted)
- Construct cap and cover

4.3.2.2 Fish and Wildlife

Impacts

Aquatic Habitat/Resources

Adverse and beneficial impacts for aquatic habitat, fish, shellfish, and benthic/epibenthic organisms are listed in Table 4.3-3 (See Appendix E for additional habitat impact information).

Upland Habitat

Upland habitat could be modified and terrestrial species affected by upland sediment disposal. The effects would vary, depending on the disposal site or sites that were ultimately selected for use. No impacts to upland habitat would occur if dredged material were transported to the Roosevelt Regional Landfill, an active facility. As stated in the previous section, birds and mammals at the landfill could come in contact with contaminated material as it is placed in the landfill.

Seabirds

Seabirds would be temporarily disturbed by dredging and cap construction. Glaucous-winged gulls use beaches along the shoreline from the G-P ASB to the G-P Log Pond for nesting, resting, and foraging. These areas would be directly disturbed by project construction activities. The mudflat area at the head of Whatcom Waterway that is used by a variety of seabirds would be left intact. Dredging and capping at the Harris Avenue Shipyard would temporarily disturb beaches used by seabirds.

Other habitat used by aquatic birds, including eelgrass present at the Cornwall Avenue Landfill and Starr Rock would be temporarily lost as a result of cap placement.

Table 4.5-3 ... rnative 2B: Summary of Aquatic Resource Adverse Impacts and Benefits

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Mid/Outer Whatcom Waterway: 30' Federal Channel	■ Conversion of 0.5 acres of shallow subtidal habitat (-4 to -10) to 0.5 acres of intertidal habitat (+4 to 0), and 0.7 acres of shallow subtidal habitat to deep-water habitat (below -10). ■ Dredging of 24.2 acres (total habitat area in site) would result in a temporary loss (2-3 years) of benthic infauna and a temporary loss (months) of epibenthic fauna over 4.2 acres.	■ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate. ■ Increased epibenthic production from converting 0.5 acres of subtidal to intertidal.	■ Minor conversion (less than 1 acre) of habitat types is occurring.
Head of Whatcom Waterway: 30' Federal Channel	■ No substantial habitat type conversion (only 0.1 acres is being converted and it is all subtidal – shallow subtidal to deep-water). ■ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.1 acres, and a temporary loss (2-3 years) of benthic infauna over 7.1 acres.	■ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate.	■ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 18' Federal Channel	■ No habitat type conversion. ■ Dredging of 3.3 acres of deep-water and shallow subtidal habitat would result in a temporary loss (months) of epibenthic invertebrates over 0.5 acres, and a temporary loss (2-3 years) of benthic infauna over 3.3 acres.	■ Restores biological function of chemically degraded habitat in the area where removal (dredging) of contaminated sediments would occur. ■ Other shallow areas where the surface sediments are currently clean would remain intact, continuing to serve a shallow nearshore estuary habitat function consistent with the habitat objectives developed by the Pilot Team.	■ No conversion of habitat types is occurring. Existing clean shallow-water habitat remains intact.
I&J Waterway	■ No changes	■ No changes	■ No changes
G-P Log Pond	■ Conversion of 2.2 acres of deep-water (below -10) to 1.3 acres of shallow subtidal (-4 to -10) and 0.9 acres of intertidal habitat (+11 to -4). ■ Loss of rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp over 0.9 acres. ■ Temporary loss (months) of epibenthic invertebrates over 4.6 acres due to cap construction. ■ Temporary loss (2-3 years) of benthic infauna over 7.8 acres.	■ Restores biological function of chemically and physically degraded habitat via capping with clean sediments. ■ Increased epibenthic production from converting 0.9 acres of subtidal to intertidal. ■ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 0.9 acres of subtidal to intertidal. ■ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	■ Actions would result in a minor net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the additional 1 acre of intertidal being created. ■ To further enhance the productivity and diversity of the site, areas of the cap could be modified to include large cobble material to provide macroalgae attachment sites.
G-P Aerated Stabilization Basin	■ Conversion of 3.4 acres of deep-water (below -10) to 3.4 acres of shallow subtidal (-4 to -10) and 3.1 acres of deep-water (below -10) to 3.1 acres of intertidal (+4 to -4) habitat. ■ Loss of 6.5 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ■ Temporary loss (months) of epibenthic invertebrates over 14.8 acres. ■ Temporary loss of benthic infauna over 45 acres.	■ Restores biological function of chemically degraded habitat via capping with clean sediments over 45.8 acres of currently contaminated bay bottom. ■ Increased epibenthic production from converting 6.5 acres of deep subtidal to shallow subtidal and intertidal. ■ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 6.5 acres of subtidal to intertidal. ■ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	■ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift in habitat function consistent with the habitat objectives developed by the Pilot Team. ■ To further enhance the productivity and diversity of the site, areas of the cap could be enhanced with eelgrass restoration, particularly adjacent to the area near I&J Waterway where there is an established existing eelgrass bed.

Table 4.3-3 Alternative 2B: Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes/Impacts	Changes/Benefits	Summary
Port Log Rafting Area	▪ Conversion of 0.4 acres of deep-water (below -10) and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4) habitat. ▪ Loss of 1.2 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 5.7 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 24.7 acres.	▪ Restores biological function of chemically and physically degraded habitat through removing (via dredging) the contaminated sediment or capping over the area with clean sediments. ▪ Increased epibenthic production from converting 0.4 acres of deep-water and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4). ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 1.2 acres into intertidal.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay, although the increases are minimal because only 1 acre of subtidal habitat is converted to intertidal.
Starr Rock	▪ No habitat type conversion. ▪ Capping 2.9 acres of shallow subtidal would result in a temporary loss (months) of epibenthic invertebrates, and capping of 42 additional acres of deep-water habitat would result in a temporary loss (2-3 years) of benthic fauna over 44.9 acres total.	▪ Restores biological function of existing degraded habitat via capping of contaminated sediments with clean sediments. ▪ No change in habitat elevations as a result of capping – all areas remain subtidal.	▪ No conversion of habitat types is occurring.
Cornwall Avenue Landfill	▪ Conversion of 1.1 acres of deep-water habitat to 0.4 acres of shallow subtidal and 0.7 acres of intertidal. ▪ Loss of 0.7 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Capping would result in a temporary loss (months) of epibenthic invertebrates over 6.4 acres, and a temporary loss (2-3 years) of benthic infauna over 13.8 acres. ▪ Capping of the existing solid waste substrate would result in a loss of 0.5 acres of existing eelgrass	▪ Restores and improves biological function of physically degraded habitat exposed to deleterious substances via capping of contaminated sediments with clean material. ▪ Increased epibenthic production, rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 0.7 acres to intertidal.	▪ Proposed action would eliminate the exposure of aquatic organisms to deleterious substances in the substrate/habitat. ▪ Minor conversion of habitat types to shallow intertidal functions. ▪ Loss of 0.5 acres of existing eelgrass.
Harris Avenue Shipyard	▪ No habitat type conversion. ▪ Dredging of 4 acres of deep-water habitat would result in a temporary loss (2-3 years) of benthic infauna over 4 acres.	▪ Restores biological function of chemically degraded habitat through dredging and possibly capping.	▪ No conversion of habitat types is occurring.

Marine Mammals

Impacts would be the same as 2A except that the area of restored habitat and the potential benefit to marine mammals would be smaller under Alternative 2B than under Alternative 2A.

Threatened and Endangered Species

Impacts would be the same except that the benefits to chinook and coho salmon would be smaller under Alternative 2B than under Alternative 2A, as the increase in the area of intertidal and shallow subtidal habitat would be less. Alternative 2B would cap the Log Pond area as opposed to Alternative 2A, which would construct a CAD in the Log Pond. The cap would not provide as much elevation gain, and therefore about 1 acre less of intertidal mudflat would be available.

No direct mortality of threatened, endangered, candidate, or sensitive species, including bull trout, would be expected as a result of dredging or cap construction. Other federally-listed threatened and endangered or state-listed sensitive species could occur at an upland disposal facility selected for use under Alternative 2B. The potential effects of upland disposal on threatened, endangered, or sensitive species would depend on the species and habitats present at or near the disposal site(s).

There is no difference between Alternative 2A and 2B with respect to potential impacts to threatened or endangered bird species.

Mitigation

The Preliminary Draft Habitat Mitigation Framework (described in Section 2.3.3) could be used at the discretion of relevant regulatory agencies during future permitting activities to quantify mitigation requirements for the loss of existing eelgrass and other aquatic resource impacts. Mitigation for the potential intake of contaminants by birds and mammals is described above in Geology, Water, Sediment, and Environmental Health.

4.3.2.3 Land Use, Shoreline Use, and Recreation/Public Use

Impacts

Navigation and Commerce

The impacts of Alternative 2B are summarized in Table 4.3-4. Short-term construction impacts would be as described for Alternative 2A. Restricted Navigational Area impacts associated with the caps would be the same as those described for 2A.

Tribal and Commerical Fishing

Potential impacts would be similar to those described for Alternative 2A, with the exception of the Cornwall Avenue Landfill and the Starr Rock areas. In those areas, a CAD would not be constructed and there would not be any potential displacement of set net or crab pot fisheries due to the shallower water created by the CAD.

Table 4.3-4 Potential Navigation and Commerce Impacts Associated with Alternative 2B

Site (potential area impacted)	**Current Uses**	**Navigation & Commerce Impact**
Whatcom Waterway (58 acres)	Federally-authorized navigation channel providing access for deep draft ship traffic to the Port's shipping terminal, the G-P facility, and other water-dependent industry and commerce. Marine traffic includes break bulk ship cargo, barge access to the central waterfront, delivery of commercial fish catch, and access to boat repair yard.	Same as Alternative 2A.
I&J Waterway (9 acres)	Federally-authorized navigational channel providing access for moderate draft ship traffic to Squalicum Harbor, U.S. Coast Guard Station, and fish processing operations.	No change in current use.
G-P Log Pond (8 acres)	Shared ownership by the Port and G-P. The area has been used for small vessel moorage and periodic large vessel moorage rather than log rafting in recent years.	This area would be capped resulting in a uniform change of 2 feet in elevation (shallower) across the site. These shallower depths may cause some limitations on small boat moorage depending on the vessels' draft requirements and restricts future water-dependent uses.
G-P ASB (43 acres)	State-designated Harbor Area intended to support navigation and commerce by providing access to upland facilities. Since upland area is fully dedicated to waste water treatment, the adjacent aquatic area is used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.	Same as Alternative 2A.
Port Log Rafting (24 acres)	State-designated Harbor Area with aquatic land leases to the Port and G-P for log rafting, navigation and commerce, including access to the Port's Chemical Dock facility leased to G-P for export (lignins, caustics) and import (chlorine).	Same as Alternative 2A.
Starr Rock (48 acres)	State-designated Harbor Area used primarily for shallow draft recreational boating and traffic along the shoreline. Tribal/ commercial fishing. Adjacent upland use is primarily recreational park.	This area would be capped, and existing bathymetry elevations would shift by approximately 2 feet across the entire site. This change in bathymetry would not affect recreational boating or fishing activities along the shoreline. Anchorage limitations may be necessary to protect cap integrity.
Cornwall Ave. Landfill (14 acres)	State-designated Harbor Area with aquatic land lease to G-P for in-water log rafting, upland log storage and warehouse. Beach and shoreline access is prohibited because of uncontrolled landfill waste. Some tribal/ commercial fishing and recreational boating traffic .	This area would be capped, changing the existing bathymetry by approximately 2 feet shallower across the site. The capping of the site would have some limitations on future maritime uses due to limited navigation access. However, a barge access corridor could still be created to the north of the capped area, and capping would still provide adequate depths for some maritime uses of the uplands such as dry-stack storage. Existing beach access restrictions would likely be removed following site remediation.
Harris Ave. Shipyard (4 acres)	Shipyard activities including the operation of a drydock	Same as Alternative 2A.

Recreational Uses and Public Access

As in Alternative 2A, this alternative would preserve the mudflat area at the head of the Whatcom Waterway, but may not be consistent with community efforts to develop the Maritime Heritage Park/Citizens Dock area. Unlike Alternative 2A, there would be no opportunity to develop an intertidal beach north of Boulevard Park.

Mitigation

Potential mitigation measures would be similar to those described for Alternative 2A.

4.3.2.4 Air and Noise

Impacts

Impacts associated with this alternative would be as described under Alternative 2A.

Upland disposal could create impacts to air quality through volatilization of contaminants when sediments are exposed to the air. Contaminants could also be carried into the air as dust by wind. The significance of these potential impacts would depend on the condition of the sediment and the operations of the landfill.

Some additional noise from on-site construction equipment may occur under this alternative, but is not expected to exceed noise standards. It is unlikely that the activity associated with delivery and disposal of sediment material to a landfill would be a significant increase over the existing noise level at the landfill.

Mitigation

Potential mitigation measures would be as described under Alternative 2A.

4.3.2.5 Cultural Resources

Impacts

This alternative includes the same amount of dredging as Alternative 2A, but would dispose of sediments at an established off-site upland landfill. No impacts to historic structures or archaeological deposits are expected. Isolated historic artifacts associated with the PAF complex may be unearthed during dredging activities at the Harris Avenue Shipyard. The historic artifacts would probably lack integrity and would not likely contribute information important to the history of the area. The capping activities may impact cultural resources present along the shoreline of the inner bay by further burying them under approximately 3 feet of clean cap material.

Mitigation

No mitigation measures are anticipated to be required for this alternative. However, in the event that cultural artifacts are uncovered during construction, coordination with the Washington State Office of Archaeology and Historic Preservation and potentially the

National Advisory Council on Historic Preservation would be necessary to ensure that impacts to cultural resources are identified and mitigated appropriately.

4.3.3 Alternative 2C - Full Removal from Navigation Areas (CAD Disposal)

The overall objective of Alternative 2C is to achieve cleanup, allowing for future navigation deepening of the navigation channels, and converting subtidal aquatic habitat to intertidal aquatic habitat by using caps and CAD facilities. Unlike Alternative 2A, minimizing dredging and disposal volumes is not a primary objective of Alternative 2C.

Approximately 820,000 CY of sediments would ultimately be dredged under Alternative 2C, mainly within the Whatcom Waterway. With the exception of the G-P wastewater pipeline area, contaminated sediments that are located within the Whatcom Waterway, even if present below the currently authorized depths, would be dredged under Alternative 2C, thus providing future flexibility for channel deepening. The extreme head of the Whatcom Waterway near Citizens Dock, consisting of a 2-acre area of mudflats that has formed naturally within this area, would be left intact. Relatively smaller dredging operations would be performed within the Port Log Rafting Area and the Harris Avenue Shipyard.

Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 1,100,000 CY. In this alternative, the sediment disposal capacity would be provided by two CAD facilities:

1. A small 50,000 CY CAD at the G-P Log Pond

2. A larger 1,100,000 CY CAD at the Starr Rock/Cornwall area.

Engineered caps would be placed over approximately 112 acres of inner Bellingham Bay (excluding CAD facilities; Table 2.3-1). Other remedial elements of this alternative are similar to Alternatives 2A and 2B.

4.3.3.1 Geology, Water, Sediment, and Environmental Health

Impacts

Under Alternative 2C, the impacts to geology, water, sediment, and environmental health are as under Alternative 2A except:

- **Short-term water quality impacts associated with dredging and transport of contaminated sediments**. Compared to Alternatives 2A and 2B (see above), Alternative 2C would result in approximately 65 percent greater dredging and disposal volumes, and associated water quality impacts.
- **Short-term impacts associated with cap and CAD construction.** The combined remedial capping and CAD areas would be greater (within 15 percent) in Alternative 2C, as compared with Alternatives 2A and 2B (Table 2.3-1), therefore impacts would be greater.
- **Short-term impacts associated with disposal at the CAD site**, including short-term releases of particulate and dissolved contaminants to the water column. Again, because the dredging volume is larger, greater short-term water quality impacts would be associated with

dredge material disposal at the CADs under Alternative 2C, as compared with Alternative 2A.

- **Potential longer-term impacts associated with the stability, isolation, and water quality protection performance of the CAD facilities.** These impacts would be similar to those described for Alternative 2A, but since there is more acreage placed under a cap and/or CAD under Alternative 2C, the impacts would be greater.

Mitigation

Potential mitigation measures would be similar to those described for Alternative 2A.

4.3.3.2 Fish and Wildlife

Impacts

Aquatic Habitat/Resources

Adverse and beneficial impacts for aquatic habitat, fish, shellfish, and benthic/epibenthic organisms are listed in Table 4.3-5 (See Appendix E for additional habitat impact information).

Upland Habitat

Potential impacts would be as described for Alternative 2A.

Seabirds

Potential impacts would be as described for Alternative 2A.

Marine Mammals

Potential impacts would be as described for Alternative 2A.

Threatened and Endangered Species

Potential impacts would be as described for Alternative 2A.

Mitigation

Although this alternative results in a loss of 0.5 acres of existing eelgrass, due to the increase in shallow subtidal/intertidal habitat occurring under alternative 2C, it is not clear at this time if mitigation would be required. The need for mitigation would be determined during remedial design and permitting, also considering possible off-site eelgrass impacts resulting from CAD construction. At the discretion of the relevant regulatory agencies, the Preliminary Draft Habitat Mitigation Framework (described in Section 2.3.3) could be used during future permitting activities to quantify mitigation requirements.

Table 4.3-5 Alternative 2C: Summary of Aquatic Resource Adverse Impacts and Benefits

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Mid/Outer Whatcom Waterway: 30' Federal Channel	▪ Dredging 1.3 acres of shallow subtidal, and 0.1 acres of intertidal would result in a temporary loss (months) of epibenthic invertebrates over 1.4 acres, and a temporary loss (2-3 years) of benthic infauna over 45.4 acres of total aquatic habitat. ▪ One acre of shallow subtidal would be dredged and converted to deep-water habitat.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments.	▪ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 30' Federal Channel	▪ Minor habitat type conversion. ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.1 acres, and a temporary loss (2-3 years) of benthic infauna over 7 acres. ▪ A small portion (0.1 acre) of the deep-water habitat would be converted to shallow subtidal.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate.	▪ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 18' Federal Channel	▪ Minor habitat type conversion. ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.5 acres, and a temporary loss (2-3 years) of benthic infauna over 3.4 acres. ▪ A small portion (0.2 acres) of the shallow subtidal habitat would be converted to deep-water habitat.	▪ Restores biological function of chemically degraded habitat in the area where removal (dredging) of contaminated sediments would occur. ▪ Other shallow areas where the surface sediments are currently clean would remain intact, continuing to serve a shallow nearshore estuary habitat function consistent with the habitat objectives developed by the Pilot Team.	▪ No conversion of habitat types is occurring. ▪ Existing clean shallow-water habitat remains intact.
I&J Waterway	▪ No Changes	▪ No changes	▪ No changes
G-P Log Pond	▪ Conversion of 2.2 acres of deep-water (below -10) and 2.2 acres of shallow subtidal (-4 to -10) to intertidal habitat (between 0 and -4). ▪ Loss of rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 4.4 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 7.8 acres.	▪ Restores and improves biological function of chemically and physically degraded habitat via capping with clean sediments (as part of CAD). ▪ Increased epibenthic production from converting 4.4 acres of subtidal to intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 4.4 acres of subtidal to intertidal. ▪ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift to intertidal habitat. ▪ To further enhance the productivity and diversity of the site, areas of the cap could be modified to include large cobble material to provide macroalgae attachment sites.
G-P Aerated Stabilization Basin	▪ Conversion of 3 acres of deep-water (below -10) to 3 acres of shallow subtidal habitat (-4 to -10), and 3 acres of deep-water (below -10) to 3 acres of intertidal (+4 to -4) habitat. ▪ Loss of 6 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 14.7 acres. ▪ Temporary loss of benthic infauna over 45 acres.	▪ Restores biological function of chemically degraded habitat via capping with clean sediments over 45.8 acres of currently contaminated bay bottom. ▪ Increased epibenthic production from converting 6.5 acres of subtidal to intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 6.5 acres of subtidal to intertidal. ▪ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift in habitat function consistent with the habitat objectives developed by the Pilot Team. ▪ To further enhance the productivity and diversity of the site, areas of the cap could be enhanced with eelgrass restoration, particularly adjacent to the area near I&J Waterway where there is an established existing eelgrass bed.

Table 4.3-3 ...rnative 2C. Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Port Log Rafting Area	▪ Conversion of 0.4 acres of deep-water (below -10) and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4) habitat. ▪ Loss of 1.2 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates of 5.7 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 24.7 acres.	▪ Restores biological function of chemically and physically degraded habitat through removing (via dredging) the contaminated sediment or capping over the area with clean sediments. ▪ Increased epibenthic production from converting 0.4 acres of deep-water and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4) habitat. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 1.2 acres into intertidal.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay, although the increases are minimal because only 1 acre of subtidal habitat is converted to intertidal.
Starr Rock	▪ Conversion of 45.7 acres of deep-water habitat (below -10) and 4.4 acres of shallow subtidal habitat (-4 to -10) to 50.2 acres of intertidal habitat (0 to -4). ▪ Loss of 29 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 9.3 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 9.3 acres. ▪ Temporary loss of at least 0.25 acres of eelgrass bed.	▪ Alters and improves the biological function of existing degraded habitat through filling and capping (via constructing a CAD site) over 48 acres of currently contaminated sediment. ▪ Increased epibenthic production from converting 46 acres of deep-water (below -10) and 4 acres of shallow subtidal (-4 to -10) to 50 acres of intertidal (0 to -4) habitat. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp through converting 50 acres to intertidal habitat. ▪ Enhanced migratory corridor and the potential for eelgrass restoration are both consistent with the habitat objectives developed by the Pilot Team.	▪ Proposed actions eliminate the exposure pathway for contaminants into the food chain that currently exists at 48 acres within the overall site. ▪ The additional filling/capping acreage on clean sediments is necessary to create a confined disposal site for sediments being removed from elsewhere in Bellingham Bay. ▪ The CAD would increase habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay through the shift to intertidal habitat that is consistent with the habitat objectives developed by the Pilot Team. ▪ Habitat enhancement measures for this site include the potential for eelgrass restoration.
Cornwall Avenue Landfill	▪ Conversion of 2.9 acres of deep-water habitat (below -10) and 0.6 acres of shallow subtidal habitat (-4 to -10) to 3.5 acres of intertidal habitat (+8 to -4). ▪ Loss of 3.5 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 6.4 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 13.8 acres. ▪ Constructing a cap over the existing solid waste substrate would result in a loss of 0.5 acres of existing eelgrass. Preliminary evaluations suggest that CAD construction would not adversely impact adjacent eelgrass; however, this would need to be evaluated in more detail during remedial design.	▪ Restores and improves biological function of physically degraded habitat exposed to deleterious substances typical of solid waste landfills through filling and capping over 13.8 acres of currently contaminated sediment. ▪ Increased epibenthic production from converting 2.9 acres of deep-water (below -10) and 0.6 acres of shallow subtidal (-4 to -10) to 3.5 acres of intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp through converting 3.5 acres to intertidal habitat. ▪ Enhanced migratory corridor and the potential for eelgrass restoration are both consistent with the habitat objectives developed by the Pilot Team.	▪ Proposed action would eliminate the exposure of aquatic organisms to deleterious substances. ▪ Extending the CAD and capping over the Cornwall Avenue Landfill would increase habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay. ▪ Loss of 0.5 acres of existing eelgrass. ▪ Habitat enhancement measures for this site include the potential for eelgrass restoration.
Harris Avenue Shipyard	▪ No habitat type conversion. Dredging of 4 acres of deep-water habitat would result in a temporary loss (2-3 years) of benthic infauna over 4 acres.	▪ Restores biological function of chemically degraded habitat through dredging and possibly capping.	▪ No conversion of habitat types is occurring.

4.3.3.3 Land Use, Shoreline Use, and Recreation/Public Use

Impacts

Navigation and Commerce

The impacts of Alternative 2C are summarized in Table 4.3-6. In addition, there would be short-term impacts during construction. CAD disposal of 820,000 cubic yards would require the operation of two dredges and four barges. This amount of barge traffic is not expected to significantly impact Bellingham Bay harbor operations.

Tribal and Commercial Fishing

The overall effect of cleanup actions under Alternative 2C would be similar to that described for Alternative 2A except that the CAD would be larger. This would result in a larger area where net fishing and crab pot placement would be displaced. However, the potential beneficial impacts to fish and wildlife would be greater due to the additional habitat function provided by the larger CAD facility.

Recreational Uses and Public Access

Potential impacts to recreational uses and public access would be as described for Alternative 2A except that the beach enhancement north of Boulevard Park would be larger because of the increased size of the proposed CAD. Additional dredging at the head of Whatcom Waterway would increase the opportunity to use the area as a public access point to the Bay.

Mitigation

Potential mitigation measures would be as described for Alternative 2A.

4.3.3.4 Air and Noise

Impacts

Impacts associated with this alternative would be similar to those described under Alternative 2A.

Mitigation

Potential mitigation measures associated with this alternative would be similar to those described under Alternative 2A.

Table 4.3-6 Potential Navigation and Commerce Impacts Associated with Alternative 2C

Site (potential area impacted)	**Current Uses**	**Navigation & Commerce Impact**
Whatcom Waterway (58 acres)	Federally-authorized navigation channel providing access for deep draft ship traffic to the Port's shipping terminal, the G-P facility, and other water-dependent industry and commerce. Marine traffic includes break bulk ship cargo, barge access to the central waterfront, delivery of commercial fish catch, and access to boat repair yard.	The majority of this area would be dredged to remove all contaminated sediments. This action would provide access to the current authorized depths, and would provide the flexibility to modify the authorized depth to a deeper elevation in the future without encountering contaminated sediments. Two small areas in the waterway would have elevated subsurface levels of mercury beneath a clean surface layer. One of these areas (7 acres) is due to the presence of a buried pipeline in that segment where cleanup options are limited to dredging and capping back over with clean material resulting in a final bottom elevation of -33 MLLW. The other area (1.5 acres) is at the head of the waterway where habitat considerations warrant not modifying the existing conditions, which are shallower than -18 MLLW.
I&J Waterway (9 acres)	Federally-authorized navigational channel providing access for moderate draft ship traffic to Squalicum Harbor, U.S. Coast Guard Station, and fish processing operations.	No change in current use.
G-P Log Pond (8 acres)	Shared ownership by the Port and G-P. The area has been used for small vessel moorage and periodic large vessel moorage rather than log rafting in recent years.	Same as Alternative 2A.
G-P ASB (43 acres)	State-designated Harbor Area intended to support navigation and commerce by providing access to upland facilities. Since upland area is fully dedicated to waste water treatment, the adjacent upland area is used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.	Same as Alternative 2A.
Port Log Rafting Area (24 acres)	State-designated Harbor Area with aquatic land leases to the Port and G-P for log rafting, navigation and commerce, including access to the Port's Chemical Dock facility leased to G-P for export (lignins, caustics) and import (chlorine).	Same as Alternative 2A.
Starr Rock (85 acres)	State-designated Harbor Area used primarily for shallow draft recreational boating and traffic along the shoreline. Tribal/commercial fishing. Adjacent upland use is primarily recreational park.	This area would be either capped or included as part of the CAD, and elevations would shift to intertidal or shallow subtidal, limiting the use of the area for boating during low tide periods. To reduce the risk of navigational accidents a Restricted Navigational Area (RNA) may be established (see Alternative 2A). Of the 85 acres, 48 acres are currently contaminated on the surface. Beach access would improve along portions of Boulevard Park adjacent to the CAD.
Cornwall Ave Landfill (14 acres)	State-designated Harbor Area with aquatic land lease to G-P for in-water log rafting, upland log storage and warehouse. Beach and shoreline access is prohibited because of uncontrolled landfill waste. Some tribal/ commercial fishing and recreational boating traffic.	Same as Alternative 2A.
Harris Ave. Shipyard (4 acres)	Shipyard activities including the operation of a drydock	Same as Alternative 2A.

4.3.3.5 Cultural Resources

Impacts

This alternative includes full removal of sediments in the Whatcom Waterway, dredged to the clean native layer. No impacts to archaeological deposits are expected. Dredging activities will occur in close proximity to Citizens Dock, a National Register of Historic Places property. Since the dock is being demolished because it is a safety hazard, concerns about dredging impacting the integrity of the dock are not an issue. Isolated historic artifacts associated with the PAF complex may be unearthed during dredging activities at the Harris Avenue Shipyard. The historic artifacts would probably not have integrity and would likely not contribute information important to the history of the area. There is a possibility that a cap or a CAD could be placed over an area that contains unidentified cultural resources.

Mitigation

No mitigation measures are anticipated to be required for this alternative. However, in the event that cultural artifacts are uncovered during the remedial design phase or construction, coordination with the Washington State Office of Archaeology and Historic Preservation, and potentially the National Advisory Council on Historic Preservation, would be necessary to ensure that impacts to cultural resources are identified and mitigated appropriately.

4.3.4 Alternative 2D - Full Removal from Navigation Areas and Partial Removal from the G-P ASB and Starr Rock Areas (Upland Disposal)

Similar in most respects to Alternative 2C, the overall objective of Alternative 2D is to achieve cleanup, allowing for future deepening of the navigation channels. However, unlike Alternative 2C, avoiding disposal in the aquatic environment is a primary objective.

This alternative includes a similar amount of dredging as Alternative 2C, but also includes the dredging of an additional 320,000 CY of sediments exceeding the site-specific mercury BSL that are located offshore of the G-P ASB and at the former Starr Rock disposal site (Figure 2.3-10). The dredged sediments would be disposed at one or more off-site upland landfills described previously under Alternative 2B. All dredged sediments would be offloaded on shore, dewatered as necessary to facilitate transport, and hauled by rail, truck, and/or barge outside of the Bellingham Bay watershed to upland disposal facilities.

Approximately 1,100,000 CY of contaminated sediment, primarily from areas within and adjacent to the Whatcom Waterway, would ultimately be dredged (Table 2.3-1). Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 1,300,000 CY.

Engineered caps would be placed over approximately 96 acres of inner Bellingham Bay (Table 2.3-1). Other remedial elements of this alternative are the same as Alternatives 2A, 2B, and 2C.

4.3.4.1 Geology, Water, Sediment, and Environmental Health

Impacts

Under Alternative 2D, the impacts to geology, water, sediment, and environmental health would be the same as Alternative 2C, except:

- **Short-term water quality impacts associated with dredging and transport of contaminated sediments.** Compared to Alternative 2C (see above), Alternative 2D would result in approximately 35 percent greater dredging, dewatering, and disposal volumes, and associated water quality impacts.
- **Short-term impacts associated with cap construction.** The capping area would be approximately 40 percent lower in Alternative 2D, as compared with the Alternative 2C combined cap/CAD area (Table 2.3-1).
- **Potential longer-term impacts associated with the stability, isolation, and water quality protection** performance of the upland disposal facilities. The impacts would be as in Alternative 2C but larger due to the higher volume of material.

One of principal differences between Alternative 2D and Alternatives 2A through 2C is that sediments located offshore of the G-P ASB and at the former Starr Rock disposal site that exceed the site-specific mercury BSL would be dredged and disposed at an upland facility. Although there is a potential for human health risks associated with sediments that exceed the mercury BSL, such risks have not been verified by tissue monitoring data. That is, even the maximum tissue concentrations reported in the area of highest sediment mercury concentrations (near the G-P Log Pond and the middle Whatcom Waterway) are below conservative benchmark concentrations calculated to protect tribal fishers who may consume relatively large amounts of seafood (Anchor Environmental and Hart Crowser 1999). Further, as discussed in the final RI/FS for the Whatcom Waterway Site, monitoring results to date in the region have shown that capping of mercury BSL areas, as included in Alternatives 2A through 2C, would provide effective sediment remediation (Sumeri 1996). For these reasons, long-term environmental health consequences resulting from the implementation of Alternative 2D are expected to be similar to those of Alternatives 2A through 2C.

Mitigation

Potential mitigation measures are the same as those identified for Alternatives 2A, 2B, and 2C.

4.3.4.2 Fish and Wildlife

Impacts

Aquatic Habitat/Resources

Adverse and beneficial impacts for aquatic habitat, fish, shellfish, and benthic/epibenthic organisms are listed in Table 4.3-7 (See Appendix E for additional habitat impact information).

Table 4.5-7 Alternative 2B: Summary of Aquatic Resource Adverse Impacts and Benefits

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Mid/Outer Whatcom Waterway: 30' Federal Channel	▪ Conversion of 1.0 acre of shallow subtidal habitat (-4 to -10) to 1.0 acre of deep water (below -10). ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 1.4 acres and a temporary loss (2-3 years) of benthic infauna over 45.4 acres.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments.	▪ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 30' Federal Channel	▪ No substantial habitat type conversion (0.1 acres converted from subtidal, shallow subtidal to deep water). ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.1 acres, and a temporary loss (2-3 years) of benthic infauna over 7 acres.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate.	▪ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 18' Federal Channel	▪ No substantial habitat type conversion (0.2 acres converted from subtidal, shallow subtidal to deep water). ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.5 acres, and a temporary loss (2-3 years) of benthic infauna over 3.4 acres.	▪ Restores biological function of chemically degraded habitat in the area where removal (dredging) of contaminated sediments would occur. ▪ Other shallow areas where the surface sediments are currently clean would remain intact, continuing to serve a shallow nearshore estuary habitat function consistent with the habitat objectives developed by the Pilot Team.	▪ No conversion of habitat types is occurring. ▪ Existing clean shallow water habitat remains intact.
I&J Waterway	▪ No changes	▪ No changes	▪ No changes
G-P Log Pond	▪ Conversion of 2.2 acres of deep water (below -10) to 1.3 acres of shallow subtidal (-4 to -10) and 0.9 acres of intertidal habitat (+11 to -4). ▪ Loss of rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp over 0.9 acres. ▪ Temporary loss (months) of epibenthic invertebrates over 4.6 acres due to cap construction. ▪ Temporary loss (2-3 years) of benthic infauna over 7.8 acres.	▪ Restores biological function of chemically and physically degraded habitat via capping with clean sediments. ▪ Increased epibenthic production from converting 0.9 acres of subtidal to intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 0.9 acres of subtidal to intertidal. ▪ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	▪ Actions would result in a minor net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the additional 1 acre of intertidal being created. ▪ To further enhance the productivity and diversity of the site, areas of the cap could be modified to include large cobble material to provide macroalgae attachment sites.
G-P Aerated Stabilization Basin	▪ Conversion of 9 acres of shallow subtidal (-4 to –10) and 0.7 acres of intertidal to 9.7 acres of deep subtidal. ▪ Loss of 0.7 acres of rearing habitat for juvenile flatfish, juvenile Dungeness crab, and juvenile salmon. ▪ Temporary loss (months) of epibenthic invertebrates over 14.7 acres. ▪ Temporary loss of benthic infauna over 42 acres.	▪ Restores biological function of chemically degraded habitat via capping with clean sediments over approximately 37 acres of currently contaminated bay bottom. ▪ Removes approximately 18 acres of sediments exceeding the BSL from the aquatic environment (to an upland disposal location). ▪ Increased rearing area for adult flatfish and marine fish species, adult Dungeness crab, and adult pandalid shrimp from converting 9.7 acres of intertidal and shallow subtidal to deep subtidal.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift in habitat function consistent with the habitat objectives developed by the Pilot Team. ▪ To further enhance the productivity and diversity of the site, areas of the cap could be enhanced with eelgrass restoration, particularly adjacent to the area near I&J Waterway where there is an established existing eelgrass bed.

Table 4.3-7 ...ernative 2D: Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Port Log Rafting Area	■ Conversion of 0.4 acres of deep water (below -10) and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4). ■ Loss of 1.2 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ■ Temporary loss (months) of epibenthic invertebrates of 5.7 acres. ■ Temporary loss (2-3 years) of benthic infauna over 24.7 acres.	■ Restores biological function of chemically and physically degraded habitat through removing (via dredging) the contaminated sediment or capping over the area with clean sediments. ■ Increased epibenthic production from converting 0.4 acres of deep-water and 0.8 acres of shallow subtidal (-4 to -10) to 1.2 acres of intertidal (+8 to -4). ■ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 1.2 acres into intertidal.	■ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay, although the increases are minimal because only 1 acre of subtidal habitat is converted to intertidal.
Starr Rock	■ No substantial habitat type conversion (minor conversion of 0.2 acres of deep water to shallow subtidal). ■ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 2.9 acres, and a temporary loss (2-3 years) of benthic infauna over 44.9 acres.	■ Restores biological function of the currently degraded habitat via capping of sediments exceeding the MCUL, and dredging sediments exceeding the BSL.	■ No conversion of habitat types is occurring.
Cornwall Avenue Landfill	■ Conversion of 1.1 acres of deep water habitat to 0.4 acres of shallow subtidal and 0.7 acres of intertidal. ■ Loss of 0.7 acres of rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp. ■ Capping would result in a temporary loss (months) of epibenthic invertebrates over 6.4 acres and a temporary loss (2-3 years) of benthic infauna over 13.8 acres. ■ Capping of the existing solid waste substrate would result in a loss of 0.5 acres of existing eelgrass.	■ Restores and improves biological function of physically degraded habitat exposed to deleterious substances via capping of contaminated sediments. ■ Increased epibenthic production, rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 0.7 acres to intertidal.	■ Proposed action would eliminate the exposure of aquatic organisms to deleterious substances in the substrate/habitat. ■ Minor conversion of habitat types to shallow intertidal functions. ■ Loss of 0.5 acres of existing eelgrass.
Harris Avenue Shipyard	■ No habitat type conversion. ■ Dredging of 4 acres of deep water habitat would result in a temporary loss (months) of epibenthic invertebrates, and a temporary loss (2-3 years) of benthic infauna over 4 acres.	■ Restores biological function of chemically degraded habitat through dredging and possibly capping.	■ No conversion of habitat types is occurring.

Upland Habitat

Potential impacts would be the same as described for Alternative 2B.

Seabirds

Potential impacts would be the same as described for Alternative 2B.

Marine Mammals

Potential impacts would be the same as described for Alternative 2B.

Threatened and Endangered Species

Potential impacts would be the same as described for Alternative 2B.

Mitigation

The Preliminary Draft Habitat Mitigation Framework (described in Section 2.3.3) could be used at the discretion of relevant regulatory agencies during future permitting activities to quantify mitigation requirements for the loss of 0.5 acres of existing eelgrass and other aquatic resource impacts. Mitigation for the potential intake of contaminants by birds and mammals is described above in Geology, Water, Sediment, and Environmental Health.

4.3.4.3 Land Use, Shoreline Use, and Recreation/Public Use

Impacts

Navigation and Commerce

The impacts of Alternative 2D are summarized in Table 4.3-8. In addition, there would be short-term impacts during construction. Alternative 2D would require the operation of two dredges and four barges. This amount of barge traffic is not expected to significantly impact Bellingham Bay harbor operations.

Tribal and Commercial Fishing

Potential impacts would be the same as described for Alternative 2B.

Recreational Uses and Public Access

Dredging at the head of Whatcom Waterway would increase the ability to use the site as a public access point. There would be no opportunity for beach enhancements north of Boulevard Park.

Mitigation

Potential mitigation measures would be as described for Alternatives 2A.

Table 4.3-8 Potential Navigation and Commerce Impacts Associated with Alternative 2D

Site (potential area impacted)	**Current Uses**	**Navigation & Commerce Impact**
Whatcom Waterway (58 acres)	Federally-authorized navigation channel providing access for deep draft ship traffic to the Port's shipping terminal, the G-P facility, and other water-dependent industry and commerce. Marine traffic includes break bulk ship cargo, barge access to the central waterfront, delivery of commercial fish catch, and access to boat repair yard.	Same as Alternative 2C.
I&J Waterway (9 acres)	Federally-authorized navigational channel providing access for moderate draft ship traffic to Squalicum Harbor, U.S. Coast Guard Station, and fish processing operations.	No change in current use.
G-P Log Pond (8 acres)	Shared ownership by the Port and G-P. The area has been used for small vessel moorage and periodic large vessel moorage rather than log rafting in recent years.	Same as Alternative 2B.
G-P ASB (43 acres)	State-designated Harbor Area intended to support navigation and commerce by providing access to upland facilities. Since upland area is fully dedicated to waste water treatment, the adjacent aquatic area is used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.	Approximately half of this area would be capped, making this area approximately 2 feet shallower than it is currently. Recreational boaters could continue to traverse the area, as a 2-foot shift in elevation does not affect the navigability of the area for recreational vessels. An engineered berm may be constructed to protect the cap. This berm may present a navigational hazard at some tidal conditions. To reduce the risk of navigational accidents an RNA may be established. Depending on cap design, anchorage limitations may be necessary to protect cap integrity. Approximately 18 acres next to the Whatcom Waterway would have complete removal of surface and subsurface elevated mercury. Potential future navigation uses in this area that may require dredging would not be limited due to the presence of contaminated sediments.
Port Log Rafting Area (24 acres)	State-designated Harbor Area with aquatic land leases to the Port and G-P for log rafting, navigation and commerce, including access to the Port's Chemical Dock facility leased to G-P for export (lignins, caustics) and import (chlorine).	Same as Alternative 2A.
Starr Rock (48 acres)	State-designated Harbor Area used primarily for shallow draft recreational boating and traffic along the shoreline. Tribal/commercial fishing. Adjacent upland use is primarily recreational park.	The majority of this area (37 acres) would be capped, and existing bathymetry elevations would shift by approximately 2 feet across the entire site. This change in bathymetry would not affect recreational boating or fishing activities along the shoreline. Depending on cap design, anchorage limitations may be necessary to protect cap integrity. A portion of this area (about 11 acres) would have complete removal and therefore no future limitations on navigation and commerce.
Cornwall Ave Landfill (14 acres)	State-designated Harbor Area with aquatic land lease to G-P for in-water log rafting, upland log storage and warehouse. Beach and shoreline access is prohibited because of uncontrolled landfill waste. Some tribal/commercial fishing and recreational boating traffic.	Same as Alternative 2B.
Harris Ave. Shipyard (4 acres)	Shipyard activities including the operation of a drydock	Same as Alternative 2A.

Impacts and Mitigation

Impacts and potential mitigation measures associated with this alternative would be the same as described under Alternative 2B.

4.3.4.4 Cultural Resources

Impacts

This alternative includes the same amount of dredging as Alternative 2C, but would dispose of sediments at an established off-site upland landfill. No impacts to historic structures or archaeological deposits are expected. Isolated historic artifacts associated with the PAF complex may be unearthed during dredging activities at the Harris Avenue Shipyard. The historic artifacts would probably lack integrity and would likely not contribute information important to the history of the area. The capping activities may impact cultural resources present along the shoreline of the inner bay by further burying them.

Mitigation

No mitigation measures are anticipated to be required for this alternative. However, in the event that cultural artifacts are uncovered during construction, coordination with the Washington State Office of Archaeology and Historic Preservation and potentially the National Advisory Council on Historic Preservation would be necessary to ensure that impacts to cultural resources are identified and mitigated appropriately.

4.3.5 Alternative 2E - Full Removal from Public Lands (Upland Disposal)

The overall objective of Alternative 2E is to achieve cleanup by removing all contaminated sediment from state-owned aquatic lands in Bellingham Bay, and avoiding disposal in the aquatic environment. This alternative would also allow for the most flexibility regarding future deepening of the navigation channels and state-owned harbor areas.

This alternative would maximize removal of contaminated sediments and adjacent landfills from Bellingham Bay, concurrently minimizing the need for capping. With the exception of sediments located immediately adjacent to the existing G-P wastewater pipeline, dredging would be performed within all reaches of the Whatcom Waterway, including the extreme head of the federal channel, encompassing Citizens Dock and associated mudflat areas (Figure 2.3-11). All dredged sediments would be offloaded on shore, dewatered as necessary to facilitate transport, and hauled by rail and/or truck outside of the Bellingham Bay watershed to upland disposal facilities.

Approximately 2,400,000 CY of contaminated sediment would be removed under this alternative. The areas where removal would occur are within and adjacent to the Whatcom Waterway, including solid/wood waste in the upland and aquatic environment at the Cornwall Avenue Landfill and sediments from the Harris Avenue Shipyard site (Table 2.3-1). Allowing for a conservative 20 percent additional contingency volume to ensure adequate disposal capacity, the required capacity of the disposal sites is approximately 2,900,000 CY. In this alternative, the sediment disposal capacity would be provided by one or more upland disposal facilities described in Alternative 2B.

Implementation of Alternative 2E would result in complete removal of contaminated sediments over approximately 185 acres of inner Bellingham Bay, and the placement of an engineered cap over approximately 8 acres in the G-P Log Pond (Table 2.3-1).

4.3.5.1 Geology, Water, Sediment, and Environmental Health

Impacts

Under Alternative 2E, impacts to geology, water, sediment, and environmental health are as in Alternative 2B except as follows:

- **Short-term water quality impacts associated with dredging and transport of contaminated sediments**. Alternative 2E would result in much greater dredging, dewatering, and disposal volumes compared with the other alternatives, with correspondingly greater water quality impacts. Excavation of solid wastes from the Cornwall Avenue Landfill could result in temporary exposure of solid wastes to the aquatic environment, with possible dissolved oxygen and other water quality impacts.
- **Potential longer-term impacts associated with the stability, isolation, and water quality protection** performance of the upland disposal facilities. The impacts would be similar to Alternative 2B but larger due to the higher volume of material.

Mitigation

Potential mitigation measures would be similar to those described for Alternative 2B. In addition, measures taken to minimize short-term impacts with the Cornwall Avenue Landfill may include working during low tides (to the extent possible) and placement of a temporary dike during excavation to prevent erosion of cut landfill faces.

4.3.5.2 Fish and Wildlife

Impacts

Aquatic Habitat/Resources

Adverse and beneficial impacts for aquatic habitat, fish, shellfish, and benthic/epibenthic organisms are listed in Table 4.3-9 (See Appendix E for additional habitat impact information).

Upland Habitat.

Under this alternative, a portion of the upland at the Cornwall Avenue Landfill would be excavated. However, the area to be excavated currently provides little or no functional habitat; therefore, no impacts are expected to occur to terrestrial wildlife due to modification of uplands. There could be additional modification of upland habitat, and resulting impacts on terrestrial species, as a result of upland sediment disposal, as explained under Alternative 2B.

Seabirds

Potential impacts would be as described for Alternative 2B.

Table 4.3-9 ...ernative 2E: Summary of Aquatic Resource Adverse Impacts and Benefits

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Mid/Outer Whatcom Waterway: 30' Federal Channel	▪ Conversion of 1 acre of shallow subtidal habitat (-4 to -10) to 1 acre of deep-water (below -10). ▪ Dredging in deep-water habitat would result in a temporary loss (2-3 years) of benthic infauna over 38 acres.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments.	▪ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 30' Federal Channel	▪ No substantial habitat type conversion (0.1 acres converted from subtidal, shallow subtidal to deep-water habitat). ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.1 acres, and a temporary loss (2-3 years) of benthic infauna over 7 acres.	▪ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate.	▪ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 18' Federal Channel	▪ Conversion of 0.6 acres of intertidal to deep-water habitat would result in loss of rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp. ▪ Conversion of 0.7 acres of shallow subtidal to deep-water habitat has minor effect on habitat function because similar habitat types. ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 2.1 acres, and a temporary loss (2-3 years) of benthic infauna over 5.6 acres.	▪ Restores biological function of chemically degraded habitat.	▪ Proposed action removes all contaminated sediments, including those currently beneath a clean surface. ▪ The removal action of some of the clean areas alters the biological function that is currently intertidal to a subtidal condition.
I&J Waterway	▪ No changes	▪ No changes	▪ No changes
G-P Log Pond	▪ Conversion of 2.2 acres of deep-water (below -10) to 1.3 acres of shallow subtidal (-4 to -10) and 0.9 acres of intertidal habitat (+11 to -4). ▪ Loss of rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp over 0.9 acres. ▪ Temporary loss (months) of epibenthic invertebrates over 4.6 acres due to cap construction. ▪ Temporary loss (2-3 years) of benthic infauna over 7.8 acres.	▪ Restores biological function of chemically and physically degraded habitat via capping with clean sediments. ▪ Increased epibenthic production from converting 0.9 acres of subtidal to intertidal. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 0.9 acres of subtidal to intertidal. ▪ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	▪ Actions would result in a minor net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the additional 1 acre of intertidal being created. ▪ To further enhance the productivity and diversity of the site, areas of the cap could be modified to include large cobble material to provide macroalgae attachment sites.
G-P Aerated Stabilization Basin	▪ Conversion of 2.3 acres of intertidal habitat to deep-water habitat would result in loss of rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp. ▪ Conversion of 8.7 acres of shallow subtidal habitat to deep-water habitat has minor effect on habitat function because relatively similar habitat types. ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 16.1 acres, and a temporary loss (2-3 years) of benthic infauna over 50.1 acres.	▪ Restores biological function of chemically degraded habitat via dredging to clean sediments. ▪ Increase in rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp over 3.8 acres.	▪ Proposed action removes all contaminants from the aquatic environment. ▪ Converts intertidal habitat to subtidal habitat at a location providing habitat connectivity to an estuary.

Table 4.3-9 Alternative 2E: Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Port Log Rafting Area	▪ Conversion of 1.8 acres of intertidal habitat to shallow subtidal and deep-water habitat would result in loss of rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp. ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 5.2 acres, and a temporary loss (2-3 years) of benthic infauna over 30.2 acres.	▪ Restores biological function of chemically degraded habitat via dredging to clean sediments. ▪ Increase in rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp over 2.5 acres.	▪ Proposed action removes all contaminants from the aquatic environment. ▪ Converts intertidal habitat to subtidal habitat at a location providing habitat connectivity to an estuary.
Starr Rock	▪ Minor habitat conversion of 0.8 acres of shallow subtidal to deep-water, no effect on habitat function. ▪ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 2.9 acres, and a temporary loss (2-3 years) of benthic infauna over 44.9 acres.	▪ Restores biological function of degraded habitat via dredging to clean sediments.	▪ No conversion of habitat types is occurring.
Cornwall Avenue Landfill	▪ Dredging of aquatic habitat would result in a temporary loss (months) of epibenthic invertebrates over 6.4 acres, and a temporary loss (2-3 years) of benthic infauna over 13.8 acres. ▪ Dredging of the existing solid waste substrate would result in the loss of 0.5 acres of existing eelgrass.	▪ Removal of upland solid waste fill would result in the creation of new aquatic habitat in the following quantities/locations: 2.3 acres of deep-water, 1.4 acres of shallow subtidal, 0.9 acres of 0 to -4, 0.9 acres of +4 to 0, 0.9 acres of +8 to +4, and 0.7 acres of +12 to +8. ▪ This new habitat would provide 3.7 acres of function for rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp; and 3.4 acres of function for rearing habitat for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay. ▪ To further enhance the productivity and diversity of the site, areas of the new shoreline could be modified to include large cobble material to provide macro algae attachment sites, and/or substrate suitable to support eelgrass production. ▪ Loss of 0.5 acres of existing eelgrass.
Harris Avenue Shipyard	▪ No habitat type conversion. ▪ Dredging of 4 acres of deep-water habitat would result in a temporary loss (2-3 years) of benthic infauna over 4 acres.	▪ Restores biological function of chemically degraded habitat through dredging and possibly capping.	▪ No conversion of habitat types is occurring.

Marine Mammals

Potential impacts would be as described for Alternative 2B.

Threatened and Endangered Species

Potential impacts would be as described for Alternative 2B.

Mitigation

The Preliminary Draft Habitat Mitigation Framework (described in Section 2.3.3) could be used at the discretion of relevant regulatory agencies during future permitting activities to quantify mitigation requirements for the loss of 0.5 acres of existing eelgrass and impacts to other aquatic resources. Mitigation for the potential intake of contaminants by birds and mammals is described above in Geology, Water, Sediment, and Environmental Health.

4.3.5.3 Land Use, Shoreline Use, and Recreation/Public Use

Impacts

Navigation and Commerce

Excavating the Cornwall Avenue Landfill would eliminate existing upland warehouse uses. It would also severely limit any potential future upland uses due to the small size and configuration of the remaining upland area. The remaining upland would be about 6.5 acres and an average of about 150-feet wide.

The impacts of Alternative 2E are summarized in Table 4.3-10. In addition, there would be short-term impacts associated with construction. Alternative 2E would require the operation of four dredges and eight barges. This amount of barge traffic is not expected to significantly impact Bellingham Bay harbor operations.

Tribal and Commercial Fishing

Potential impacts are similar to those described for Alternative 2B, with the exception of the Cornwall Avenue Landfill site. The removal of the upland landfill would increase the area available for tribal fishing due to the new aquatic area that would be created.

Recreational Uses and Public Access

Dredging of the head of Whatcom Waterway would improve the use of this area as a public access point. Public shoreline access could also be provided at the Cornwall Avenue Landfill after the upland portion of the landfill was excavated.

Mitigation

Potential mitigation measures would be as described for the previous alternatives.

Table 4.3-10 Potential Navigation and Commerce Impacts Associated with Alternative 2E

Site (potential area impacted)	**Current Uses**	**Navigation & Commerce Impact**
Whatcom Waterway (58 acres)	Federally-authorized navigation channel providing access for deep draft ship traffic to the Port's shipping terminal, the G-P facility, and other water-dependent industry and commerce. Marine traffic includes break bulk ship cargo, barge access to the central waterfront, delivery of commercial fish catch, and access to boat repair yard.	The majority of this area would be dredged to remove all contaminated sediments. This action would provide access to the current authorized depths, and would provide the flexibility to modify the authorized depth to a deeper elevation in the future without encountering contaminated sediments. This action removes contaminated sediments from the Whatcom Waterway, with the exception of a small area in the -30 foot MLLW portion of the waterway. Due to the presence of a buried pipeline in that segment, cleanup options are limited to dredging and capping back over with clean material resulting in a final bottom elevation of -33 feet MLLW.
I&J Waterway (9 acres)	Federally-authorized navigational channel providing access for moderate draft ship traffic to Squalicum Harbor, U.S. Coast Guard Station, and fish processing operations.	No change in current use.
G-P Log Pond (8 acres)	Shared ownership by the Port and G-P. The area has been used for small vessel moorage and periodic large vessel moorage rather than log rafting in recent years.	This area would be capped resulting in a uniform change of 2 feet in elevation (shallower) across the site. These shallower depths may cause some limitations on small boat moorage depending on the vessels' draft requirements and restricts future water-dependent uses.
G-P ASB (43 acres)	State-designated Harbor Area intended to support navigation and commerce by providing access to upland facilities. Since upland area is fully dedicated to waste water treatment, the adjacent aquatic area is used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.	This area would be dredged resulting in a relatively minor increase in navigation depth capability of approximately 2 feet across the entire site. Potential future navigation uses that may require dredging would not be limited due to the presence of contaminated sediments.
Port Log Rafting Area (24 acres)	State-designated Harbor Area with aquatic land leases to the Port and G-P for log rafting, navigation and commerce, including access to the Port's Chemical Dock facility leased to G-P for export (lignins, caustics) and import (chlorine).	Remediation involves dredging throughout this area. The dredging would provide a clean-bottom navigation corridor to the Chemical Dock. Also, the area would have flexibility for future navigation uses throughout the area, even those that may require dredging. The dredging would not affect current log rafting uses in the area.
Starr Rock (48 acres)	State-designated Harbor Area used primarily for shallow draft recreational boating and traffic along the shoreline. Tribal/commercial fishing. Adjacent upland use is primarily recreational park.	This area would be dredged, and existing elevations would deepen by approximately 3-6 feet across the site. The removal would result in a Harbor Area free of contaminated sediments.
Cornwall Ave Landfill (21 acres; incl. 7 acres of existing uplands**)**	State-designated Harbor Area with aquatic land lease to G-P for in-water log rafting, upland log storage and warehouse. Beach and shoreline access is prohibited because of uncontrolled landfill waste. Some tribal/ commercial fishing and recreational boating traffic .	This area would be dredged, deepening the existing bathymetry across the site by 3-10 feet. Contaminated sediments would be removed from the Harbor Area providing flexibility for future adjacent upland uses that may involve navigation and commerce. Existing beach access restrictions would likely be removed following site remediation.
Harris Ave. Shipyard (4 acres)	Shipyard activities including the operation of a drydock	This area would be dredged. Increasing bottom depths would provide additional flexibility for future maritime uses.

Air and Noise

Impacts

Impacts associated with this alternative would be as described under Alternative 2B. Handling and transport of larger volumes of dredged material could increase the risk of potential exposure of construction personnel to volatilized contaminants.

Mitigation

Potential mitigation measures would be as described under Alternative 2B.

4.3.5.4 Cultural Resources

Impacts

This alternative would maximize removal of contaminated sediments and adjacent landfills from Bellingham Bay. Dredging would be performed throughout Whatcom Waterway including the head of the channel, encompassing Citizens Dock, a National Register of Historic Places property (slated for demolition due to safety concerns), and associated mud flat areas. Surface and subsurface sediments would be dredged to the clean native layer and disposed at an upland site. This alternative has the potential to disturb archaeological deposits. Complete dredging of the Whatcom Waterway to the native layer in the vicinity of Citizens Dock and the associated mud flats around the dock may disturb submerged archaeological deposits. Isolated historic artifacts associated with the PAF complex may be unearthed during dredging at the Harris Avenue Shipyard. The historic artifacts would probably lack integrity and would likely not contribute information important to the history of the area.

Mitigation

- A professional archaeologist would monitor dredging activities in the vicinity of the Citizens Dock and associated mud flats to identify archaeological deposits that may be significant.
- Field reconnaissance should be conducted prior to any ground disturbing activities in areas containing previously recorded hunter-fisher-gatherer archaeological sites that are adjacent to fill deposits. Field reconnaissance is necessary to establish site boundaries relative to the project area.
- A professional archaeologist should monitor any ground disturbing activities within the sections containing a moderate to high probability for hunter-fisher-gatherer cultural deposits.

4.3.6 Preferred Remedial Action Alternative

The Preferred Remedial Action Alternative is similar to alternative 2C and best achieves the seven interrelated goals of the Pilot (Page S-2). This alternative would achieve state SQS criteria through a combination of dredging, CAD, and capping technologies and includes provisions for treatment (see Section 2.1). Contaminated sediments that are located within the Whatcom Waterway, even if present below the currently authorized depths, would be dredged under the

Preferred Remedial Action Alternative, providing flexibility to meet future navigation needs. Dredging would be performed in all areas of the Whatcom Waterway federal navigation channel that are currently used for navigation. The extreme head of the Whatcom Waterway near Citizens Dock, consisting of a 2-acre area of mudflats that has formed naturally within this area, would be left intact. Dredging and capping actions are similar to that proposed in Alternative 2C, except that the Preferred Remedial Action Alternative also includes additional dredging at the extreme head of the Whatcom Waterway to accommodate public access improvements as proposed by the City of Bellingham, and navigation access to New West Fisheries.

If a viable treatment technology is developed through the MTCA process within the timeframe necessary for making critical decisions regarding CAD construction, some or all of the most contaminated dredged sediments would be treated. Depending on the amount of sediment treated, a CAD facility of variable size, located adjacent to the Cornwall Avenue Landfill, would be constructed. Figure 2.3-12 depicts the approximate layout of the Cornwall CAD under a reasonable range of sediment disposal capacities varying from 300,000 to 820,000 CY. In no event would the CAD exceed 26 acres. Clean sediments present below the outer areas of the CAD could be excavated to provide additional confinement capacity, concurrently minimizing the CAD footprint and providing additional material for habitat restoration. The final capacity and extent of the CAD would be determined during remedial design based on considerations of treatment viability, PSDDA characterization (see Whatcom Waterway discussion on previous pages), and detailed engineering designs. The following section describes the potential impacts associated with implementation of the Preferred Remedial Action Alternative. Since treatment is not currently viable, the potential environmental impacts are not analyzed in this final EIS. Should treatment become viable it will undergo a separate SEPA environmental review process.

4.3.6.1 Geology, Water, Sediment, and Environmental Health

Impacts

Under the Preferred Remedial Action Alternative, the impacts to geology, water, sediment, and environmental health are as under Alternative 2A.

Mitigation

Potential mitigation measures would be similar to those described for Alternative 2A.

4.3.6.2 Fish and Wildlife

Impacts

Aquatic Habitat/Resources

Adverse and beneficial impacts for aquatic habitat, fish, shellfish, and benthic/epibenthic organisms are listed in Table 4.3-11.

Upland Habitat

Potential impacts would be as described for Alternatives 2A and 2C.

Table 4.3-1. Preferred Alternative: Summary of Aquatic Resource Adverse Impacts and Benefits

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Mid/Outer Whatcom Waterway: 30' Federal Channel	■ Dredging 1.3 acres of shallow subtidal, and 0.1 acres of intertidal would result in a temporary loss (months) of epibenthic invertebrates over 1.4 acres, and a temporary loss (2-3 years) of benthic infauna over 45.4 acres of total aquatic habitat. ■ One acre of shallow subtidal would be dredged and converted to deep-water habitat.	■ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments.	■ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 30' Federal Channel	■ Minor habitat type conversion. ■ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.1 acres, and a temporary loss (2-3 years) of benthic infauna over 7 acres. ■ A small portion (0.1 acre) of the deep-water habitat would be converted to shallow subtidal.	■ Restores biological function of chemically degraded habitat via removal (dredging) of contaminated sediments and capping back over with clean substrate.	■ No conversion of habitat types is occurring.
Head of Whatcom Waterway: 18' Federal Channel	■ Minor habitat type conversion. ■ Dredging would result in a temporary loss (months) of epibenthic invertebrates over 0.5 acres, and a temporary loss (2-3 years) of benthic infauna over 4.3 acres. ■ A small portion (0.2 acres) of the shallow subtidal habitat would be converted to deep-water habitat.	■ Restores biological function of chemically degraded habitat in the area where removal (dredging) of contaminated sediments would occur. ■ Other shallow areas where the surface sediments are currently clean would remain intact, continuing to serve a shallow nearshore estuary habitat function consistent with the habitat objectives developed by the Pilot Team.	■ No conversion of habitat types is occurring. ■ Existing clean shallow-water habitat remains intact.
I&J Waterway	■ No Changes	■ No changes	■ No changes
G-P Log Pond	■ Conversion of 1.5 acres of deep-water (below -10) and 2.5 acres of shallow subtidal (-4 to -10) to intertidal habitat (between +8 and -4). ■ Loss of rearing habitat for adult flatfish, adult Dungeness crab and adult pandalid shrimp. ■ Temporary loss (months) of epibenthic invertebrates over 4.6 acres. ■ Temporary loss (2-3 years) of benthic infauna over 8.0 acres.	■ Restores and improves biological function of chemically and physically degraded habitat via capping with clean sediments. ■ Increased epibenthic production from converting 4.0 acres of subtidal to intertidal. ■ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 4.0 acres of subtidal to intertidal. ■ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	■ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift to intertidal habitat. ■ To further enhance the productivity and diversity of the site, nearshore areas of the cap could be modified to include large cobble material to provide macroalgae attachment sites.
G-P Aerated Stabilization Basin	■ Conversion of 3.6 acres of deep-water (below -10) to 3.6 acres of shallow subtidal habitat (-4 to -10), and 3.7 acres of deep-water (below -10) to 3.7 acres of intertidal (+8 to –4) habitat. ■ Loss of 7 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ■ Temporary loss (months) of epibenthic invertebrates over 14.8 acres. ■ Temporary loss of benthic infauna over 45.8 acres.	■ Restores biological function of chemically degraded habitat via capping with clean sediments over 45.8 acres of currently contaminated bay bottom. ■ Increased epibenthic production from converting 7.3 acres of subtidal to intertidal. ■ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 7.3 acres of subtidal to intertidal. ■ Enhanced migratory corridor and habitat connectivity consistent with the habitat objectives developed by the Pilot Team.	■ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift in habitat function consistent with the habitat objectives developed by the Pilot Team. ■ To further enhance the productivity and diversity of the site, areas of the cap could be enhanced with eelgrass restoration, particularly adjacent to the area near I&J Waterway where there is an established existing eelgrass bed.

Table 4.3-11. Preferred Alternative: Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Port Log Rafting Area	▪ Conversion of 1.2 acres of deep-water (below -10) to 1.2 acres of shallow subtidal (-4 to -10) and 3.2 acres of deep-water to 3.2 acres of intertidal (+8 to –4) habitat. ▪ Loss of 4.4 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates of 5.7 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 24.7 acres.	▪ Restores biological function of chemically and physically degraded habitat through removing (via dredging) the contaminated sediment or capping over the area with clean sediments. ▪ Increased epibenthic production from converting 3.2 acres of subtidal to intertidal habitat. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp from converting 3.2 acres into intertidal.	▪ Actions would result in a net increase in habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay due to the shift in habitat function consistent with the habitat objectives developed by the Pilot Team.
Starr Rock	▪ No habitat type conversion. ▪ Capping 2.9 acres of shallow subtidal would result in a temporary loss (months) of epibenthic invertebrates, and capping of 42 additional acres of deep-water habitat would result in a temporary loss (2-3 years) of benthic fauna over 44.9 acres total.	▪ Restores biological function of existing degraded habitat via capping of contaminated sediments with clean sediments. ▪ No change in habitat elevations as a result of capping – all areas remain subtidal.	▪ No conversion of habitat types is occurring.
Cornwall Avenue Landfill	▪ Conversion of 4.2 acres of deep-water (below –10) to 4.2 acres of shallow subtidal (-4 to –10), and 25 acres of deep-water habitat (below -10) to 25 acres of intertidal habitat (+11 to -4). ▪ Loss of 25 acres of rearing habitat for adult flatfish, adult Dungeness crab, and adult pandalid shrimp. ▪ Temporary loss (months) of epibenthic invertebrates over 6.4 acres. ▪ Temporary loss (2-3 years) of benthic infauna over 29.4 acres. ▪ Capping of the existing solid waste substrate would result in the loss of 0.5 acres of existing eelgrass. Although preliminary evaluations suggest that CAD construction will not adversely affect eelgrass patches and meadows present adjacent to (south of) the prospective CAD facility, these evaluations would be refined during remedial design. In any event, the CAD would be engineered to avoid eelgrass impacts beyond the 0.5 acre footprint.	▪ Restores and improves biological function of physically degraded habitat exposed to deleterious substances typical of solid waste landfills through filling and capping over 13.8 acres of currently contaminated sediment. ▪ Increased epibenthic production from converting 25 acres of deep-water (below -10) to 25 acres of intertidal habitat. ▪ Increased rearing area for juvenile salmon, juvenile flatfish and marine fish species, juvenile Dungeness crab, and juvenile pandalid shrimp through converting 25 acres to intertidal habitat. ▪ Enhanced migratory corridor and the potential for eelgrass restoration are both consistent with the habitat objectives developed by the Pilot Team.	▪ Proposed action would eliminate the exposure of aquatic organisms to deleterious substances. ▪ The additional filling/capping acreage on clean sediments may be necessary to create a confined disposal site for sediments being removed from elsewhere in Bellingham Bay. ▪ The CAD would increase habitat productivity and function beneficial to the fish and wildlife resources in Bellingham Bay through the shift to intertidal habitat that is consistent with the habitat objectives developed by the Pilot Team. ▪ Loss of 0.5 acres of existing eelgrass. ▪ Habitat enhancement measures for this site include the potential for eelgrass restoration.
Harris Avenue Shipyard	▪ No habitat type conversion. Dredging of 4 acres of deep-water habitat would result in a temporary loss (2-3 years) of benthic infauna over 4 acres.	▪ Restores biological function of chemically degraded habitat through dredging and possibly capping.	▪ No conversion of habitat types is occurring.

Seabirds

Potential impacts would be as described for Alternatives 2A.

Marine Mammals

Potential impacts would be as described for Alternatives 2A.

Threatened and Endangered Species

Potential impacts would be as described for Alternatives 2A.

Mitigation

Although this alternative results in the loss of 0.5 acres of existing eelgrass, due to the increase in shallow subtidal/intertidal habitat occurring under the Preferred Remedial Action Alternative, it is not clear at this time if mitigation would be required. The need for mitigation would be determined during remedial design and permitting. At the discretion of the relevant regulatory agencies, the Preliminary Draft Habitat Mitigation Framework (described in Section 2.3.3) could be used during future permitting activities to quantify mitigation requirements

4.3.6.3 Land Use, Shoreline Use, and Recreation/Public Use

Impacts

Navigation and Commerce

The impacts of the Preferred Remedial Action Alternative are summarized in Table 4.3-12. In addition, there would be short-term impacts during construction. CAD disposal of up to approximately 820,000 cubic yards would require the operation of two dredges and four barges. This amount of barge traffic is not expected to significantly impact Bellingham Bay harbor operations. Water dependent access can be provided at both the north and south end of the Cornwall CAD area and will be enhanced at the NW side of the head of the Whatcom Waterway.

Tribal and Commercial Fishing

The overall effect on tribal and commercial fisheries of the Preferred Remedial Action Alternative would be less than that described for Alternative 2C, primarily because the CAD footprint has been moved to have less impact on primary tribal fishing areas. Nevertheless, depending on final design of the CAD, there may still be some displacement of net fishing and crab pot placement in this area. However, the Preferred Remedial Action Alternative would also result in beneficial impacts to fish and wildlife, due to the additional habitat functions provided by the overall action.

Recreational Uses and Public Access

Potential impacts to recreational uses and public access would be as described for Alternatives 2A and 2C, except that public access opportunities would not be provided at the south end of Cornwall Avenue. However, additional public access opportunity would be provided at the corner shallow beach area east of the Port barge dock (due to the habitat bench in that area). Additional dredging at the head of Whatcom Waterway would also further increase the opportunity to use the area as a public access point to the Bay.

Mitigation

Potential mitigation measures would be as described for Alternative 2A. Restricted Navigation Areas may be necessary to ensure the integrity of capped areas and the CAD facility. Mitigation to address Tribal Treaty Rights will be identified by the Lummi and Nooksack tribes prior to permitting.

4.3.6.4 Air and Noise

Impacts

Impacts associated with this alternative would be similar to those described under Alternatives 2A.

Mitigation

Potential mitigation measures associated with this alternative would be similar to those described under Alternatives 2A.

4.3.6.5 Cultural Resources

Impacts

This alternative includes full removal of sediments in the Whatcom Waterway, dredged to the clean native layer. Dredging activities will occur in close proximity to Citizens Dock, a National Register of Historic Places property. Since the dock is being demolished because it is a safety hazard, concerns about dredging impacting the integrity of the dock are not an issue. Isolated historic artifacts associated with the PAF complex may be unearthed during dredging activities at the Harris Avenue Shipyard. The historic artifacts would probably not be significant because they would not have integrity and would not contribute information important to the history of the area.

There is a possibility that a cap or a CAD could be placed over an area that contains unidentified cultural resources.

Mitigation

No mitigation measures are anticipated to be required for this alternative. However, in the event that cultural artifacts are uncovered during remedial design of the CAD or during construction, coordination with the Washington State Office of Archaeology and Historic Preservation and potentially the National Advisory Council on Historic Preservation would be necessary to ensure that impacts to cultural resources are identified and mitigated appropriately.

Table 4.3-12 Potential Navigation and Commerce Impacts Associated with the Preferred Alternative

Site (potential area impacted)	Current Uses	Navigation & Commerce Impact
Whatcom Waterway (58 acres)	Federally-authorized navigation channel providing access for deep draft ship traffic to the Port's shipping terminal, the G-P facility, and other water-dependent industry and commerce. Marine traffic includes break bulk ship cargo, barge access to the central waterfront, delivery of commercial fish catch, and access to boat repair yard.	The majority of this area would be dredged to remove all contaminated sediments. This action would provide access to the current authorized depths, and would provide the flexibility to modify the authorized depth to a deeper elevation in the future without encountering contaminated sediments. Two small areas in the waterway would have elevated subsurface levels of mercury beneath a clean surface layer. One of these areas (7 acres) is due to the presence of a buried pipeline in that segment where cleanup options are limited to dredging and capping back over with clean material resulting in a final bottom elevation of -33 MLLW. The other area (1.5 acres) is at the head of the waterway where habitat considerations warrant not modifying the existing conditions, which are shallower than -18 MLLW.
I&J Waterway (9 acres)	Federally-authorized navigational channel providing access for moderate draft ship traffic to Squalicum Harbor, U.S. Coast Guard Station, and fish processing operations.	No change in current use.
G-P Log Pond (8 acres)	Shared ownership by the Port and G-P. The area has been used for small vessel moorage and periodic large vessel moorage rather than log rafting in recent years.	Same as Alternative 2A.
G-P ASB (43 acres)	State-designated Harbor Area intended to support navigation and commerce by providing access to upland facilities. Since upland area is fully dedicated to waste water treatment, the adjacent upland area is used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.	Same as Alternative 2A.
Port Log Rafting Area (24 acres)	State-designated Harbor Area with aquatic land leases to the Port and G-P for log rafting, navigation and commerce, including access to the Port's Chemical Dock facility leased to G-P for export (lignins, caustics) and import (chlorine).	Same as Alternative 2A.
Starr Rock (85 acres)	State-designated Harbor Area used primarily for shallow draft recreational boating and traffic along the shoreline. Tribal/commercial fishing. Adjacent upland use is primarily recreational park.	Same as Alternative 2B
Cornwall Ave Landfill (14 acres)	State-designated Harbor Area with aquatic land lease to G-P for in-water log rafting, upland log storage and warehouse. Beach and shoreline access is prohibited because of uncontrolled landfill waste. Some tribal/ commercial fishing and recreational boating traffic.	This area would be either capped or included as part of the CAD, and elevations would shift to intertidal or shallow subtidal, limiting the use of the area for boating during low tide periods. The shift in elevations would also restrict water-dependent commerce uses in the area, limiting barge access to the Cornwall site. To reduce the risk of navigational accidents a Restricted Navigational Area (RNA) may be established (See Alternative 2A). Of the 29 acres, 14 acres currently contain solid wastes and other deleterious substances. Existing beach access would improve along portions of Cornwall Avenue Landfill adjacent to the CAD.
Harris Ave. Shipyard (4 acres)	Shipyard activities including the operation of a drydock	Same as Alternative 2A.

RESPONSES TO COMMENTS

5 RESPONSES TO COMMENTS

5.1 RESPONSES TO COMMON THEMES

Many of the comments on the draft EIS from different parties addressed similar issues. These common issues fell into seven topics; responses to these issues are provided in this section.

5.1.1 General Comment Response #1 – Process for Implementation of the Comprehensive Strategy

A number of comments on the draft EIS were positive in their support for the vision and planning of a Comprehensive Strategy that integrated sediment cleanup with habitat restoration, land use, and source control. However, many of the comments cautioned that the Strategy would only be effective if there is a mechanism in place to be sure that future actions around the Bay are consistent with the specific components of the Comprehensive Strategy. In response, an appendix has been included in the final EIS (Appendix G) that conveys a conceptual framework for implementing the Comprehensive Strategy.

5.1.2 General Comment Response #2 – Cost Estimating

A number of comments on the draft EIS requested additional detail and/or refinement of the methods used to estimate the total cost of implementing the integrated near-term remedial action alternatives. Some of these comments requested consideration of "soft" costs potentially associated with long-term encumbrance of aquatic lands for containment of contaminated sediments and habitat restoration, while other comments requested consideration of long-term adaptive management/repair costs. Several comments recommended that the cost analysis also include considerations of economic benefits resulting from the implementation of the different alternatives, including navigation and commerce benefits and increased long-term harvests of fisheries resources (e.g., resulting from habitat restoration). Other comments recommended that the EIS exclude consideration of costs and economic factors, particularly if a complete cost analysis is not provided in the EIS, in order to focus the evaluation solely on environmental considerations. Lastly, some comments also requested that the cost of implementing the overall Comprehensive Strategy be quantified in the EIS.

The EIS focuses on environmental considerations; however, cost estimates were presented to provide preliminary baseline cost comparison of the Integrated Near-Term Remedial Action Alternatives. These cost estimates, which exclude a number of "soft" costs as outlined below, were based on detailed cost estimates presented in the Remedial Investigation/Feasibility Study (RI/FS) reports prepared for the Whatcom Waterway and Cornwall Avenue Landfill sites, which are incorporated by reference into this EIS. As part of the Bellingham Bay Demonstration Pilot Disposal Siting Documentation Report, the Pilot Team also developed additional planning-level disposal and habitat mitigation cost estimates that were used in the development of overall planning-level cost estimates. Using this information, preliminary engineering cost estimates for each near-term remedial alternative were developed, and are summarized in Appendix F.

Comparable cost estimating assumptions were used in all of the Pilot documents, and followed planning-level remediation cost estimating guidelines developed by the U.S. Environmental Protection Agency (EPA). Equivalent cost estimating procedures and assumptions have also been used for other similar projects elsewhere in Puget Sound (e.g., Commencement Bay). All costs were evaluated on a net present worth basis, including direct and indirect costs, engineering and permitting, estimated habitat mitigation costs, long-term operation and maintenance, administration, and a 30 percent contingency factor to allow for uncertainties. However, the 30 percent contingency was not applied to the treatment line item in the Preferred Remedial Action Alternative as this has been determined to be a fixed cost. The basis for the cost estimates is fully described in the RI/FSs and Disposal Siting Documentation Report, however, in response to comments received, a summary of the preliminary cost estimates for all alternatives, including the Preferred Remedial Action Alternative, are provided in Appendix F of the final EIS.

Finally, the Pilot Team only considered cost economies associated with implementation of the Integrated Near-Term Remedial Action Alternatives (e.g., concurrent capping, sediment disposal, and habitat restoration provided by the Cornwall CAD), and not with the overall Comprehensive Strategy. The economies of an integrated cleanup and habitat restoration action are reflected in the overall cost estimates presented in the final EIS. Due to the broad range of possible actions that could be taken to implement the Comprehensive Strategy, costs associated with the overall Comprehensive Strategy are not quantified.

Although the cost estimates developed by the Pilot Team considered all anticipated costs, the preliminary construction and long-term monitoring/maintenance cost estimates presented in the RI/FSs and final EIS intentionally excluded a number of "soft costs" such as:

- **Land encumbrance and/or easement fees** associated with use of state-owned aquatic land. Such costs are difficult to estimate and can vary widely depending on specific circumstances. Because of the complexities of landowner interest determinations, these costs were not included in the EIS estimates.

- **Mitigation for habitat impacts** associated with conversion of deep-water habitat to shallower elevations. The need for habitat mitigation for impacts would be addressed in the future as part of permitting. The Preliminary Draft Habitat Mitigation Framework presented in the final EIS (see below) could be used to inform decisions regarding potential mitigation requirements.

- **Compensation for impacts to Tribal Usual and Accustomed (U&A) Fishing Areas.** These costs are also difficult to estimate and can vary widely depending on specific circumstances. The Preferred Remedial Action Alternative evaluated in the final EIS was designed to minimize potential impacts to Tribal U&A areas, but does not eliminate impacts.

Because of the complexities of Tribal U&A impact determinations, these costs were not included in the EIS cost estimates.

- **Administrative costs**. Agency oversight costs have not been incorporated, nor is there any cost estimate associated with additional legislative funding to the Bellingham Pilot. The need for and scope of such additional funding has not yet been determined.

- **Long-term liability**. All alternatives would require the Potentially Liable Parties (PLPs) to be responsible for the proper operation, maintenance, monitoring, and repair of the CAD and caps in perpetuity; anticipated costs of these actions have been included in the RI/FS estimates. However, contingency actions as may be required if the CAD or caps do not function properly and cannot be repaired are not included in the cost estimates. Nevertheless, such costs would remain the responsibility of the PLPs, and Ecology would require financial assurances to ensure that sufficient reserves are available for this purpose, should they become necessary.

- **Natural Resource Damage Assessment (NRDA) settlement**. The Preferred Remedial Action Alternative evaluated in the EIS has been designed to restore critical habitat that historically existed in Bellingham Bay. However, natural resource trustees have the authority to bring separate actions against the PLPs to compensate for natural resource damages. Because of the complexities of NRDA determinations, the costs of such compensation were not included in the EIS estimates.

5.1.3 General Comment Response #3 – Treatment Options

Several draft EIS comments requested additional detail on sediment treatment options. The Whatcom Waterway RI/FS presents a more detailed discussion on sediment treatment options. The RI/FS, as well as the New York/New Jersey Water Resources Development Act (WRDA) study, evaluate different technologies and carry some of these forward for additional analysis. Although several existing treatment technologies are feasible, the implementability and effectiveness on various types of contaminants and volumes of sediment is uncertain. Specifically, the high volume and low contaminant concentration of the Bellingham Bay dredged materials may be difficult to address using available treatment technologies. In addition, many of the available "treatment" technologies may not remove concentrations or recover mercury – a key contaminant present in Bellingham Bay, but would convert it to a less mobile or toxic forms.

In spite of these potential limitations, there are a number of promising treatment technologies that could possibly be developed for application to Bellingham Bay and other areas of Puget Sound.

DNR is planning to complete a pilot study to evaluate treatment technologies specific to Bellingham Bay sediments. A promising treatment technology would be evaluated to assess production, cost and effectiveness. This site-specific study, coupled with the Cooperative Sediment Management Program (CSMP) study described below would provide a determination of the practicability of sediment treatment for Bellingham Bay sediments.

The Cooperative Sediment Management Program (CSMP) is a consortium of federal and state agencies formed in 1994 to oversee the management of Puget Sound sediments. An interagency and stakeholder group, the Sediment Cleanup Work Group, was formed to evaluate and recommend ways to expedite sediment cleanup. One of the Work Group's recommendations was to initiate a study to evaluate the feasibility and practicability of multi-user treatment and disposal alternatives to help manage contaminated sediments in Puget Sound. The multi-user treatment and disposal study was initiated in spring, 2000. The Bellingham Bay Demonstration Pilot Project, which was also originally conceived by the CSMP, would follow the actions of the Sediment Cleanup Work Group to determine if any identified treatment technologies can be readily applied to Bellingham Bay. Among other elements, the Work Group study, funded by Ecology, will:

- Assess the market feasibility of treating contaminated sediments in the Puget Sound area;
- Identify the most technically feasible treatment methods;
- Characterize potential environmental impacts associated with the more promising alternatives;
- Compare sediment properties associated with typical urban sediments in Puget Sound with East Coast sediments that have previously been used in bench- and pilot-scale treatment demonstrations;
- Determine the feasibility of a regional treatment facility, including identification of barriers to a constant minimum flow of contaminated dredged material (or alternative raw materials) required to maintain facility operation;
- Identify and suggest options for private or public-private funding of a regional treatment facility, including government incentives to encourage private sector development; and
- Perform public outreach to solicit public comments on the feasibility of treating contaminated sediments in the Puget Sound region.

The multi-user treatment and disposal study, which is expected in draft form in late 2000 or early 2001, may recommend one of three possible courses of action:

1. Pursue a public or private management option to construct and implement the most promising treatment technology (ies);
2. Issue a Request for Proposals for a private/public partnership to construct and implement the most promising treatment technology (ies); or
3. Implement a pilot study of the most promising treatment technology (ies), and use that information to determine the feasibility of a future public management or private/public partnership option.

The development of treatment technologies is fully supported by the Pilot Team and members of the Team will be working to develop an acceptable technology within the timeframe necessary to make cleanup decisions in Bellingham Bay. Should a treatment technology be identified as a potential remedy for the Bellingham Bay sediments, it would undergo public review through the MTCA process.

5.1.4 General Comment Response #4 – Confined Aquatic Disposal (CAD) Design

Several DEIS comments noted that the location and configuration of the Starr Rock CAD as presented in the DEIS could interfere with tribal U&A fishing and public use of the Boulevard Park site, and may also impact existing eelgrass patches in that area. Other comments requested additional detail on how the CAD would be designed and constructed to achieve the stated objectives of containing contaminated sediments and concurrently achieving habitat restoration and/or enhancement.

The Preferred Remedial Action Alternative evaluated in the EIS includes a revised configuration of the CAD facility, moving it northeast from Starr Rock to limit its footprint to areas immediately adjacent to existing solid waste deposits of the Cornwall Avenue Landfill. This change also minimizes potential tribal fishing, recreation, and eelgrass impacts associated with CAD construction, while still allowing for barge access and redevelopment of the Cornwall uplands. Other modifications to the CAD design included in the Preferred Remedial Action Alternative include:

- Eliminating the CAD in the G-P Log Pond due to its limited capacity and replacing it with a relatively thick (nominal 3 to 10 feet thickness) clean sediment cap that concurrently accomplishes habitat restoration (conversion from subtidal to intertidal and shallow subtidal elevations). The thick cap in this case would also provide additional isolation from underlying contaminated sediments.

- Excavation of clean native sediments as may be present beneath the Cornwall CAD footprint (i.e., away from solid waste deposits, pending the results of remedial design sampling and analysis), and beneficially reusing these materials to build habitat embankments in inner Bellingham Bay. This design also concurrently minimizes the footprint of the CAD on state-owned aquatic lands, and allows the CAD to be constructed at deeper elevations.

- Addition of a gently sloping sand beach (nominal 10H:1V slope) adjacent to the Cornwall Landfill, that would tie into the inner edge of the adjacent CAD surface, providing a greater diversity of habitats in this area. Additionally, the outer edge of the CAD would be flanked by relatively gently sloping, finer-grained habitat embankments (10H:1V above -10 ft MLLW; 5H:1V below -10 ft MLLW). These features are depicted in a new graphic added to the final EIS (Figure 2.3-12). The CAD cap would be constructed to a minimum thickness of 5 feet, ensuring isolation from underlying contaminated sediments. The surface of the cap would be constructed of fine sands to facilitate eelgrass meadow development.

The Whatcom Waterway RI/FS includes a detailed review of how CADs and caps have been designed and constructed in Puget Sound and elsewhere, including a summary of available performance monitoring data for these facilities. All of the available data supports the conclusion, as stated in the EIS and RI/FS documents, that CADs and caps can be designed and constructed to accomplish effective long-term isolation of contaminants from the environment. The only instances of "failure" have occurred when design standards have not been followed, such as when adjacent upland sources are not adequately controlled (see General Comment response #7 below) or when the cap design did not adequately consider geotechnical requirements. Key design considerations include:

- **Seismic stability**. Typically, the most critical factor for CAD design in the Puget Sound region is seismic resistance. Seismic activity can cause liquefaction of the CAD foundation as well as slope instability. The typical approach taken within Puget Sound in design of marine facilities is very similar to that taken by other major West Coast ports in seismically active areas. In essence, major marine structures must be able to withstand, with possible damage but without failure, an earthquake that has an approximate 500-year recurrence interval (i.e., 10 percent chance of being exceeded in 50 years).

- **Static stability.** Static stability evaluates the most critical case (i.e., both short- and long-term scenarios). Static stability would include both bearing failure assessment as well as slope stability of the facility. With CAD facilities, and the anticipated construction methods in Bellingham Bay, the period immediately following construction would be the most critical for evaluating static stability. With time the sediments will gain strength increasing the stability of the facility. Therefore, static stability does not have a design life associated with it.

- **Contaminant transport.** Field and laboratory analysis coupled with CAD modeling evaluates the long-term maximum estimated levels of contaminants leaching out from the disposal facility. Therefore, contaminant transport does not have a design life associated with it.

- **Cap wave resistance.** The typical approach taken in design of shoreline protection is to resist a 30- to 100-year recurrence interval storm event, depending on the critical nature of the area being protected. For the CAD, a preliminary assessment using a 100-year event was used. Models will be used to determine the appropriate cap grain size necessary to resist the design wave.

- **Cap current resistance.** Currents that could affect the CAD cap would be primarily tidal currents. There are no significant rivers or outfalls that would impact the cap. Models will be used to determine the appropriate cap grain size necessary to resist the design current. Tidal currents will vary over the tidal swings but will not vary with time. Therefore, current resistance does not have a design life associated with it.

- **Cap propeller wash resistance.** The standard approach to design a stable cap is to resist propeller wash from the different vessels that use the site. That is, the cap will be designed to resist the largest possible propeller wash generated based on the vessels that use the site. Models will be used to determine the appropriate cap grain size necessary to resist the design propeller wash. Therefore, propeller wash resistance does not have a design life associated with it.

- **Cap biological resistance.** The standard approach to design a cap to resist biological disturbance is to determine likely organisms in the area of the cap and understand their burrowing characteristics. The cap will be designed to resist the most disturbing of organisms. Therefore, biological resistance does not have a design life associated with it.

The conceptual CAD and capping designs presented in the final EIS and RI/FSs were developed based on preliminary, conservative analysis of the Bellingham Bay environment and applications of engineering analyses completed at other Puget Sound facilities. These analyses would be refined during the remedial design, based on site-specific sampling, analysis, and detailed engineering calculations. As discussed in the Whatcom Waterway RI/FS, the CAD and associated caps would be designed according to current standards, as developed by the Corps, EPA, Ecology, and others, to ensure that these facilities provide permanent containment of contaminated sediments and isolation from surface or near-surface biological exposures. The most recent regulatory guidance includes:

- "Guidance for Subaqueous Dredged Material Capping" (U.S. Army Corps of Engineers);

- "Guidance for *In-Situ* Subaqueous Capping of Contaminated Sediments" (EPA Assessment and Remediation of Contaminated Sediment [ARCS] Program); and

- "Multi-user Disposal Sites (MUDS) for Contaminated Sediments from Puget Sound – Subaqueous Capping and Confined Disposal Alternatives".

Other requirements have also been developed for specific application within the Puget Sound region, including considerations of cap thickness necessary to prevent exposure to indigenous burrowing aquatic organisms, and regional seismic design criteria. Detailed engineering design would be performed, and reviewed by Ecology and other agencies, to ensure that the design achieves isolation of contaminated sediments and facility integrity at a selected risk level (e.g., 500-year seismic event). Specifications of material type, thickness, and configuration would be designed to protect to that level. Ecology (and other regulatory agencies) would only approve the design if it has been developed to achieve these current standards; upland disposal would likely be identified as the contingent remedy in the event that the CAD cannot be designed to achieve these protection standards. Under the MTCA process, Cleanup Action Plan and Consent Decree would provide more specific information on the design of the CAD facility, and these documents/milestones include a public review component. Long-term monitoring would be performed to verify the protectiveness of the CAD and caps, and to determine the need for future contingency actions.

5.1.5 General Comment Response #5 – Habitat Mitigation and Restoration

Several draft EIS comments pertained to habitat mitigation and restoration. These comments included the need to further address eelgrass restoration potential, habitat function and mitigation requirements, and the ability to exchange subtidal with intertidal habitat and consider it to be mitigation.

The draft EIS points out that construction of a CAD facility, and in some cases, portions of the capped areas, would be completed such that final elevations and substrate types are consistent with conditions where eelgrass may colonize. The EIS has been modified to more clearly state that the conditions provide the potential for eelgrass production, but there is not certainty that eelgrass would establish itself throughout these areas. The clarification also points out that large-scale eelgrass restoration has not occurred in Puget Sound, and that smaller-scale efforts have had variable success.

While eelgrass restoration cannot be guaranteed, the CAD and caps create shallower water, which in and of itself is a habitat benefit. The shallow water intertidal habitat serves to improve juvenile salmon rearing conditions in the estuary and inner bay, provides habitat for juvenile crabs and flatfish, and can serve to provide connectivity between other key segments of shallow water habitat – particularly at the creek mouths of the small urban estuaries. These functions are not provided by subtidal habitat, but are provided by intertidal habitat regardless of eelgrass vegetation – as long as there is gently sloped soft substrate habitat associated with the new intertidal habitat. Creating more of this shallow water/ intertidal habitat was identified as one of the habitat restoration objectives for the Bay by the Pilot Team (Section 2.3.13 of the EIS and Bellingham Bay Demonstration Pilot Habitat Restoration Documentation Report, 1999).

All of the near-term remedial action alternatives change habitat conditions from what they are today to something different in the future. At a minimum, all of them eliminate habitat functions that are currently impaired due to sediment contamination, and provide clean habitat conditions from a sediment chemistry perspective. In terms of defining what is required for mitigation for impacts caused by the remediation, a Preliminary Draft Habitat Mitigation Framework (Appendix C) has been developed that addresses both the types of actions being contemplated by the alternatives, as well as the various functions provided by the alternatives. For example, the framework accounts for temporary loss of benthic and epibenthic organisms in areas targeted for dredging, capping, or a CAD facility. Quantifying the impacts for these actions takes into account whether or not the action is occurring in an area where habitat is currently chemically degraded or if it occurs in an area where it is chemically clean. Also, the framework takes into account if a habitat type is currently functioning as a subtidal area benefiting certain species and life stages, or is functioning as an intertidal area benefiting a different set of life stages. There is a premise built into both the mitigation framework and the impact analysis that intertidal habitat, when properly located and designed, is more desirable than subtidal habitat. This is based on the habitat restoration objectives stated in the report. A Preliminary Draft Habitat Mitigation Framework is provided in the final EIS that provides a starting point for mitigation discussions. This framework is still a work in progress and could be used to inform future regulatory decisions.

5.1.6 General Comment Response #6 – Cap Design

A number of comments on the draft EIS requested additional information on how sediment caps would be designed and constructed. While much of this information is already included in the Whatcom Waterway RI/FS, the final EIS has been expanded to provide additional discussion of key cap design and construction elements.

The generally accepted design guidance for caps is described in general response #4 – CAD design. The following general design sequence would be followed in the design of an *in situ* cap:

- **Characterize the sites to be capped.** Assess the site's features, site uses, geotechnical, and institutional constraints associated with a cap.
- **Characterize the sediments to be capped.** Assess the contaminated sediment's physical, chemical, and biological characteristics.
- **Identify potential capping sources.** Conduct a preliminary evaluation of potential sources of capping material.
- **Complete cap design.** Complete cap design, considering the three previous factors.
- **Select appropriate equipment and placement techniques.** Consider the cap design and its intended function and how these factors may require certain approaches to cap construction.
- **Develop appropriate monitoring and management program.** Develop a preliminary short- and long-term monitoring plan to monitor critical features of the design and construction. Also, develop conceptual maintenance programs keyed toward the monitoring.

The following factors must be successfully assessed and controlled during design:

- **Biological disturbance**. The cap must physically isolate biological organisms from underlying contaminated sediments
- **Long-term durability**. A number of durability factors would be evaluated during final design:
    - Stabilization. The cap that is placed over the soft underlying sediments would need to be of certain grain size and placed at certain rates to minimize mixing and mudwaves.

- Waves and currents. The cap would need to be of sufficient grain size to resist erosion from waves and currents.
- Propeller wash. The cap would need to be of sufficient grain size to resist erosion from boat propeller wash.
- Anchor Drag – The cap would need to be of sufficient thickness to prevent anchor drag from small vessels scouring through the cap into the underlying sediments.
- Human contact. The cap would need to be of sufficient grain size to resist disturbance from human contact.
- Slope stability. The impact of the cap on slopes would need to be assessed.
- Seismic stability. The performance of the cap under a design level seismic event would need to be assessed.

- **Chemical isolation.** The cap must provide resistance to chemical advection and diffusion. Advection refers to the movement of pore water through the sediment. Diffusion is the process whereby ionic and molecular species in water are transported by random molecular motion from an area associated with high concentrations to an adjacent area associated with a low concentration.

A preliminary assessment of caps to be used as part of the Bellingham Bay cleanup was completed for the Whatcom Waterway RI/FS using existing data and past Puget Sound experience. As part of the final design each of the factors described above would be evaluated in greater detail, using additional site-specific data and refined engineering analyses.

The Bellingham Bay remedial caps could potentially reuse clean navigational dredge material generated from other nearby areas of Puget Sound and the Straits of Georgia. Most of these materials are predominantly fine-grained, non-plastic silt, similar in consistency to the sediment being capped. Caps may vary in thickness from a minimum of 1-foot-thick to over 10-feet-thick depending on site constraints and end use of cap surface; based on experience at other areas of Puget Sound, a typical cap thickness of 3 feet is anticipated.

Slow placement and use of capping materials that are similar to existing sediments would minimize mixing and mudwaves during placement. A slightly coarser material may be required on the surface in certain intertidal and/or navigational areas that may be subject to periodic wave, wake, and propeller wash forces. Since the caps would be constructed on gentle slopes (maximum slope of 5H:1V, caps are not anticipated to induce stability issues and are anticipated to be seismically stable. Geotechnical considerations, including static slope and seismic stability analyses, would be incorporated into the final design. Under the MTCA process, a Cleanup Action Plan and Consent Decree would provide more specific information on the design of the caps, and these documents/milestones include a public review component.

5.1.7 General Comment Response #7 - Source Control

Source control is a key consideration in the design of any sediment remediation project, and would be addressed in detail during remedial design. As presented in the Whatcom Waterway RI/FS and the Bellingham Bay Demonstration Pilot Sediment Site and Source Control Documentation Report, both attachments to the EIS, conservative screening-level analyses of the available data suggest that only highly localized ongoing sources of sediment contamination still exist in Bellingham Bay. Existing sediment contamination has been attributed to historical discharges that have since been controlled. Nevertheless, this condition would need to be confirmed prior to initiating sediment cleanup actions, to ensure that recontamination would not occur.

Several comments requested additional information on the current status of source controls in the bay, along with specific source control projects included in the Preferred Remedial Action Alternative evaluated in the EIS. Much of this information is provided in the various attachments to the EIS, and is summarized below:

- The primary historical source of mercury to Bellingham Bay was G-P's chlorine plant, installed in 1965. During the first few years of operation, wastewater from the chlorine plant was discharged directly into the G-P Log Pond. However, following the first few years of operation, levels of mercury being released from the facility have steadily declined due to plant improvements. The chlorine plant was closed in 1999, permanently curtailing any further direct mercury releases from the G-P facility.

- Groundwater loadings of mercury from the former chlorine plant and adjacent sediment disposal area (currently uplands) are currently being evaluated. Contaminant transport modeling has been performed to assess the probability of localized cap recontamination associated with these relatively low-level groundwater releases. The results of these modeling evaluations, subsequently confirmed with low-level mercury sampling and analysis of nearshore wells and seepage discharges, suggest that there is little potential for even localized cap recontamination. The seepage discharges into the Log Pond are below ambient water quality criteria. Thus, caps constructed in the G-P Log Pond area will remain protective. In addition, G-P is also proceeding quickly with upland remediation of the former chlorine plant site. In parallel with the demolition of portions of the facility in August/Sept. 2000, G-P will complete, under Ecology oversight, an RI/FS of the upland area to further ensure that sources are controlled.

- As part of its NPDES permit requirements, G-P recently completed sampling and analysis of sediments adjacent to its offshore Bellingham Bay wastewater diffuser (Outfall 001). The results of this assessment confirmed that mercury concentrations in the outfall area have declined below SQS cleanup criteria, consistent with prior implementation of source controls at the facility and with earlier natural recovery modeling predictions presented in the Whatcom Waterway RI/FS. Further improvements are expected over the next 5 years as a result of closure of the chlorine plant and bleaching technology improvements. Sediment quality in the outfall area would be monitored as a condition of the NPDES permit.

- The City of Bellingham has drafted their stormwater management plan, and has been working with Ecology to finalize this document. However, stormwater controls have continued to be implemented during this period. For example, following a 3-year hiatus, the City has been cleaning storm drains continuously since 1998, in an effort to reduce identified discharges of phenolic compounds and other chemicals to Bellingham Bay. The City is also developing implementation plans to retrofit older stormwater systems with improved treatment systems.

- The Department of Ecology is currently working with the owners of the R.G. Haley site, a former wood treatment facility located immediately north of the Cornwall Avenue Landfill site, to address a recently discovered seep that is discharging into Bellingham Bay. Emergency measures to stop the seep are expected be in place by fall of 2000.

- Chevron Bulk Fuels Facility. Petroleum contaminated soil and groundwater at this former fuel terminal were removed and/or treated at the site in the early 1990s. Chevron is considering further controls to address residual groundwater contamination. However, sediment samples collected immediately adjacent to the site have not exceeded SQS biological criteria (Anchor Environmental and Hart Crowser 1999).

5.2 PUBLIC HEARING COMMENTS

The public hearing on the draft EIS was held on August 26, 1999. A total of 10 individuals provided comment at the hearing. A copy of the transcript of the comments made at the public hearing and responses are contained on the following pages.

BEFORE THE DEPARTMENT OF ECOLOGY

In re: BELLINGHAM BAY)
COMPREHENSIVE STRATEGY)
DRAFT EIS AND WHATCOM)
WATERWAY DRAFT RI/FS)
_______________________________)

PUBLIC HEARING HELD
FOR THE PURPOSES OF PUBLIC COMMENTS
BY: CHRISTINE CORRIGAN, HEARING OFFICER
AUGUST 26, 1999
BELLINGHAM, WASHINGTON

Reported by:

SHAUN JORDAN, CCR

CCR No. JO-RD-AS-M4010H

COPY

PUBLIC TESTIMONY

BE IT REMEMBERED that a public hearing was held on August 26, 1999, at the hour of 8:00 p.m., at 355 Harris Avenue, Bellingham, Washington, before Shaun Jordan, CCR, Notary Public in and for the State of Washington, residing at Kent, Washington;

Whereupon, the following proceedings were had, to wit:

* * * * *

HEARING OFFICER CORRIGAN: Let the record show it's 8:00 p.m, on Thursday, August 26, 1999, and this hearing on the Bellingham Bay Comprehensive Strategy Draft EIS and the Whatcom Waterway Draft Remedial Investigation and Feasibility Study is being held at the Bellingham Cruise Terminal in Bellingham, Washington.

Notice of this hearing and comment period has been published in the Department of Ecology's Site Register and the Bellingham Herald. Public notice was mailed to approximately 1,100 people. In addition to this hearing there is a public comment period through September 20, 1999 for the submittal of written comments.

Now I am going to call you to the front in the order in which you signed up. Please come to the microphone and don't be afraid of it, adjust it for your height. Please state your name and organization if you represent one and your address for the record.

We will begin with Brooke Sevier, followed by Dru Saunders, and Bob Kelly.

MR. SEVIER: Yes. My name is Brooke Sevier. I live at 1019 North Garden, Apartment B, Bellingham. 98225. I'm a student at Western. I'm an environmental science major at Huxley. I have been to some classes presented at Resources. One of them attended by Mike Stoner where we were informed or received similar instruction as to the content of the Draft EIS as was given tonight.

1 I still have some questions as to why natural recovery was not listed as one of the actions, why nonaction was not listed as a plan in this EIS? What were the repercussions, especially considering the non-source point pollution or contamination from the Nooksack and other streams, natural sources of mercury given in low concentrations?

2 Also focused in what the preferred plan, especially by the Port. That was Plan 2-C. Focused on habitat restoration and improvement, but I've had a hard time finding examples of successful habitat restoration with these native species, especially eelgrass and whatnot.

The cost of the various plans that's listed right now I have questions about. I don't know that whole process of how you come up with your estimate, but it seems as though that would influence quite a few people right now particularly in this stage as far as their judgment deciding what plan is best.

3

And it's like I said, I just don't know how close those estimates are; whether that's an actual guideline people can use as deciding which plan they want to support. The plan focuses mostly, and you say that it focuses mostly on the source of pollution within the Bellingham Bay mainly, GP, the Harris Shipyard, and another waterway, the I & J waterway near the marina, and it also mentions habitat restoration along the Nooksack but doesn't deal with that non-point source of pollution.

The plan dealing mostly with mercury from the Nooksack, where that's coming from, and also doesn't deal as far as I can tell with any problems within Portage Bay and the bay, the regions of the bay farther west towards the Lummi Reservation and the Nooksack River Delta.

These are concerns that I have with the Draft EIS before deciding on how much something costs, and I don't think for too many people that that's -- it's a concern definitely, but I think most people and the people who came up with this plan as well their main concern is doing what's best for habitat restoration.

So that's my public comment. Thank you. Thank you.

HEARING OFFICER CORRIGAN: Thank you. I'd like to check with folks in the back. Can you hear?

Yes, everybody can hear. No?

Okay. Folks that come up front make sure you speak into the microphone and, Keith, you might want to turn it up just a touch.

Dru Saunders.

MR. SANDERS: My name is Dru Saunders, P.O. Box 6040, Bellingham, Washington 98227.

1

And with any project anybody is going to do, whether it's building a house or a boat or an environmental cleanup, something similar has always been done before, so I would strongly encourage to investigate previous similar type activity and to study the long-term results, and that concept is what I would like to put on the public record.

2

And also this is a little maybe futuristic, but centrifuge separation to get rid of the mercury, you know, is that possible? And basically, you know, spinning it around the heavier material goes to the outside, and you pull that out, and it might be less to take out of here.

And who is going to pay for this? Because, 3 you know, you can talk about all these, and anyway it's in Section 1.6, Significant Areas of Controversy and Uncertainty, which not much of this has been discussed about. And it says right here the availability of funds for implementation of all or part of the comprehensive strategy. So as a public person and the public is curious who is going to pay for it and say how much of the total cost is going to be paid by the people who created the mess that's being cleaned up.

And that's about it. Just to try not to reinvent the wheel if it's already been invented, just maybe improve it.

And one last concept is there's a water resources inventory area assessment being done that was brought about by the Senate Bill 2515 I think, which is basically studying water quality and quantity in the watershed which is all going to be pouring down into this area you're going to clean up, so it seems like there needs to be talk or more talk about integration of those two activities. Thank you.

HEARING OFFICER CORRIGAN: Thank you. Bob Kelly followed by Staryn Wagner.

MR. KELLY: Bob Kelly, Natural Resource Director for the Nooksack Tribe, P.O. Box 144, Deming, Washington 98244.

Just some comments and some questions on policy and procedure. The Nooksack Tribe has been involved in the pilot project now for two years. The DEIS doesn't contain the type of technical information at least from our standpoint that will allow us to make informed policy decisions on which site to pick.

1 The strategy is based on historical data only and really doesn't allow us to use current assessment tools to further analyze those impacts. This makes it difficult for us to assess the risks where the treaty protect the resources such as salmon, crab, and other shellfish.

2 All options other than 1 and 2E appear to have long-term impacts to treaty and non-treaty commercial fisheries. And 2E more so because of its location. We feel that there's a possibility that if we shallow up the bay in certain areas that there could be impacts to the actual fisheries themselves for maybe different salmon species and crab also.

3 We feel that the draft document doesn't appear to be complete. It's my understanding that the actual one piece document is missing a habitat documentation report and the draft mitigation frame work document as well also missing. I know that they exist out there somewhere, but I don't have them.

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I have been asking now for a couple of years how the Tribe could weigh in their policy decisions. Habitat mitigation is being discussed and the tribes should be part of those discussions. We obviously have been at the table now, what I view as a technical table, for a number of years, and we need some policy discussions with both the state, local, and federal agencies. I know that the directors of the state agencies have been meeting.

It's not clear to me whether or not they are the ones that are driving the process from here on out. I don't particularly understand how the process has moved forward, but yet the Tribe has been at the table.

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And lastly, I think that somebody should make it perfectly clear to at least the Nooksack just how the preferred option is going to be selected. Is it going to be done by the state agencies, one of the lead agencies, both the lead agencies, and will the tribes have the opportunity to provide input and actually be part of the selection process? Obviously, we feel we have a property right here as well and the leader of resources. So thank you.

HEARING OFFICER CORRIGAN: Thank you. Ken Speer. Ken Speer followed by George Dyson.

MR. SPEER: My name is the Ken Speer. My

business address is 1220 Central Avenue. I'm a member of the Old Town Business Association; although, I may not necessarily represent all of the members of that association, and I am a citizen of Bellingham and concerned about our waterfront.

1 I'd like to speak to the historical uses of the waterway. Traditionally our waterway has been our connection to Whatcom Creek Waterways and the connection to the rest of the world from Bellingham and the way the rest of the world got to Bellingham, especially the old days. Nowadays we have freeways.

2 But our waterway is still really important to us, and we would like to see it dredged to the bridge if possible to create a navigable and useful channel for commerce for small boats and small crafts and people who might want to come into Bellingham and shop at our stores from a boat, much like Friday Harbor or Anacortes or other places.

3 The area near the bridge has been considered by some people as potential habitat, and I would like to say that I have observed that for the last eight or nine years, and no matter what you do until you address the problem for the wood pulp drifting in from the GP plants that area is not going to be able to sustain eelgrass or anything else. You're going to have a difficult time here

until you can deal with that.

I would hope that the preferred choice for at least for me would be 2C, and I would hope that some of those choices would have the potential to be combined or altered or varied as they become implemented and not written in stone. For instance, we may be able to save
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some of the costs by not dredging as deep up near the -- we don't need to dredge 30 feet deep next to the bridge. We only want to get small boats in there. We don't need to get large ships or anything like that.

So I would say again that the historical use of that waterway is really important to us in Old Town and for the redevelopment of our community downtown, and we would like to see the potential to be able to get some docks and some small boats in there. Thank you very much.

HEARING OFFICER CORRIGAN: Thank you. George Dyson followed by John Munson.

MR. DYSON: George Dyson, 435 West Holly Street, Bellingham, and I am here as a private citizen, and I am also a landowner of property at the head of the Whatcom Creek Waterway, so that's the reason for my opinion being strong. That should be on the record.

I think it's disappointing to look at these alternatives and see that what is one of the critical areas in this whole picture, which on the various maps is area 3C, that's the head of Whatcom Creek Waterway, in all the alternatives except one that receives no action, and to me that's sort of ground zero where the Bellingham public meets the waterfront. That's really where action should happen first, and if no action is taken at this time, I think we're going to suffer for it greatly later. Because not so much that that area needs to be dredged for navigation, it's navigable to small craft now. Workable docks were in there until a few years ago.

But if it's not cleaned up now, it will be impossible to do anything with that area later. For instance, rebuild or remove Citizen's Dock. That really has to be addressed as part of this larger picture. What do we do there? You know, do we spend millions cleaning up everything else and then have to come in later and go through the whole same process to say remove the old pilings or somehow clean it up?

It's not healthy habitat now, and now is the time to clean it up. It's not a time for no action, and we should put in this draft study, we should put a number on what it would take to clean up the head of the waterway, not the 30 feet, 6 feet, 10 feet, 12 feet, whatever it takes to clean up the contamination that is admittedly under the surface. But it's still there, and it's going to come back and haunt us later if we don't do something now. Thanks.

HEARING OFFICER CORRIGAN: Thank you. John Munson.

MR. MUNSON: My name is John Munson. I live at 2195 Lummi Shore Road in Bellingham, and I'm a member of the International Longshore and Warehouse Union Local 7 of Bellingham.

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The local would like to thank the committee for the endless hours of work and discussion that went into the preparation of this plan for Bellingham Bay Cleanup. After careful examination of the document it became apparent to the local that the only solution posed in the documents that meets current and future needs of the users of the waterway is the position stated in Item 2C.

This solution not only removes the contaminated sediments from the waterway down to clean native soil but increases the depth of the shipping channel by two feet. While that increasing the depth of the channel is an asset to shippers, cleanup to the depth of native soil will be valuable in the future when maintenance dredging needs to be done in the waterway. The community would no longer be faced with the issue of disturbing contaminated sediments.

While Proposition 2C solves the problem of

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having enough depth in the waterway for the present, the local would not object to the channel being dredged to a lower depth because of vessels, and because vessels involved in maritime trade seem to be constantly increasing in size which requires greater and greater depth of waterways.

One of the things that should also have been presented in the list of options in the document should have been discussion of a near shore disposal site that could be used for new industrial land rather than marine habitat. Near shore disposal sites have created new industrial land that have been tried and tested in Seattle, Tacoma, and Everett. Discussion of this option was included under Item 14.2.3 in the Whatcom Waterway Draft Feasibility Study and should have been included in this document.

While the economic drivers that would place this option into consideration don't exist at the present time because of declining in shipping revenues because of the age and economic crisis, creation of new near shore industrial lands is a good bet for the future.

In 1962 the people of Whatcom County approved a bond issue of two million dollars for improvements at the Port. That investment has returned approximately two million dollars per year to the community since its completion. The added value of new industrial land could also help refrain some of the costs of cleaning up waterway because the contaminants are located right next to the Georgia Pacific log pond. That site would serve as an ideal spot for near shore confined disposal of dredged spoils. While there would be some loss of marine habitat with the filling in of the log pond, area-to-area mitigation could occur with no net loss of marine habitat.

The local would once again like to thank the committee for the hard work they have done on the project and like the committee hopes this project can proceed in a timely manner. Thank you.

HEARING OFFICER CORRIGAN: Thank you.

Is there anyone else who would like to comment? Anyone change their mind or got some new thoughts?

MR. ATHENS: I changed my mind. I will go on the testimony.

HEARING OFFICER CORRIGAN: Make sure if you do, that you fill out one of these registration cards so I can get your name and address?

MR. ATHENS: You want me to do it now?

HEARING OFFICER CORRIGAN: No, I'd like you to speak first.

MR. ATHENS: Okay. Fine. Very simple. There is a point --

HEARING OFFICER CORRIGAN: Sir, could you --

MR. ATHENS: My name is Don Athens. I live at 1268 Loni Lane, Ferndale. We lived at one time on the Lummi Shore right next to the proposed future Cherry Point project. We now live downtown Ferndale.

My purpose in rising is basically not to be critical and in a sense to try an amateur's approach to a synthesis of what possibly could be in the future.

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It seems to me what is lacking here not only the cost of projects and the range of the project but the most important thing is an input in all the jurisdictional areas involved. I am referring to the Lummi input that needs addressing concretely, and I am also referring to the possibility of considering a longer period than two years for a project like this because you will not have the benefit of input of what the future is in five years when controlling Nooksack pollution and sedimentation and tidal flows and so forth.

I think you need a much longer time span for completion. Even with the three and four projects you have already lined, the policy needs comprehensive exchanges and cooperation. It needs what they call remedial planning and comprehensiveness. It needs a broader field. This solves immediate problems, and it probably from a technical point of view is feasible as stated on paper.

But you see you have unknown factors, you have public input for the future, and you have the press that will elaborate negatives and positives, and us amateurs will not be able to really pinpoint solutions. You engineers will be saddled with it, so I would say basically there's a time factor here that will take more than two years to input and to get other comprehensive planning, Point No. 1.

It will take experimentation with the sediments themselves which I know from experience it will require. It will also require creative financing, Gentlemen. No one talks about that. Creative financing refers to cost and effect and how long and where is it coming from. And I don't have to name where it's coming from. We know.

Now the last point I would like to say is this is a very good opportunity for Georgia Pacific to definitely create a projection for the future of positive work that will basically succeed just as its projected right now. It will probably succeed, but it may not be comprehensive enough to allow for the negatives that will be thrown at the company backwards and forwards.

Therefore, public input may be relocation. This is a bugaboo. This is very dangerous for any corporation, and that requires a four, a five, or ten year planning if that ever happens.

So like I said, as an amateur I am only speculating and trying to put a synthesis of what I have heard here, and I am embarrassed that I didn't hear too much futurism in this, only immediacy and remedial action.

I would like to see future concepts in part of the plan, and all those goals can be met that are mentioned with future planning. I don't see it.

HEARING OFFICER CORRIGAN: Thank you.

This gentleman here.

MR. WAGNER: Hi, my name is Staryn Wagner, and I may be reached at P.O. Box 3062, Bellingham, Washington 98227.

I am a student at Whatcom Community College and have great interest in this because I live here, and I love this place. I want to thank you for all the effort you have put towards doing what we've gotten together so far.

My concerns are that as action is taken that it's not taken so quickly and so completely that sections of the bay aren't allowed to remain as they are, kind of vital seeds to the new growth over what we're creating.

So that we can leave the spots that are rich now rich to
help develop the new spots that we work on and then maybe
1 do work on those later on. Just like in cutting down on a
mountain, you want to leave areas, so you don't just clean
it off all at once.

And possibly as a funding source there's
several different options for depths to take the channels.
The deeper we go the more ships, bigger ships we can get
in. Hopefully we could recede some of the costs in doing
2 that from the businesses, the commerce that will benefit
from it the greatest. It would seem that would be an
excellent source to go to for funding.

And lastly, I would like to say that I think
that tribal considerations are probably of the greatest
importance here seeing as we were initially here as
uninvited guests and we're still here as neighbors, so we
3 should consider that greatly. Thank you.

HEARING OFFICER CORRIGAN: Thank you.
Anyone else would like to comment?

The gentleman that just spoke please make
sure you fill out a card before you leave.

MR. WAGNER: You have one.

HEARING OFFICER CORRIGAN: Sorry about that.

MR. SERVAIS: I am John Servais. I live at
1609 Mill Avenue in Bellingham down on the south side, and

I can just see the water from my house. There's three points I would like to make having listened to this tonight and looked at the documents and indeed having participated as Lucy knows in meetings three and four and five years ago on this subject and having loved the waterfront of Bellingham for the last 30 years.

All of this study is oriented around dredging of the Whatcom Waterway to make room for a ship dock and yet nowhere in here is it being considered as to whether or not we actually need a large ship dock in downtown Bellingham any more. And having been on the 2015 Cargo Committee of the Port of Bellingham for several years back in the early 1990s, indeed that's a huge question.

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And I feel that the best solution is to leave it, and I'm echoing comments that were made earlier this evening. Leave the sediment where they are. They are capped now. We may need to do some dredging and adjustments in like 3C that George pointed. There may be some other areas that we need to look at and may need to put some additional capping on top of these mercury deposits, but they're safe now if they're left where they are.

We do not need a shipping channel there. Indeed it bothers me to see on the maps that are

accompanying studies here tonight that the shipping
channel is extended another half a mile down the bay, and
yet that is not the case. The Coast Guard has not yet
2 extended that shipping channel down the bay, and it looks
to me like they're planning to extend the shipping dock
maybe another thousand feet or so down the bay, but that's
not mentioned in this study.

I am very concerned about this fact. We could consider seriously leaving the dredging where they are. Indeed I would like to see Georgia Pacific pay through the nose for the pollution that they have done the past 30 years. But if the best solution for our community is to leave it there and they get off scot-free, it doesn't bother me.

Secondly, it seems that dumping mercury as
in 2C and capping it off of Boulevard Park and Starr Rock
as it's called is the epitome of stupidity. It's nuts.
This is our prime waterfront park. People flock down all
3 year around. For us to put toxic mercury by the ton right
off shore is creating a love canal, a toxic waste dump, a
superfund site right next to the most popular place that
we have in the entire waterfront. Surely there are other
places.

I think that Ernie Lumbacher pointed out to me earlier this evening why it's being positioned there.

It's because I think in, and correct me if I am wrong or I will be corrected later I'm sure, that the bay is divided into A, B, and C, and you can't move pollutants from one section to another. And it has to stay in C which is where it is now. So Starr Rock is right on the edge. We can't take it further out into the bay where the water is cleaner, so you're putting it as close as you can to that line, but it's right next to our park.

You know, as I look at 2C and I look at you're taking the dredgings that are perfectly capped with a silk layer, and you're moving them a mile or so down the bay and you're capping them. You're moving it from A to B and you're calling it a cleanup, and it doesn't make any sense.

Third, it looks like indeed a question that's been raised earlier is what's driving this process? That's the question I have had for ten years, and I think what's driving it is to save costs for Georgia Pacific and to drive industrial expansion. What we're supposedly hearing is that we are looking at how to make our community safer and our waterfront more viable, but I don't think that moving mercury deposits over right in front of Boulevard Park is going to achieve safety and achieve viability.

It will create a dock for industrial area,

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but it won't create a more livable habitat. You know, there's another thing I just thought of that came out in the 2015 study. For us to dredge the channel at the dock with all due respect, Mr. Munson, indeed I think the longshoremen have been a vital part of this community for many years. I have nothing against them, but we'll have to rebuild the dock. The pilings are old. It hasn't been dredged in 25 years. If you dredge it to 30 feet, much less 32 feet, which would be deeper than the project depth, the dock will fall over. So we're looking at millions, tens of millions of our tax payer dollars to rebuild a dock beyond what it costs to take the dredgings out.

You know, we have the possibility of having a cargo dock out at Cherry Point, and we could put the aluminum and the other things that are coming and going off the ships at a general cargo dock at Cherry Point, and it can serve our entire community.

We no longer need it coming in down there. It's not cost effective, and the Port won't due a cost benefit study because it will show that we would spend far more money on rebuilding the dock and dredging than we would ever get in economic returns ever. What built the docks here was shipping out logs. We are not doing that any more.

So what I would like to see in closing, and what I think is needed is this entire project is looking at the Bellingham Bay cleanup and the dredging Whatcom Waterway in isolation as a single item all by itself. We need to look at the larger picture. Do we need to dredge? Do we need the docks? What is the future need for docks in this community? What are the future problems that might be caused by putting mercury deposits down along Boulevard Park? What does the community want? How many tens or a hundred million dollars might we spend for very little safety increase and very little economic benefit? And that is not addressed in this study.

And as wonderful and as extensive as this study is we have the larger questions that need to be addressed. Thank you.

HEARING OFFICER CORRIGAN: Thank you.

Anyone else?

Yes.

MS. SCHOLTZ: My name is Wendy Scholtz. I live at 3417 Connelly Road, Bellingham, 98226, and I have two concerns which I am going to state briefly.

One is I am concerned with the terminology that's described habitat restoration in the EIS. It refers to it in terms of net gain and net loss, and I want to ensure that the habitat that is gained in quantity is also of the highest quality, and that is in places where it will be used and where that it's not right next to something that is toxic.

The other concern that I have is regarding source control. I want to ensure that this project will also address issues of point pollution and non-point pollution along the waterway. That is it. Thank you.

HEARING OFFICER CORRIGAN: Thank you. Last call. Okay. You all know that the comment period is not over until September 20. We encourage you to submit written comments. If you go home and think about what you have heard and you haven't had a chance to input, we want to hear it. Tell your friends and neighbors. Okay?

Ecology will review the comments on the Whatcom Waterway RI/FS -- sorry about the acronym there -- and then we'll prepare what's called a responsiveness summary. That's a response to your comments. And all those folks who did comment will be advised when that's ready.

Final design and permitting for the selected Near-Term Remedial Action Alternative is currently scheduled for 2000 and 2001. You know, if you guys got an agenda, it's already written on there. I don't think you need me to read it again.

The same with the Draft EIS. We'll look at all the comments, and response to your comments will go out with the final EIS. A little bit different process.

All testimony received at this hearing along with all written comments received by September 20, 1999 will be part of the official hearing record, and if we can be of further help to you, please ask.

And on behalf of the Department of Ecology I want to thank you for coming and for participating, and this hearing is now adjourned at 8:40 p.m.

* * * * *

(Whereupon, the hearing was adjourned at 8:40 p.m.)

BROOKE SEVIER

1. Natural recovery was not considered because Ecology believes the risk of mercury exposure in the bay warrants more immediate action than natural recovery provides, and certain areas of the site will not naturally recover. A remedial action must occur to comply with state standards established to protect human health and the environment.

2. The statements regarding eelgrass production have been qualified to reflect the potential for production rather than actual production.

3. See General Comment response #s 2 and 7 – Cost Estimating and Source Control, respectively.

DRU SANDERS

1. The remedial action alternatives were developed based on similar work performed at other Puget Sound sites.

2. See General Comment response #3 – Treatment Options.

3. See General Comment response #2 – Cost Estimating. In terms of remedial actions, the multiple responsible parties will pay their fair share of the costs.

BOB KELLY

1. Historical data were relied on in understanding how the bay has changed over time, where contamination persists, where habitat restoration is important, and what type of restoration should be considered. Current assessment tools can be, and in some cases were, applied to the historical information to further analyze the impacts. One example of this was the risk assessment work completed as part of the Whatcom Waterway RI/FS that used current techniques to evaluate the risks associated with seafood consumption from the bay. Historical information from other Puget Sound sites was also used to estimate the juvenile salmon production potential associated with shallow nearshore habitat. This historical information was applied to current information on potential CAD sites to better understand how the CAD surface, or any new shallow water areas restored as part of this project, would improve juvenile salmon growth rates and production. This information was provided to members of the Pilot Team in correspondence and at meetings during the course of the project.

2. The EIS acknowledges that the CAD would convert deep subtidal habitat that is used by Tribal fishermen to intertidal habitat. This would result in a loss of area used by fishermen, displacing them to adjacent deep-water areas of the bay. In recognition of these impacts, the CAD site was shifted as far north as possible along the shoreline in the Preferred Remedial Action Alternative evaluated in the final EIS. It is recognized however, that the shift does not completely eliminate impacts, and these impacts would need to be addressed prior to permitting through discussions with both the Nooksack Tribe and the Lummi Nation.

3. The Bellingham Bay Demonstration Pilot Habitat Restoration Documentation Report was distributed to Pilot Team members and is a companion document to the EIS; the

Preliminary Draft Habitat Mitigation Framework is included as Appendix C to the EIS. Additional habitat evaluation data is provided as Appendix E to the EIS.

4. Policy level representatives of the entire Pilot Team have been meeting and will continue to meet to address policy issues. The Nooksack Tribe is a part of the Pilot Team, and the policy level meetings provide a forum for policy discussions.

5. Under authority of the Model Toxics Control Act (MTCA), and in compliance with the Sediment Management Standards (SMS), the Department of Ecology will ultimately select a remedial action alternative through evaluating against three general criteria:

   - Overall environmental quality
   - Ability to be implemented
   - Cost-effectiveness (Practicability)

   The selected remedy would be presented for Pilot Team and public review in a draft Cleanup Action Plan.

   The Pilot Team plays a key role in the second general evaluation criteria – ability to be implemented. The various regulatory, proprietary and Treaty Right authorities represented by the Pilot Team members are critical to moving any sediment cleanup project forward – this is the basis for the Bellingham Bay Demonstration Pilot. Ecology must be confident that the remedy selected under MTCA is able to be implemented, , therefore the Pilot Team, including the Nooksack Tribe, will influence the selection process.

KEN SPEER

1. Comment noted.
2. The Preferred Remedial Action Alternative evaluated in the final EIS provides for dredging to allow small boat access at the head of the waterway.
3. Although in an industrialized area at the end of the waterway, the shallow water habitat located near Citizen's Dock is an important habitat feature. Its importance is due to the proximity to the Whatcom Creek mouth where it serves as a rearing transition feeding and refuge estuary area for juvenile salmon migrating from the creek. The Preferred Remedial Action Alternative evaluated in the final EIS balances habitat with dredging for public access.
4. Comment noted.

GEORGE DYSON

1. Surface sediments in the head of Whatcom Waterway currently meet the State's sediment management standards. However, sediments beneath the surface are contaminated, and the vertical extent is significant. Rather than remove and re-suspend this material, and disrupt the existing clean habitat, the Preferred Remedial Action Alternative evaluated in the final EIS incorporates a balanced approach between removal for public access and habitat protection/restoration.

JOHN MUNSON

1. Comment noted.

2. Nearshore fills were considered, but not evaluated in detail (see EIS Section 2.3.5.1).

DON ATHENS

1. See General Comment response #1 – Process for Implementation of the Comprehensive Strategy Comprehensive Strategy, and Appendix G of the final EIS. Appendix G was added to the EIS to respond to comments on the draft EIS requesting more information on conceptual implementation of the Comprehensive Strategy.

STARYN WAGNER

1. Several areas of the Bay are clean, and would be left alone to help support the recovery of areas where remediation is targeted.

2. Comment noted.

3. In part to respond to tribal concerns, the Preferred Remedial Action Alternative evaluated in the final EIS minimizes impacts to tribal fishing areas. However, impacts would still occur that must be addressed through discussions with both the Lummi Nation and the Nooksack Tribe prior to permitting.

JOHN SERVAIS

1. While leaving sediments in place and allowing natural recovery to occur is often an acceptable solution in some situations, the presence of a federally authorized navigation channel, that is currently in use, constitutes a beneficial use that must be maintained. Therefore dredging of the federal channel will likely be a component of the remedial action that is ultimately selected.

2. Shipping channel delineations reflect boundaries established by the Corps of Engineers for federal navigation channels.

3. Previous experience in Puget Sound with CAD technologies confirms that this approach is viable (General Comment response #4). The CAD site has been located further to the north (away from Boulevard Park) in the Preferred Remedial Action Alternative evaluated in the final EIS. Detailed engineering designs would be developed to ensure that the CAD is constructed to be protective. Appropriate controls and monitoring would also be implemented to ensure long-term protectiveness. Ecology will develop a draft Cleanup Action Plan for the remedial alternative that it ultimately selects. Following public review and comment, the draft Cleanup Action Plan would be finalized and implemented.

4. The proposed dredging in the vicinity of the Bellingham Shipping Terminal is at the same depth that has occurred historically; therefore, no structural problems are anticipated. However, additional evaluation would occur during remedial design.

WENDY SCHOLTZ

1. See General Comment response #5 – Habitat Mitigation And Restoration

2. See General Comment response #7 – Source Control.

5.3 INDIVIDUAL COMMENTS AND RESPONSES

Written comments of the draft EIS were received from 31 individuals, representing federal, state and local agencies, tribes, businesses and private citizens. Each individual comment contained within a given letter or e-mail was assigned a number. Copies of the written comments are followed by a corresponding response.

United States Department of the Interior

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SEP 16 1999

Christine Corrigan, Washington Department of Ecology
Northwest Regional Office
3190 160th Ave. SE
Bellevue, WA 98008

Re: Bellingham Bay Comprehensive Strategy - Draft Environmental Impact Statement

Dear Ms. Corrigan:

We at the U.S. Fish and Wildlife Service support the Bellingham Bay Pilot Project in the effort to find a comprehensive approach to the cleanup of contaminants in Bellingham Bay. As a member of the Bellingham Bay Pilot Team, we have provided comments during the development of the comprehensive strategy. General and specific comments on the Draft Environmental Impact Statement (DEIS) are provided below.

<u>General Comments</u>:
Overall, the document is well thought out and presented. The DEIS seems to accomplish the goals set forth in the introduction of the document. However, there are instances in which the DEIS is quite general. We understand that many of these generalities will be addressed in the remedial and design phases of the project, or have already been addressed in other documents. We refer to several of those generalities in the specific comments section below. For clarity, it would be helpful if you indicate in the final EIS where that detailed information can be found if it is not included in the
1 document.

We understand that the DEIS is intended to be both a programmatic and project-specific document. In a programmatic sense, we believe the DEIS is a fine start to fulfilling the goals of the comprehensive strategy, but that more detail needs to be provided to have sufficient information regarding the actual project. We urge the pilot group to follow though and review the remedial investigation/feasibility studies (RI/FS) and subsequent remedial documents for individual geographic subareas as well as the project-specific Integrated Near-Term Remedial Actions. Only if the remedial activities of these sites are designed and conducted properly can the comprehensive strategy for Bellingham Bay be considered a success.

USFWS

1. See General Comment response #1 – Process for Implementation of the Comprehensive Strategy, and Appendix G of the final EIS.

2 We do not consider the cleanup objectives referenced in the DEIS, specifically the Washington Sediment Management Standards (SMS) Minimum Clean-Up Levels (MCUL), to be sufficiently protective of natural resources. In fact, the Washington State Sediment Quality Standards (SQSs) are not protective of our trust resources for several compounds, specifically polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). While we applaud the pilot group's initiative to remediate areas of the bay to the more protective SQS level, we reserve the right to continue discussions regarding appropriate cleanup levels, especially for the bioaccumulative, persistent chemicals, and the designation of sediment management areas that would be protective of fish and wildlife resources.

3 We have concerns about leaving mercury in place at depth, even inorganic mercury which can be converted via oxidation to the bioactivated form known as methyl-mercury. We recognize that sediment impact and/or recovery zones are permitted under the SMS, but we urge the pilot group to explore other remedial options, such as removing the contaminated sediment at depth and/or exploring new treatment technologies, to remove the mercury from the sediment. We understand that many of the areas that contain mercury contamination at depth are recovering naturally as evidenced by the surface samples having a lower contaminant concentration than subsurface samples.

4 However, we believe that the natural recovery approach for persistent, bioaccumulative contaminants such as mercury and tributyltin (TBT) is inappropriate and not sufficiently protective of higher order animals. Adverse effects encountered by invertebrates due to residual contaminant levels found in these sediments may be exacerbated in time to higher trophic level fish and wildlife species. Areas with mercury contamination that are proposed for natural recovery may also be associated with federally listed and proposed threatened and endangered species under the Endangered Species Act (ESA). We believe this remedial approach could constitute a risk of "take" as defined in Section 9 of the ESA. The pilot group is encouraged to address this issue in the biological assessment submitted for this project.

5 Although the document acknowledges that all costs have not been incorporated, the cost analysis of the proposed remedial/disposal alternatives is currently misleading. The cost analysis should include estimates for mitigation and/or access and easement costs where applicable. This would allow for a more readily comparable cost-benefit analysis of the proposed cleanup and disposal alternatives.

6 The document states throughout that the capping material would be coarse, large-grained sediment in order to maintain the integrity of a cap. The DEIS should provide a more detailed discussion of the composition of this material and of the existing sediment to be capped (i.e., grain size, total organic content [TOC], etc.). The composition and texture of the top portion of the cap material should closely match the character of existing sediment in the waterway.

7 This would help promote biological recolonization of species displaced by the dredging and/or placement of a cap. In addition, the DEIS generally discusses cap design only in terms of composition and thickness. Discussion should also include how the cap would be designed to perform one or more of the following functions: physical isolation, stabilization of sediment, and reduction in flux of dissolved contaminants.

USFWS

2. The cleanup boundary described in the final EIS has been delineated largely based on confirmatory biological data, interpreted using conservative SQS criteria based on no adverse effects. Thus, cleanup levels in this case need not rely on models of possible biological effects associated with sediment contaminants - they have been assessed directly. Further, as described in detail in the Whatcom Waterway RI/FS, the cleanup level for mercury utilized a conservative approach that addressed potential bioaccumulation concerns, also considering potential worst-case exposures to high trophic level wildlife. The right of USFWS to continue discussions of appropriate cleanup levels, particularly for PCBs and PAHs, is acknowledged. However, it is important to note that currently, very few sediment samples (less than 4%) collected within Bellingham Bay exceed SQS chemical criteria for these chemicals, and that substantially all of these exceedances are addressed by each one of the remedial action alternatives evaluated in the EIS. Moreover, as discussed in the Whatcom Waterway RI/FS, the maximum measured tissue concentration of PCBs, PAHs, TBT, dioxins/furans, and other potentially bioaccumulative chemicals are within regional background ranges reported in Puget Sound. Thus, overall cleanup levels as generally described in the final EIS are anticipated to be protective of human health and the environment.

3. See General Comment response #s 3, 4, 6 and 7. The protectiveness of mercury containment technologies is also discussed in greater detail in the Whatcom Waterway RI/FS. All containment remedies would maintain subsurface mercury in a reduced environment, consistent with relevant and appropriate design guidance. When clean sediment is placed over the areas designated for containment, the redox layer (depth of oxygen penetration) would move upward reducing the potential for conversion to methyl mercury. Caps and CADs would be engineered, administrative controls placed, and long-term monitoring conducted to ensure they are protective.

4. It is acknowledged that chemical thresholds defining a "take" under ESA may be different than those used to define cleanup under MTCA. A biological assessment would be prepared as part of the federal nexus occurring with the Corps of Engineers' permit process. Sediment contamination levels leading to cleanup areas and remedial actions would be addressed in the biological assessment.

5. Estimated habitat mitigation costs have been included in the cost estimates. As summarized in Appendix F, eelgrass mitigation was included to compensate for losses of approximately 0.5 acres of this habitat resulting from cap construction at the Cornwall Avenue Landfill. See General Comment response #2 – Cost Estimating.

6. See General Comment response #6 - Cap Design. Attempts would be made to match the cap material to the existing substrate; however, final selection would be dependent on the engineering design evaluation, which would determine the material most likely to ensure the stability of the cap.

7. See General Comment response #6 - Cap Design.

Specific Comments

8 Table S.1 Fish and Wildlife: The extent of eelgrass needs to be specified. Also, this table is difficult to interpret. "Disturbed habitat" should be either classified as a short term or long term impact, or else the document should explain why it warrants a separate category.

9 Page 2-1, section 2.1: Both the Model Toxics Control Act (MTCA) and the SMS mentioned in this section are currently under revision by the state. Please address how the adoption of both laws, particularly the new standards of the SMS due in April of 2000, will affect this project. Considering the organization of the DEIS, this information should be included or referenced in Appendix D - Relationship to Other Plans, Policies, and Programs.

10 Page 2-2, section 2.1, MCUL and SQS: Please change the word "organisms" in the definitions to "benthos" to more accurately reflect the type of biological resources which the SMS is designed to protect. The SMS approach (i.e,. the apparent effects threshold [AET] approach) is based on no and minor adverse effects elicited by only the benthic community and is not a true representation of the impacts on higher order organisms.

11 Page 2-2, section 2.1, fourth paragraph: We suggest adding compounds such as PCBs and organotins to the list of bioaccumulative chemicals since these are also found in the bay. Also, we suggest adding birds and wildlife to the list of organisms that bioaccumulate these compounds.

12 Page 2-14, section 2.3.4, third and fourth paragraphs: Since the values in Table 2.3-1 do not include land acquisition or easement costs ("soft" costs), they may not be indicative of the true cost for that remedial and disposal alternative. These costs also need to be included to more accurately reflect the total costs for each alternative.

13 Table 2.3-1 Summary of Integrated Near Term Remedial Action Alternatives (G-P Outfall Site): See our general comments above regarding natural recovery for areas that contain bioaccumulating contaminants.

14 Table 2.3-1 Preliminary Sediment Cleanup Summary: It appears that the figures for total sediment area remediated for alternatives 2A and 2C are incorrect. Consistent with the way in which adjacent figures are derived, those figures should read 229 and 244 acres, respectively.

15 Page 2-17, section 2.3.4.1, Whatcom Waterway Site: Due to bioaccumulation concerns with methyl-mercury, in particular, we urge the pilot group to fully characterize the subsurface contamination at all sites within the waterway. We also urge the pilot group to concentrate on source control issues prior to any remediation, particularly in areas like the G-P Log Pond where contaminated seeps have been detected.

16 Page 2-21, section 2.3.4.1, Other Sediment Cleanup Sites: Since the state has not promulgated standards for organotins like TBT, to what level will organotins be remediated to in sites such as Squalicum Harbor Inner Boat Basin and Weldcraft Steel and Marine?

USFWS

8. A separate category has been provided in the EIS for Fish & Wildlife because it is one of the major elements of the environment that is summarized in Table S-1. The term "disturbed habitat" is meant to describe any habitat, be it subtidal or intertidal, which would be affected through the remedial action. The disturbance may be dredging, capping, or an aquatic disposal site. A footnote has been added to the table to clarify the meaning of the term. Since an eelgrass survey was completed following issuance of the draft EIS, the table has been updated in the final EIS to include a specific quantity for the amount of eelgrass impact.

9. The MTCA regulation is currently being revised, but updates of the SMS have been postponed for approximately 2 years. As discussed above, cleanup boundaries have been delineated largely based on confirmatory biological data, interpreted using conservative SQS criteria based on no adverse effects. Thus, biological effects have been addressed directly. No substantive changes are anticipated to MTCA or SMS that would substantively affect this project.

10. The referenced sentences have been modified to read: MCUL/SQS corresponds to minor/no adverse effects to benthos. Protection of higher order organisms is evaluated on a case-by-case basis.

11. The suggested wording changes have been made. As discussed in the Whatcom Waterway RI/FS, the maximum measured tissue concentration of PCBs, PAHs, TBT, dioxins/furans, and other potentially bioaccumulative chemicals are within regional background ranges reported in Puget Sound. Thus, overall cleanup levels as generally described in the final EIS are anticipated to be protective of human health and the environment.

12. See General Comment response #2 – Cost Estimating.

13. See General Comment response #7 – Source Control, and response to USFWS Comment #4 above.

14. For consistency and clarity, the "remediation" area calculations presented in Table 2.3-1 excluded CAD or cap/berm footprints over sediment that is currently clean.

15. The Whatcom Waterway RI/FS and Bellingham Bay Demonstration Pilot Sediment Site Source Control Documentation Report include a detailed characterization of subsurface sediments within the Whatcom Waterway Site. Additional data would be collected, if necessary, during remedial design. See also General Comment Response #s 4, 6, and 7.

16. As discussed in the Bellingham Bay Demonstration Pilot Sediment Site and Source Control Documentation Report, the existing SQS criterion for TBT is 0.05 µg/L as TBT ion in sediment porewater. The existing PSDDA screening level is 0.15 µg/L as TBT ion in porewater, and may also be considered in the development of site-specific cleanup levels. Detailed RI/FSs and Cleanup Action Plans for TBT sites (e.g., Squalicum Inner Harbor Boat Basin) would be developed at a later date, and would be provided for agency and public review.

7 Page 2-22, section 2.3.4.2, first paragraph: The document refers to a cap thicknesses of both 2 and 3 feet as part of the remedy. Please elaborate as to why different thicknesses are used in different areas of the site. Also, justify a cap thickness of 2 feet since the standard in Puget Sound currently is 3 feet.

8 Page 2-25, section 2.3.4.2, Sediment Sites and Source Control/Sediment Disposal Siting: Again, we have concerns with subsurface contamination that is slated to be left in place. Please describe in more detail the levels of subsurface contamination as well as measures that will be in place to ensure that this contamination will not be exposed or resuspended due to scour, anchor drag, or other actions.

9 2-26, section 2.3.4.2, Sediment Sites and Source Control/Sediment Disposal Siting, bullet under Port Log Rafting Area: See comments under Page 2-22.

) Page 2-29, section 2.3.4.2, Habitat (this comment applies to this alternative and all alternatives): Prior to habitat construction, please consult with resource agencies as to the level of contaminants in and around the area to be enhanced and used for habitat. As discussed earlier, the state standards may be protective of benthos but not sufficient to protect higher order organisms. Thus, we would not want to attract wildlife to areas that we would not consider "fully" remediated and create what is known as an "attractive nuisance" for wildlife.

1 Page 2-40, section 2.3.5.2: We applaud the elimination of natural recovery as an alternative in the DEIS. We do not consider natural recovery, especially for persistent, bioaccumulative contaminants, to be an acceptable form of remediation, since it does not sufficiently protect higher order organisms from cumulative effects.

2 Page 3-5, section 3.1.2.2, second sentence: The date after the word "since" is missing from the sentence.

3 Page 3-7, section 3.1.2.3: Please indicate if groundwater concerns and source control will be further discussed in individual RI/FS reports or other documents. If this will not be the case, then a more detailed description of these issues should be included in this document.

4 Page 3-12, section 3.1.3.2, Whatcom Waterway Federal Navigation Channel: There are several instances in the report in which chemistry results from a site indicated a "hit" but the confirmatory bioassay tests indicated a "no hit." We assume that since the SMS allows the bioassay data to override the chemistry data, the pilot group considered those sites as "no hits." Please confirm our assumption and more clearly state this in the text of the FEIS.

5 Page 3-12, section 3.1.3.2, I and J Waterway: Will institutional controls or other measures be in place in this and other waterways to ensure that subsurface contamination left in place is not disturbed?

USFWS

17. See General Comment response #6 – Cap Design.

18. See response to USFWS comment #15 above. Also see General Comment response #s 4 and 6 relating to CAD and Cap design respectively.

19. See General Comment response #6 – Cap Design.

20. Sediment sub-units most likely to be used for beneficial reuse are 1A and 1B, in addition to clean material excavated at the Cornwall CAD. These areas would be characterized during remedial design, following current DMMO procedures, to ensure their suitability for use as cap surfaces or habitat benches on berm faces. The MTCA process and the permitting process associated with the remedial alternative ultimately selected would provide other opportunities for USFWS to ensure that levels would be protective of the organisms (including higher order organisms) using the new habitat. Also see response to USFWS comment #2 above.

21. Comment noted.

22. The text has been revised to correct the referenced typographical error.

23. Sources of contamination to Bellingham Bay related to contaminated sites will be addressed through individual RI/FS's. Also, see General Comment response #7 – Source Control.

24. USFWS interpretation is correct. As set forth in SMS, confirmatory biological testing results overrode the chemistry data, except in those situations where mercury concentrations exceeded the bioaccumulation screening level (BSL). Sample-by-sample interpretations are described in greater detail in the Whatcom Waterway RI/FS. The text has been modified to more clearly explain this occurrence.

25. Appropriate institutional controls would be put in place corresponding to the remedial action (and in the case of I&J Waterway a no action) ultimately selected. MTCA requires institutional controls be put in place whenever containment is selected as a remedy. The I&J Waterway has clean surface sediments, is at or below the authorized depth, and is likely to pass PSDDA. No institutional controls would be required under MTCA since no remedial action is likely to be required. However, G-P, the Port, and the Corps would likely enter an agreement that addresses the disposition and disposal/reuse of these sediments should they be dredged in the future.

26 Page 3-14 and 3-15, section 3.1.3.2, G-P Outfall and Other Sediment Cleanup Sites: We urge the pilot group to stay involved with other remedial plans, especially for the G-P Outfall site, to ensure proper cleanup is achieved in a timely manner.

27 Page 3-16, section 3.1.3.3: The first paragraph states that confirmatory modeling is "planned" to verify source control at the site. We urge the pilot group to word the sentence more strongly and "commit" to this effort.

28 Pages 3-19 and 3-20, section 3.2.1: In the first paragraph under "Intertidal," the document states that native eelgrass is most commonly found at 0 to -4 Mean Lower Low Water (MLLW). In the first paragraph under "Shallow Subtidal," it states that native eelgrass is typically more common within the -4 to -10 MLLW. Please clarify.

29 Page 3-21, section 3.2.2.1: We concur with the description of the functional limitations at contaminated sediment sites and applaud the pilot group for the inclusion of such topics.

30 Page 3-28, section 3.2.7: Please correct the spelling of "marine" in the first sentence. Also, if appropriate, include sea otters in the list of marine mammals that may be associated with the site.

31 Pages 3-29, section 3.2.8.1, third paragraph under Bald Eagle: The first sentence should be changed to read: "The bald eagle was proposed for delisting as of July 6, 1999 due to apparent recovery of the species in the U.S. (Federal Register 50 CFR Part 17)."

32 Page 4-7, section 4.3.1: The composition and texture of the top portion of the cap material should closely match the character of existing sediment in the waterway. See our earlier general comments regarding cap composition.

33 Page 4-9, section 4.3.1.1, Mechanical Dredging and Transport: Add a discussion concerning the advantages of using an environmental "closed" bucket on a clamshell dredge.

34 Page 4-10, section 4.3.1.1, Cap and Confined Aquatic Disposal (CAD) Construction: See comment above for page 4-7 as well as general comments concerning cap composition.

35 Page 4-15, section 4.3.1.1, Dredging and Transport: We urge the pilot group to use all necessary measures at their disposal, especially silt curtains and/or screens, to minimize water quality impacts during dredging operations.

36 Page 4-19, section 4.3.1.2, Threatened and Endangered Species: Please include information regarding the possible adverse impacts to bulltrout, such as entrainment, avoidance, and turbidity.

37 Page 4-19, section 4.3.1.2, Impacts, second paragraph under Seabirds: The FEIS should state that following construction, elevations would be suitable for the development of eelgrass habitat, or that the potential would exist for 30 acres of eelgrass habitat. The direct construction of large eelgrass beds has not been successfully demonstrated.

USFWS

26. See General Comment response #1 - Process for Implementation of the Comprehensive Strategy.

27. Additional groundwater sampling, modeling, and seep sampling is being conducted to confirm that source control is complete prior to remedial action. See also General Comment response #7 – Source Control.

28. Eelgrass is most common in the intertidal range (0 to –4 ft MLLW). The statement in the subtidal paragraph will be modified to accurately reflect eelgrass habitat.

29. Comment noted.

30. Spelling has been corrected.

31. The sentence has been modified, and the noted reference has been added.

32. See General Comment response #6 - Cap Design, and response to USFWS comment #6 above.

33. Comment noted. The text in this section describes the benefits of a water-tight bucket, which is the same as the environmental "closed" bucket addressed in the comment.

34. See General Comment response #6 – Cap Design, and response to USFWS comment #5 above.

35. Comment noted.

36. The text has been added to the paragraph on bull trout in Section 4.3.1.2 to address the impact concerns.

37. The text has been modified to reflect that the elevation would be suitable for eelgrass production. See also General Comment response #6.

38 Page 4-19, section 4.3.1.2, Impacts, fourth sentence under Marine Mammals: See comment above under Impacts.

39 Page 4-20, section 4.3.1.2, first paragraph under Mitigation: Please consult with us for possible fish windows for bull trout.

40 Page 4-20, section 4.3.1.2, second paragraph under Mitigation, last sentence: Please add the word "presumably" before the word "protective" in regards to measures between juvenile salmonids and bull trout.

41 Page 4-32, section 4.3.3.1, second bullet under Impacts: Suggest changing the sentence to read: "...area would be greater (within 15 percent)..."

42 Page 1 under Pilot Team Members: Tim Romanski should be included as a pilot team member.

43 Page 3, Appendix A, Subarea Strategies: The habitat actions listed in Table A-1 are not specifically discussed within the sections for each subarea strategy. This table should reference the location of more detailed discussion about each action if that information is not included in the FEIS.

We hope these comments are both constructive and helpful in completing the final Bellingham Bay Comprehensive Strategy-Environmental Impact Statement. We appreciate the opportunity to review and comment on this matter and look forward to reviewing the biological assessment for this project. Should you require more information or have questions concerning our comments, please contact Lou Ellyn Jones at 360-753-5822, or Jay Davis at (360) 753-9568.

Sincerely,

Gerry A. Jackson
Supervisor

LEJ/sp
Enclosure

cc: EPA (Roy).
NMFS (Friedman)
WDFW (Williams)

USFWS

38. The text has been modified.

39. Comment noted. The reference to WDFW in this paragraph is not meant to be all inclusive of fish windows. USFWS would be consulted as part of the permit review process and the ESA consultation process for bull trout fish windows.

40. The text has been modified.

41. The text has been modified.

42. The text has been modified.

43. The text preceding the referenced table has been modified.

Nooksack Tribe Comments

Christine Corrigan
Vashington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

RE: Bellingham Bay Comprehensive Strategy
Monday, September 20, 1999

Purpose and Need

The real purpose is to cost effectively dispose of contaminated sediments from three areas: Cornwall landfill, Whatcom Waterway and Harris Avenue Shipyard. To expedite these activities a comprehensive plan for the entire Bellingham Bay was promoted with all the jurisdictions and regulatory agencies developing strategies and goals. This EIS is in substance about strategies, goals and a plan, which can garner all the participants' unqualified support. As with any technically developed strategy document that does not have policy agreements at each step of development the critical details are at best alluded to. This document begs for binding commitments from all of the participants

Process

The technical staff goal development and strategies that are presented are scientifically and procedurally adequate. The historical data provided an adequate basis for the many types of characterizations of land use, habitat and aquatic uses. The ability of the Pilot Staff to quantify benefits and risks appear in part limited by deficiencies in current data sets and studies.

Impacts and Risks

The No Action Alternative (Alternative 1) has been characterized as status quo. The impacts have not been thoroughly reported, but they should include: significant increases in litigations around source control - storm water pollutants and discharges into Whatcom Creek, Nooksack River (current TMDL - Fecal Coliforms), Growth management - critical areas issues, critical habitat areas under ESA, and reductions in tribal fishing areas and Clean Water Act cumulative impact to water quality. Put bluntly, all the rules and overlapping jurisdictions have not done well in promoting either economic growth or overall environmental health. Sect 2.2.2 implies DOE would decide where dredge spoils would be placed. Without a binding plan, the Corps Of Engineers would most likely only allow upland disposal.

NOOKSACK TRIBE

1. The Comprehensive Strategy provides general recommendations in the areas of sediment cleanup, source control, habitat restoration and aquatic land use for all of Bellingham Bay. In areas where priority sediment cleanup/source control sites have been identified, the strategy articulates a range of specific integrated near-term remedial action alternatives to address these sites.

2. In the EIS, the environmental impacts of the near-term remedial action alternatives are evaluated and the alternatives compared against the seven goals developed by the Pilot Team. One of these goals is "Faster, Better, Cheaper" which includes cost effectiveness. In addition, when the Department of Ecology selects a remedy under its MTCA regulatory authority, cost effectiveness is one of three general evaluation criteria. The others are overall environmental quality and ability to be implemented. For more discussion on the Comprehensive Strategy, see General Comment response #1 – Process for Implementation of the Comprehensive Strategy.

3. See General Comment response #1 – Process for Implementation of the Comprehensive Strategy.

4. Comment noted.

5. The existing, relatively uncoordinated approach, and resulting potential for litigation would continue in the absence of a Comprehensive Strategy. This effectively means that actions would continue to be protracted. Section 4 of the EIS addresses impacts related to Alternative 1 – No Comprehensive Strategy and specifically evaluates the environmental impacts of the delayed actions that would result from not having a Comprehensive Strategy. The purpose of the referenced paragraph is to inform the readers that decisions would be made on a case-by-case basis. The reference to Ecology in this paragraph is with respect to cleanup plans, any decisions regarding disposal sites within the cleanup plan would need to be made in concert with those other agencies that have regulatory authority on specific issues within the cleanup plan. Text has been added to the final EIS to clarify this point.

The Nooksack Tribe, Lummi Nation and Whatcom County have an Endangered Species Act Memorandum of Agreement that will be used to implement a Chinook recovery plan, which includes Bellingham Bay. Any activity that will impact the Listed fish or their Habitat will be reviewed by NEAT (the cooperative group including the three entities) which will further complicate the jurisdictional overlap and regulatory rules. Long-term binding agreements will have to be in place for 4d rule exemptions to avoid take provisions; such agreements, however, may be impossible in the No Action Alternative.

Comprehensive Strategy

The comprehensive strategy will have significant impact to both the Port of Bellingham and the upland and shoreline development community. Other cost impacts which have not been adequately described in the DEIS include: 1) increased monitoring for source control of storm and NPDES discharges, 2) long-term funding to continue evaluations of contaminated sites, and 3) continued dialog and sampling with other participants of BBPP to continue source control activities.

The Port of Bellingham will also have increased costs to monitor their storm water discharges and water quality violations in the harbor at potential clean-up sites. Some of the habitat preservation and enhancement activities may have significant cost associated with them, i.e. use of non-creosote piles or enhancing the estuary areas and functions. What will be the financial impacts of this type of activity when one looks at the long-term maintenance of a dock or pier, or growth and development that is already scheduled for an area adjacent to one of the estuaries?

Clearly this strategy document will have to be reevaluated when National Marine Fisheries Service develops nearshore marine critical habitat and water and sediment quality standards for Chinook salmon. The Shoreline Master program may also require substantial changes in the document. If it conforms with NMFS guidelines for planning documents, there will need to be an implementation section that spells out how and what gets accomplished to improve and preserve Chinook habitat. They have said that a high probability of accomplishment is required.

This document needs a near-term alternative risk assessment including:

) CAD failures and magnitude of release

) Cap failures and magnitude of release

) A generalized assessment of marine habitat enhancements being functional 30 years after construction.

A detailed quantification of benefits for Listed salmon stocks should include :

) Reduction in toxic chemicals - bioaccumulation

) Habitat modifications

) Elevation changes

NOOKSACK TRIBE

6. Comment noted.

7. Comment noted.

8. See General Comment response #2 – Cost Estimating, and General Comment response #7 – Source Control.

9. See General Comment response #2 – Cost Estimating, and General Comment response #7 – Source Control.

10. The Comprehensive Strategy would serve as a guidance document as long as it is relevant and useful. It may be superceded in whole or in part by future more detailed documents, and it may be used as the foundation to create more detailed documents. Also, there may be a desire to periodically revisit and update the Comprehensive Strategy, perhaps as part of the Port and City master planning procedures. Also see General Comment response #1 - Process for Implementation of the Comprehensive Strategy.

11. See General Comment response number #1 - Process for Implementation of the Comprehensive Strategy, as well as response to Nooksack Tribe comment #10.

12. See General Comment response number #1 - Process for Implementation of the Comprehensive Strategy, as well as response to Nooksack Tribe comment #10.

13. See General Comment response #s 3, 4, and 5 on CAD design, habitat, and cap design.

14. The EIS includes quantitative information with respect to acres of habitat types affected by the various near-term remedial action alternatives and acres of contaminated sediment remediation. Additional habitat evaluation data is provided as Appendix E to the final EIS. Technical memorandums associated with the Pilot process have quantitatively estimated potential benefits to salmon, but incorporating that information is beyond the impact analysis needs of an EIS. Also, the Comprehensive Strategy is neither a habitat restoration plan nor a salmon recovery plan. Rather, it could be a starting point to develop such plans. For further information see General Comment response #4 – Habitat Mitigation and Restoration.

b) Flora changes

3) The magnitude of the presence of listed stocks at each site.

A Long Term Risk or Probability evaluation is needed to make both BBPP participate and the public aware of the long term financial commitment that will be required to make this strategy work the way it was technically developed. A comprehensive strategy will require all of the players to interact on a routine basis. It will require significant increases in some agencies' budgets to handle increased water quality monitoring and sampling and continued functional participation in the Bellingham Bay work group. Will the legislators fund this pilot project at a reasonable level for 5 or even 10 years into the future? Will the city and the Port of Bellingham have resources to accomplish their respective roles? From the perspective of a Tribal Biologist, if a well-funded binding commitment to a comprehensive strategy cannot be made, the risks far outweigh the benefits.

Summary

The DEIS does not in its current state allow for a reasonable evaluation of the costs, both financial and fisheries wise, because the risks are unquantified and the benefits are not clearly delineated for salmon. I have indicated where further study is needed. The no action alternative is not viable given the current regulatory environment, and the strategy is not viable unless it is binding and adequately funded. The Nooksack Tribe has lost 20 - 30% of its usual and accustomed fishing areas to regulatory processes. The 200 acres involved in this process are important.

____

Dale T. Griggs

Biologist

NOOKSACK TRIBE

15. See General Comment response #s 1 and 2 – Process for Implementation of the Comprehensive Strategy and Cost Estimating, respectively.

16. Comment noted.

Lummi Nation Comments

September 20, 1999

Christine Corregon
Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue S.E.
Bellevue Washington, 98002

Dear Ms. Corregon

The Lummi Nation has participated in the Bellingham Bay Demonstration Pilot Project.
We have reviewed the State Environmental Policy Act Draft Environmental Impact
1 Statement (DEIS). We do not think that draft provides enough information to adequately
evaluate the options presented.

The Lummi Nation has seen its treaty reserved fishing rights diminished by the
deterioration of habitat required to sustain the resources, which make the treaty right
meaningful. The development of the Bellingham shoreline has eliminated rich intertidal
clam habitat, crab habitat and estuarine habitat for salmon stocks, which are basic to our
2 Schelangen (way of life). Several entities have contaminated the substrate in portions of
the remaining habitat. The DEIS focused more on contamination rather than the
environmental health of the total Bellingham Bay ecosystem.

We have the following comments on the draft:

1. A more thorough analysis of the nearshore fill and treatment options is needed in
3 order to ensure that all reasonable alternatives considered for actions which would
meet the projects objectives at a lower environmental cost.
2. Further information is required to evaluate the assumption in the DEIS that confined
4 aquatic disposal equals habitat benefits, and that the structures will achieve the stated
objective of containing the contaminated sediments.
3. The DEIS cost analysis is insufficient and results in bias in the evaluation of
alternatives. The costs of upland disposal and sediment dewatering are overstated.
5 Restoration costs are not included or greatly understated, and the costs in the DEIS
are not comparable because of on going monitoring and evaluation costs.
6 4. The governments and agencies involved should develop binding agreement that will
ensure the implementation of a comprehensive strategy of ecosystem recovery.
7 5. The DEIS has not fully addressed the full range of impacts: short term, long term,
direct, indirect and cumulative.
8 6. The surest way to protect the public health would be to remove the contaminants from
the bay rather than to collect them and move them to a single spot.
7. There needs to be a habitat valuation analysis that distinguishes between damaging
9 existing habitat and converting one habitat to another.

LUMMI NATION

1. Comment noted.

2. As stated in Section 1.1 of the final EIS, the primary objective of the Pilot was to address contaminated sediments, but also consider other key elements that are critical to improving the overall health of Bellingham Bay, including habitat restoration, land use, and source control.

3. See General Comment response #3 - Treatment Options. As described in Section 2.3.5.1 of the EIS, nearshore fills were considered but not evaluated because they eliminate aquatic habitat and would be extremely difficult to mitigate/permit in light of Endangered Species Act considerations. Also, the Pilot Team participants did not indicate a need for the additional land provided by a nearshore fill.

4. Additional information has been provided on the habitat benefits of the CAD, and the CAD design has been refined in the Preferred Remedial Action Alternative to incorporate habitat benches providing additional shallow subtidal habitat. The eelgrass benefits have been qualified where appropriate to be considered as potential benefits. See additional information presented in the General Comment response #4 - CAD Design, addressing the ability to achieve the objective of containing the sediments.

5. See General Comment response #2 – Cost Estimating.

6. See General Comment response #1 - Comprehensive Strategy.

7. The EIS evaluates environmental impacts consistent with the approach prescribed by SEPA.

8. Under the MTCA program, a remedy will be selected as required by law to be protective of human health and the environment. The environmental evaluation provided by the final EIS and the evaluations provided in the RI/FS for the Whatcom Waterway site and in the RI/FS for the Cornwall Avenue Landfill site will inform the Department of Ecology's selection of a remedial alternative. The selection criteria used by Ecology fall into three general categories:

    - Overall environmental quality;
    - Ability to be implemented; and
    - Cost effectiveness.

    The selected remedy will be articulated for public and tribal consideration through a draft Cleanup Action Plan.

9. The Preliminary Draft Habitat Mitigation Framework analysis takes into account conversion of habitat types, impacts to existing habitat that currently does not have contaminated sediment present, and benefits to existing habitat that currently does have contaminated sediment present.

10 8. The CADs and dredging will interfere with treaty right fisheries. Remedies have not been addressed to the satisfaction of Lummi.

11 9. The DEIS does not adequately address the impacts of the alternatives on tribal aquatic cultural or archeological resources.

12 10. The long term viability of the CADs has not been adequately demonstrated. What actions will be required to protect the CADs or maintain them.

13 After reviewing the alternatives in the DEIS, we can not identify a preferred alternative. A new alternative which contains many of the elements of 2C and the following modifications may have merit after thorough analysis:

1. All surface sediments above the Minimum Clean Up Level (MCLU) as well as the dredge spoils from the Whatcom Waterway be taken to upland disposal, with the exception of the GP Log Pond which is to be confined in place.
2. The remaining surface sediments exceeding the Sediment Quality Standards (SDS) from the ASB, Port Log Raft area and the old Starr Rock dump (5A, 6A, and 7A respectively) be dredged and placed in the proposed Starr Rock CAD.

Benefits from this approach would be:

- The GP Log Pond sediments would not be re-suspended.
- The worst of the contaminated sediments would be removed from the water column.
- The remaining contaminated sediments would be isolated in a single spot for improved protection and monitoring.
- Navigation hazards posed by confinement reefs would be reduced to one nearshore reef around the Starr Rock CAD.
- Less expensive than full upland disposal

We look forward to the recovery of the environmental health of Bellingham Bay.

Sincerely yours,

Merle Jefferson
Director, Department of Natural Resources

LUMMI NATION

10. Comment acknowledged. Based upon tribal input, the CAD location in the Preferred Remedial Action Alternative evaluated in the final EIS minimizes impacts to Usual and Accustomed fishing areas. However, it is recognized that even with the revised location there would still be an effect to those areas. The effect of the remedial alternative ultimately selected, must be addressed through discussions with both the Lummi Nation and the Nooksack Tribe prior to permitting.

11. The archaeological and cultural resources impact analysis has attempted to include resources/issues of value to the Lummi Nation. If there are specific areas of concern, please notify the Department of Ecology immediately so that this can be factored into the decision-making process.

12. See General Comment response #4 - CAD design.

13. These specific comments were used to develop the Preferred Remedial Action Alternative evaluated in the final EIS.

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M. BELCHER
Commissioner of Public Lands

September 20, 1999

Lucy Pebles
Department of Ecology, NWRO
3190 - 160th Ave. SE
Bellevue, WA 98008-5452

Subject: Comments on the *Bellingham Bay Comprehensive Strategy, Draft Environmental Impact Statement*, July 1999

Dear Ms. Pebles:

In response to the July 19, 1999 request for public comment, the Department of Natural Resources (DNR) is submitting comments on the State Environmental Policy Act Draft Environmental Impact Statement (SEPA DEIS) for the Bellingham Bay Comprehensive Strategy. The DEIS evaluates impacts from implementation of the Comprehensive Strategy and from five near-term cleanup alternatives associated with the strategy.

As a cooperating agency in the Bellingham Bay Demonstration Pilot Project, we applaud the efforts of the Department of Ecology on the DEIS. As you know, DNR has provided significant input throughout the development of the DEIS. Development of the DEIS was a high priority for DNR because we can use the DEIS work in future DNR decision-making processes and because the SEPA process provides the opportunity to receive input from the public regarding the use of public aquatic lands. Both the Comprehensive Strategy presented in the DEIS and the specific near-term cleanup alternatives have great implications for the public aquatic lands that DNR manages, and we look forward to hearing from the public on how we can best manage these lands for the benefit of today's citizens, as well as for the benefit of future generations.

To meet the objective of providing a comprehensive, decision-making context for subsequent activities in Bellingham Bay, as well as to maximize the benefit of this project as a pilot for new approaches to restoration and sediment cleanup, we believe a number of issues need to be addressed. We are working on potential solutions to the concerns we are raising through a number of mechanisms, including the series of matrices being developed for the State Directors' discussions and the technical and other supporting documents that have concurrent public review periods with the DEIS. We would like to take this opportunity to summarize a few of the primary issues.

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Scope of Analysis

All reasonable alternatives must be evaluated under SEPA. A reasonable alternative is one that could meet the objectives of the proposal but at a lower environmental cost or decreased level of environmental degradation. The current range of alternatives discussed in the DEIS does not provide the basis for a DNR decision on siting contaminated sediment storage in Harbor Areas both from a SEPA compliance perspective and from the compatibility and exceptional circumstances analyses required by WAC 332-30-137. DNR must also consider the thirty year limitation on leases in Harbor Areas (Article XV, Section 2, Constitution of the State of Washington) and the evaluation associated with Harbor Area relocation, WAC 332-30-116. Treatment options, for example, can potentially meet the objectives of the Comprehensive Strategy, and in order to satisfy both SEPA and DNR needs, we recommend additional analysis of this and other options that can reasonably meet the objectives.

The limited analysis provided in the DEIS of the nearshore fill option is inadequate. First, the analysis does not recognize information provided in the Final Disposal Siting Document, one of the supporting documentation reports for the DEIS analysis. In this documentation report, nearshore fills were found to be more effective than upland disposal and confined aquatic disposal (CAD) in satisfying two primary goals for the Pilot Project, protecting human health and safety and protecting and improving ecological health.

Second, the analysis provided in the DEIS does not substantiate the failure of this alternative to meet the purpose and need of the Comprehensive Strategy. Specifically, nearsbore fill was not considered because:

1. Existing and planned land uses do not have a defined need for additional land;
2. A nearshore fill would eliminate aquatic habitat; and
3. The Endangered Species Act (ESA) listing of Puget Sound chinook and the imminent listing of bull trout make the protection and restoration of aquatic habitat imperative.

Nowhere in the stated objectives does it specify the "no defined need for additional land" criteria, and no other alternative is subjected to this criteria. The Comprehensive Strategy is not project specific, and under the phasing in the plan, the purpose of the Comprehensive Strategy does not require or target the identification of specific land uses. In fact, under the purpose, a nearshore fill could be used for any function that is compatible with existing regulatory framework. Reasons 2 and 3 are not valid because they define criteria that would exclude all projects having an adverse environmental impact, including the alternatives that are analyzed in the DEIS.

DNR

1. See General Comment response #3 – Treatment Options. There are a number of promising treatment technologies under development, however their implementability and effectiveness for the Bellingham Bay dredged materials is uncertain. When a viable technology is identified it would be subjected to a separate SEPA compliance process.

2. While nearshore fills were evaluated in detail in the Whatcom Waterway RI/FS and also in the Bellingham Bay Demonstration Pilot Disposal Siting Documentation Report, they were not included in the Integrated Near-Term Remedial Alternatives for reasons summarized in Section 2.3.5.1 of the EIS. Source control at Cornwall Avenue Landfill site was the reason for the slight difference in score for the Cornwall Nearshore fill and the Starr Rock CAD, as indicated in the Final Disposal Siting Document. The effectiveness of controlling the source at Cornwall is not related to the type of facility but rather related to the facility location. The revised CAD location depicted in the Preferred Remedial Action Alternative evaluated in the final EIS provides improved source control at the Cornwall Avenue Landfill site over the Starr Rock CAD.

3. The Comprehensive Strategy incorporates land use as one of the project elements it addresses. In developing sub area strategies during the Pilot process, none of the Pilot representatives identified current or future water-dependent upland uses with a potential nearshore fill at the Cornwall site. Reasons 2 and 3, as cited in the comment, are valid criteria to consider when evaluating a nearshore fill. Reason 2 would not exclude all of the alternatives. Other alternatives convert aquatic habitat from one type to another, however, they do not eliminate aquatic habitat. Therefore, habitat elimination, when used as a criterion, does not exclude other alternatives. ESA compliance would clearly focus on protection and restoration (Reason 3). Eliminating aquatic habitat, as would occur with a nearshore fill, is inconsistent with protecting and restoring habitat.

Impacts Analysis

The impacts analysis provided in the DEIS is insufficient with respect to habitat, normal use of public waters, and cultural resources.

Habitat

The habitat analysis provided in the DEIS must reflect the new information available regarding
4 existing eelgrass beds, as well as the new information suggesting that very shallow depths are
necessary for eelgrass growth in Bellingham Bay. In particular, the proposed Starr Rock CAD
will significantly impact existing eelgrass. Even if the CAD is moved farther offshore, the
impacts to the existing eelgrass will be great and will most likely result in destruction of the
5 eelgrass from an increased accumulation of sediment between the CAD and the shore.
Therefore, avoidance of impacts to the eelgrass is not possible with the proposed Starr Rock
CAD.

We also find the analysis of habitat impacts/benefits in the DEIS to be inaccurate in discussing
habitat improvement. The analysis emphasizes the benefit associated with elevation changes at
6 the proposed CADs, primarily because of the potential to restore eelgrass. The analysis should
discuss this as a change in habitat, not a habitat improvement, and the assessment should
recognize other habitat needs in addition to eelgrass restoration. Unless there is additional
specific quantification of habitat needs in the bay, the change in tidal elevation can only be
accurately reflected as a conversion from one habitat type to another. In addition, given the
uncertainty with restoration of eelgrass (Revised Final Integrated Fidalgo Bay-Wide Plan and
7 EIS, 1999, City of Anacortes; 1990, Thom, R.M., 1990, A review of eelgrass (Zostera marina L.)
transplanting in the Pacific Northwest, The Northwest Environmental Journal 6:121-137), the
DEIS analysis should not be based on speculation that eelgrass can be restored.

The discussion of habitat benefit resulting from in-water contaminated sediment storage also
requires clarification. First, the DEIS analysis shows habitat benefit from engineered features at
CADs. According to the DEIS, the CADs will be capped with material that minimizes turbidity,
withstands 100 year storm events, and resists moderate-high energy erosional regimes, materials
8 that are not appropriate for eelgrass meadows. "The densest, most luxuriant growth of eelgrasses
usually occurs in fine sands and mixed sand and mud (Bulthuis, 1995). In addition, eelgrass has
specific light, energy, and nutrient requirements that have not been considered in the DEIS.
Therefore, the assumptions in the DEIS that "following construction, the development of 30+
9 acres of eelgrass habitat should provide substantial benefits" are too speculative and do not meet
the analysis needs.

Second, the analysis is incomplete in representing impacts to habitat from the potential
0 ineffective containment of contaminants, especially in the long-term. The alternatives that
confine contaminants in the aquatic environment are assigned a greater habitat benefit than those

DNR

4. The EIS has been modified to incorporate the new eelgrass information. In addition, the EIS has been revised to indicate the potential for impact to existing eelgrass from the Starr Rock CAD above the known loss of 0.5 acres that occurs under all alternatives.

5. The Preferred Remedial Action Alternative presented in the final EIS shifts the CAD location much further north along the shoreline, avoiding impacts to existing eelgrass.

6. The habitat restoration planning associated with the Pilot process, defined shallow-water nearshore habitat in the inner Bay as in important component to provide connectivity to the urban estuaries in addition to providing habitat for juvenile salmon, crab, and flatfish. Because of the scarcity of this type of habitat due to historical infilling of the Bay, conversion to shallow-water habitat, when properly located, is considered an improvement in function by the objectives set forth in the habitat restoration planning process.

7. The document has been modified to clarify that eelgrass production is only a potential, and that large-scale eelgrass restoration efforts have not been implemented in Puget Sound. See response to General Comment response #5 – Habitat Mitigation and Restoration.

8. The alternative CAD designs presented in the final EIS all include construction of capping sections that include:

    1. Base sand bedding layers immediately overlying the contaminated sediment;

    2. Intermediate armor layers to provide secondary protection to ensure that the cap would not erode, even in the unlikely event that the primary containment layer (the surface cap) were to erode; and

    3. A final cap surface of sand-sized materials that is within elevation zones optimal for eelgrass development. Based on preliminary analyses as outlined in General Comment responses 5 and 7, the final sand surface is expected to remain stable even during worst-case oceanographic conditions; this would be verified during remedial design with more detailed evaluations.

9. See response to DNR comment #8 above.

10. The in-water alternatives were assigned a greater habitat value because CADs have been proven to isolate contaminants, and can additionally provide an improved habitat function due to the shallow water habitat they help create. For those alternatives that focus on removal and upland disposal, although a clean habitat surface is provided, there is not an additional improvement in habitat function due to changes in elevation.

alternatives that completely and permanently remove contaminants from the aquatic environment
through upland disposal. As with the in-water containment alternatives, the document needs to
1 recognize that habitat can be engineered into those alternatives that remove contamination from
the aquatic environment and that the engineered habitat will not be exposed to the risk of impacts
from remaining contamination.

Federal agencies (the Environmental Protection Agency, National Marine Fisheries Service, and
US Fish and Wildlife Service) are continuing to develop standards of protection that will be
2 adequate for ESA compliance. The viability of all of the alternatives remains uncertain until the
baywide Clean Water Act 404 analysis and Biological Assessment are completed and approved
by regulators. All alternatives need to be evaluated for ESA compliance.

Use of Public Waters

Any placement of caps and CADs in water has direct and indirect impacts on normal use of
public waters. This is a result of the Restricted Navigational Areas necessary to protect the
integrity of the CADs and caps and the displacement (shallowing) of navigable waters. The
3 document does not adequately discuss the potential for a Restricted Navigational Area and does
not recognize the impacts of such an area on normal public uses such as net or crab pot fisheries,
anchoring, construction of future structures, removal of existing structures, and commercial
navigation. The DEIS must include a comprehensive analysis of the impacts to public uses in
order to provide DNR an adequate basis for decisions specific to state-owned aquatic lands.

For example, the document stresses the habitat benefit associated with potential eelgrass beds on in-water contaminated storage areas. However, if these in-water storage areas are designed to produce eelgrass habitat, they will have a correspondingly greater impact on the normal use of public waters in Bellingham Bay. This is because new information suggests that eelgrass grows at very shallow depths in the bay. The DEIS does not adequately analyze the impacts to normal use of public waters due to the proposed significant shallowing from contaminated sediment storage.

Archeological Resources

Archeological resources have been insufficiently examined in the DEIS. No cultural resource survey work has been completed in the areas where CADs or caps are proposed, and the DEIS does not recognize existing information regarding the cultural resources in the area. For example, the high probability for prehistoric sites dating from ca. 8,000 B.P. to the present at the mouths of the numerous major drainages is not recognized. Also, the DEIS notes a low

DNR

11. The alternatives with removal and upland disposal do not incorporate back-filling with clean material to meet habitat restoration objectives, although they could. Likewise, many of the areas targeted for capping could have caps 10 feet or thicker, to provide an additional habitat functional benefit through conversion to shallow water. However, the strategy in developing remedial alternatives was to create packages of remedies that would be protective of human health and the environment. If individual remedial solutions within a package provided additional benefits (be it in habitat restoration or land use), then that was noted in the analysis completed for the EIS.

12. See response to USFWS comment #2. The 404 analysis and Biological Assessment (BA) would be completed for the remedy that is ultimately selected at the time of permit application. The BA is the vehicle used to address ESA compliance.

13. Additional text has been added to the tables that summarize the impacts to Navigation and Commerce for each of the alternatives (i.e., Table 4.3.2) to further explain the impacts on future water-related uses.

14. The EIS notes that the areas proposed for CADs or caps have a low probability for significant historic archaeological resources. Archaeological survey is not warranted in areas with a low probability for significant archaeological deposits. The final EIS has been modified to specifically describe resource probability at the mouths of drainages discharging to the inner bay that have been inundated. The EIS does describe the probability for hunter-fisher-gatherer in localities within the project area that were inundated by rising sea level. The EIS does note the probability for intact hunter-fisher-gatherer archaeological deposits beneath historic period fill at the mouth of Whatcom Creek and also describes the distribution pattern of recorded sites, which are on sand spits, on beach terraces and embayments, and on bluffs or ridges. The mitigation describes the need to contact the Washington State Office of Archaeology and Historic Preservation in the event cultural artifacts are uncovered during the remedial design phase.

    The final EIS has been modified to include the list of historic archaeological resources in tidal flats provided by DNR. Isolated historic artifacts or features and individual pilings that are remnants of old piers probably would not qualify for listing in the National Register of Historic Places. Some existing relatively intact pier and wharf complexes with standing structures on the Bellingham waterfront have been evaluated by historic preservation professionals, who determined that the pier and wharf complexes probably were not eligible for listing in the National Register of Historic Places. Isolated pilings of old piers that appear on NOAA navigation charts probably would not be eligible for listing in the National Register of Historic Places.

15 probability of structures in the tideflats which is contrary to information provided on NOAA navigation charts for the area. Finally, the DEIS suggests that if there are existing resources, those resources would be protected by placing fill at the site. We know of no instance where the Office of Archaeology and Historic Preservation has recommended protecting an archeological resources site beneath contaminated sediment.

Economic Analysis

16 The economic analysis discussed in the DEIS regarding cost is insufficient, resulting in bias in the comparison of alternatives. Some of the costs provided in the DEIS are inaccurate. For example, the cost of upland disposal is overstated and should be set at $40 per cubic yard. We can provide documentation to support this cost estimate if there is a concern. The cost of dewatering the sediment is also overstated, perhaps by a factor of two.

17 In addition, the cost of restoration is not accurately reflected in the analysis. For example, we understand that the only restoration costs included are based on $30,000 per acre for eelgrass. This cost estimate is from a site that involved planting only 3% of the potential acres and bringing that planted area to 75% within 5 years. For the Pilot Project, an order of magnitude greater percentage should be restored in order to define the potential area as habitat. The Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters describes $204,000 per acre for planting, monitoring, and reporting. This cost is lower than the 3% for $30,000 figure and would allow coverage of 22% of the proposed potential acres of habitat. Adjustments such as these need to be made in the DEIS in order to accurately represent restoration costs.

18 The discussion must also incorporate costs associated with the use of state-owned aquatic lands. Under the law (RCW 79.90.500), fair market rent can be charged in accordance with a number of appraisal techniques. The techniques that apply are the substitution method, the extension method, the income method, the market data method, and the shore contribution method (WAC 332-30-125). Preliminary calculations, without an appraisal, indicate that the extension method may give the lower bound for the rent on the nonmarket use of contaminated sediment storage, and the substitution, income, and market methods may yield similar but higher rents.

19 The comparison of costs in the DEIS is affected by these accuracy issues, but the cost comparison is also affected by the fact that the design life of the cleanup solutions differs. We suggest that an analysis be included to reflect the cost per cubic yard per year of design life. If these changes are incorporated, it is likely that a different alternative will be the lowest cost value. For example, Alternative 2E may have the lowest per cubic yard per year cost, and other alternatives that have not been thoroughly explored in the DEIS may have even lower costs.

DNR

15. Archaeological resources in Washington State are routinely protected from adverse effects through placement of fill, with the approval of the Office of Archaeology and Historic Preservation. Consultation with Dr. Robert G. Whitlam, State Archaeologist, on April 18, 2000, confirmed that placement of clean fill is used to protect archaeological sites in Washington State. Dr. Whitlam also noted that there are no demonstrated archaeological resources in the areas proposed for fill placement in the proposed Bellingham Bay Demonstration Project Area, nor is there any indication that if there were archaeological resources, that they would be eligible for listing in the National Register of Historic Places. Archaeological resources that are not eligible for listing in the National Register of Historic Places do not require protection. The final EIS has been modified to clarify that in the case of CADs, the fill does include contaminated sediments.

16. The basis for the assumed upland disposal costs was presented in the Bellingham Bay Demonstration Pilot Disposal Siting Documentation Report, and also in the Whatcom Waterway RI/FS. These estimates were based on a written estimate (provided as Attachment B-1 of the Disposal Siting Report) of $30/ton for transportation, rail, handling and taxes. However, additional costs are also anticipated to address dewatering requirements, construction monitoring, and other contingencies. The representativeness of the assumed upland disposal costs were recently verified during the Corps of Engineers/Port of Seattle Stage I dredging and upland disposal of contaminated sediments from the East Waterway, Seattle. See also General Comment response #2 – Cost Estimating.

17. Based on the comment, the unit cost for eelgrass mitigation has been revised to $200,000/acre, and this change is reflected in the overall cost estimates for each alternative that may result in impacts to existing eelgrass patches or meadows. Though opportunities to significantly reduce this cost may be identified during final design, we agree that the cost estimates at this point should be conservative. See also General Comment response #2 – Cost Estimating.

18. See General Comment response #2 – Cost Estimating.

19. See General Comment response #2 – Cost Estimating. Also see General Comment response #4 – CAD Design. Consistent with applicable design guidelines developed by EPA and the Corps, the assumed design life for CADs is upwards of 500 years. The cost estimates presented in the EIS follow standard remedial cost estimating procedures developed by EPA.

The cost analysis in the DEIS is significant because it must provide a comprehensive, accurate
discussion of the costs the public might assume. The public should also be informed of the
20 uninsured value of the cleanup burden they would bear should a proposed CAD fail. In addition,
economic benefits expected from greater dredging and greater navigational flexibility should be
reflected in the text and tables of the DEIS. The inclusion of these factors in the discussion will
21 provide the public a more defined analysis from which to compare economic gain with
environmental disturbance and short- and long-term containment solutions.

Mitigation Framework

22 As noted in the previous discussion regarding impacts analysis, we have not reached resolution
on the changes in habitat as a result of the proposed near-term cleanup alternatives. We are also
limited in decision-making because the mitigation framework has not been applied. The
3 mitigation framework is designed to establish compensatory mitigation. This means that capping
of contaminated sediments and CADs which result in creation/restoration or enhancement of
4 habitat will not be enough to satisfy the regulatory agencies and additional habitat mitigation will
be required. The consequences are: more aquatic habitat will be impacted as part of any
additional mitigation process; and the acres of habitat discussed in the DEIS for each alternative
are not an accurate reflection of the final acres involved. We therefore recommend that decisions
be based on habitat information available after applying the mitigation framework.

The mitigation framework has a defined objective to "endeavor for net gain in aquatic area and
function." With respect to state-owned aquatic lands, we agree that the proper objective is a net
gain of aquatic habitat functions from each mitigation activity and in the bay as a whole.
25 However, we do not agree with the limited emphasis placed on avoidance and minimization in
the mitigation framework. With respect to state-owned aquatic lands, avoidance and
minimization require much greater attention, and in certain circumstances, such as those
impacting endangered and threatened species, avoidance should be required. The mitigation
26 framework also provides for preservation as a form of compensatory mitigation. On state-owned
aquatic lands, since DNR already has proprietary authority to protect the environment,
preservation of other existing habitat areas is not authentic mitigation for impacts to certain
habitat areas. For land that might be donated to the state for preservation, we are obligated in the
first instance to protect the environment on existing state-owned aquatic lands, rather than land
that may become state-owned. Transferring existing habitat from private to public ownership
fails to replace lost habitat on aquatic lands already under DNR's stewardship.

Implementation

As we proceed with finalization of the DEIS, we need to recognize uncertainties that may affect the decisions being made and discuss possible contingencies that might address the uncertainties. In particular, we must address the uncertainties associated with implementation of both near-term and long-term actions associated with the Comprehensive Strategy. We are currently making

DNR

20. See General Comment response #2 – Cost Estimating.

21. See General Comment response #2 – Cost Estimating.

22. Comment noted.

23. The term compensatory mitigation used in the comment is unclear because of multiple potential meanings. The Preliminary Draft Habitat Mitigation Framework, if applied to the remedial alternative ultimately selected or to future shoreline development, could help to define mitigation requirements. The acres of habitat discussed in the EIS refer to acres of habitat affected by the remedial alternative. The comment regarding more aquatic habitat being impacted as part of mitigation activities is unclear. Mitigation actions would be designed to improve habitat, not create more impacts. The EIS has been revised to indicate that the mitigation requirements are still uncertain and that the mitigation framework is a preliminary draft product.

24. See response to DNR comment #23 above

25. The lack of consistent policy on mitigation requirements among resource agencies has been a challenge throughout the development of the Preliminary Draft Mitigation Framework. Because of this, the Preliminary Draft Habitat Mitigation Framework has not been finalized and individual resource agencies can elect to use it or not during future permit and/or aquatic lands leasing processes.

26. Comment noted. The inclusion of preservation does not only pertain to aquatic lands or lands under DNR stewardship. Acquisition and preservation of riparian corridors, and/or intertidal and supralittoral areas under private ownership in combination with other forms of mitigation can result in more favorable habitat conditions and functions. In addition, acquisition and preservation of privately held lands does not necessarily need to become state-owned or managed land. Other mechanisms for preservation may be more appropriate such as a conservation easement, donation to private environmental group, local jurisdictions private entities, etc.

near-term cleanup decisions that are linked to a comprehensive framework for the entire bay without certainty that additional actions will be taken to implement the framework. The EIS
:7 analysis must include an assessment of the potential for implementation of the Comprehensive Strategy recommendations in the reasonably foreseeable future. As quantified or qualified by this assessment, the environmental effects that may result should be identified in the DEIS. We will then have a more defined basis for making agreements to ensure that the purposes of the Comprehensive Strategy are met.

We appreciate the opportunity to provide input on the proposed actions presented in the DEIS, and we look forward to continuing to work with the Department of Ecology on addressing these concerns in the context of creating new, innovative mechanisms for resolving sediment cleanup issues at all sites.

Sincerely,

Paul A. Silver
Deputy Supervisor

c: Bellingham Bay Pilot Team Members
State Agency Directors
Army Corps of Engineers
Environmental Protection Agency

DNR

27. See General Comment response #1 - Process for Implementation of the Comprehensive Strategy.

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Region 4 Office: 16018 Mill Creek Boulevard - Mill Creek, Washington 98012 - (425) 775-1311

September 15, 1999

RECEIVED
SEP 16 1999
DEPT. OF ECOLOGY

Department of Ecology
Toxic Cleanup Program
Attention: Lucy Pebles
3190 160th Avenue SE
Bellevue, WA 98008-5452

Subject: Washington Department of Fish and Wildlife Comments - Draft Environmental Impact Statement - Bellingham Bay Comprehensive Strategy

Dear Ms. Pebles:

The Washington Department of Fish and Wildlife (WDFW) has reviewed the Bellingham Bay Comprehensive Strategy Draft Environmental Impact Statement and offer the following comments for you consideration. WDFW may submit additional comments in the future as review of the comprehensive strategy progresses.

1 1. WDFW will support the cleanup alternative that provides the greatest opportunity to satisfy the habitat restoration and protection objectives identified in the "Habitat Documentation Report".

2 2. WDFW's support of capping and CAD strategies is based on the assumption that capping and CAD technologies will effectively provide long term isolation of contaminants from the environment. The effectiveness of capping and CAD strategies needs to be addressed in detail.

3 3. The Draft EIS lacks sufficient habitat data to adequately compare the habitat impacts and benefits associated with the different alternative. The "Summary of Habitat Modifications" tables for each of the alternatives that were provided in the Preliminary Draft EIS should be updated and included in the Final EIS. In addition, the following habitat related tables and diagram developed by the Pilot Habitat Committee should also be included in the final EIS:

a. Figure - simplistic representation of marine food web
b. Table - Bellingham Pilot Habitat Strategy Objectives Alternative Assessment
c. Table - Bellingham Pilot Summary of Aquatic Resource Impacts and Benefits
d. Table - Bellingham Bay General Ecology Relative to Tidal Elevation

WDFW

1. Comment noted.
2. See General Comment responses 5 and 7, CAD and cap design, respectively.
3. The products have been added as Appendix E to the Final EIS.

4 4. The two dredging alternatives proposed for the head of the Whatcom Waterway will either dredge area 3B or retain area 3B. Area 3B as presented in the DEIS for each of the proposed alternatives (figures 2.3-4 through 2.3-11) appears to represent a sizable area. The Bellingham Pilot Summary of Aquatic Resource Impacts and Benefits table developed by the Pilot Habitat Committee indicates that area 3B represents a very small area (.1 acres). The discrepancy between the area represented in the figures and the area presented in the Impacts/Benefits table needs to be clarified.

5 5. The Habitat Mitigation Framework needs to be completed and presented in the FEIS.

6 6. WDFW is very encouraged by the fact that the development of the Sub Area Strategies for Bellingham Bay Comprehensive Strategy provided habitat values equal consideration with other land use values.

If you have any questions, please call me at (360) 466-4354, extension 250.

Sincerely,

Brian Williams
Area Habitat Biologist
Habitat Program

cc:
Greg Huckel
Randy Carman
Bob Everett

WDFW

4. Depending on the specific Integrated Near-Term Remedial Action Alternative, the area of unit 3A that would be affected by the dredging action ranges from zero (Alternatives 2A and 2B) to 1.2 acres (Alternatives 2C, 2D, 2E, and Preferred Remedial Action Alternative). The acreage presented in the Impacts and Benefits table prepared for the Habitat Subcommittee represents the net change in intertidal acreage resulting from the action.

5. An updated version of the Habitat Mitigation Framework has been added to the final EIS as a Preliminary Draft document. See response to DNR comment #25.

6. Comment noted.

September 21, 1999

Christine Corrigan
Northwest Regional Office
Department of Ecology
3190 160th Avenue SE
Bellevue, Washington 98008

Re: Comments on Bellingham Bay Comprehensive Strategy Draft Environmental Impact Statement

Dear Ms. Corrigan:

Thank you for the opportunity to comment on the Bellingham Bay Comprehensive Strategy DEIS. This document represents an important milestone in our efforts to protect and restore the marine habitat and shoreline of Bellingham Bay.

1. Pg. S-1. The first paragraph under Project Background says that contaminated sediments "can pose a threat to both marine life and public health." This understates the situation. Contaminated sediments are killing benthic invertebrates and causing diseases in fish. And sediments which exceed the sediment management standards are NOT providing properly functioning habitat.

2. Pages S-3&4. The descriptions of alternatives only talk about the navigational benefits of the additional removal of contaminated material in alternatives C, D, and E. The discussion should say that removing the additional material in these alternatives eliminates the risk of excavating or exposing this material in the future, whether for navigation or for some other reason.

3. Table S-1. This table and other discussions of the habitat impacts of alternatives seems to count contaminated sediments as pristine habitat. This is reflected by saying that dredging these areas results in a "loss" of habitat. But these areas are poisoning the marine life. The habitat was lost when the contamination occurred. Contaminated sediments must not be counted as habitat the same way they would be if not contaminated. It is more accurate to treat areas of contamination as if they were paved. Disturbing the benthos in these areas is also listed as an adverse impact. But you would not be disturbing a normal and natural benthic community. You would be halting the movement of toxic chemicals from those sediments into benthic invertebrates and then into the fish, a beneficial effect.

PUGET SOUND WATER QUALITY ACTION TEAM

1. Comment noted.

2. The text in the final EIS has been modified to reflect that removing additional material eliminates the risk of excavating or exposing this material in the future.

3. A footnote has been added to Table S-1 clarifying that much of the "disturbed habitat" (referred to in certain sections of the table) is currently impaired due to the presence of contaminated sediments.

Section 3.2.2.1 discusses this issue correctly. And the tables of impacts and benefits (for example, Table 4.3-1) discuss the restoration of biological functions through removal of contaminated sediments. But this perspective is lost in the summary tables.

4 **4. Need for specifics on source control.** Part of the Bellingham Bay Comprehensive Strategy is to pursue source controls so that sediment will not be re-contaminated and so that the resulting clean sediments will enjoy good water quality. Yet few if any specifics about planned source controls are included in the DEIS. Specific source control projects that will occur under the Comprehensive Strategy should be called out in the final EIS. In particular, the projects called out in the July 30, 1999 Sediment Site and Source Control Documentation Report should be included, as should a discussion of planned stormwater controls.

5 **5. Need to address transportation impacts.** The alternatives being considered would result in up to 2.7 million cubic yards of material being transported to upland disposal sites. Yet the DEIS never discloses just how many barges, trucks, and railcars that would require. Since different alternatives being considered have different upland transport impacts, these should be addressed in the document.

6 **6. Monitoring and Adaptive Management.** The final EIS should contain more information about the types of monitoring that would be required for each alternative. The analysis should also discuss the types of failures that might occur, how the monitoring would detect them and the types of corrective actions that might be required.

Thank you again. If you have any questions about these comments, please contact John Dohrmann at (360) 407-7305 or jdohrmann@psat.wa.gov.

Sincerely,

Nancy McKay
Chair
Puget Sound Water Quality Action Team

PUGET SOUND WATER QUALITY ACTION TEAM

4. See General Comment response #7 – Source Control.

5. Detailed information regarding traffic impacts was not included in the EIS because it was determined that there was no potential for significant impacts to occur with any of the options considered. A table summarizing this information is provided below for those who might be interested in the limited impacts that may occur. Impacts from the Preferred Remedial Action Alternative presented in the final EIS would be the same as Alternative 2C.

Summary of Construction Traffic Impacts by Alternative

	Alt 2A	Alt 2B		Alt 2C	Alt 2D		Alt 2E	
		Upland Disposal			Upland Disposal		Upland Disposal	
Disposal Method	CAD	Option 1[a]	Option 2[b]	CAD	Option 1[a]	Option 2[b]	Option 1[a]	Option 2[b]
Rail to Roosevelt Landfill	None	220,000	None	None	900,000	400,000	2,200,000	1,700,000
Trains per week		1-4	0-2		7-10	3-46	18-21	14-17
Barge to private upland facility	420,000	None	220,000	820,000	None	500,000	None	500,000
Barges per day	1-2		1	2-3		2-3		2-3
Total CY dredged	420,000	420,000	420,000	820,000	1,100,000	1,100,000	2,400,000	2,400,000

[a] Worst-case scenario for train traffic. Assumes all sediments not transported to local/regional landfills would go to Roosevelt Landfill; all of the sediments could potentially be transported to the Roosevelt Landfill.

[b] Worst-case scenario for barge traffic. Assumes up to 500,000 CY would be barged to other private upland disposal facilities.

6. Monitoring and adaptive management are essential components of any remedial action conducted by Ecology under the MTCA. This level of detail would be developed as part of implementing a Cleanup Action Plan for the remedy that is ultimately selected.

WASHINGTON PUBLIC PORTS ASSOCIATION

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DEPT. OF ECOLOGY

September 17, 1999

Christine Corrigan
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Dear Ms. Corrigan,

The Washington Public Ports Association is offering these comments on the draft Environmental Impact Statement for the Bellingham Bay Comprehensive Strategy. Our Association represents the public port districts of the State of Washington. We have been supporters of the Bellingham Bay process since its inception, because it holds promise for addressing many of the complicated jurisdictional, environmental and commercial problems that plague harbor cleanups throughout our state.

Washington's ports have named Bellingham Bay as one of the top three harbor cleanup priorities statewide. We have supported the expenditure of funds from the Local Toxics Control Account to help fund this study, because we hope that it will demonstrate how to approach complex bay-wide cleanups in urbanized areas. These types of cleanups have proven to be extraordinarily difficult to move forward with. This is unfortunate because nearly all the barriers to progress are institutional – the actual techniques for proceeding with cleanups are proven to be effective.

The Bellingham Bay EIS demonstrates a thorough examination of the various strategies for addressing source control of contaminants, cleaning up contaminated sediments, improving opportunities for commerce and navigation, and improving the habitat functions of the bay ecosystem.

Having examined the alternatives set forth in the EIS, it is clear to our
Association that option 2C – "Full Removal from Navigation Areas with
Confined Aquatic Disposal", is the best option overall. This option allows 1
navigation for modern-day vessels, cleans up contaminated sediments,
restores habitat and improves public access to the shoreline. Perhaps most
importantly, this option's cost-effectiveness makes it implementable.

All of us are familiar with reports and strategies that have been developed to 2
solve various societal problems, which have never been implemented due to a
lack of available funding. Options 2D and 2E of this EIS appear to solve some

P.O. Box 1518 • Olympia, WA 98507-1518 • (360) 943-0760 • Fax 753-6176 • 1501 Capitol Way • Suite 304

WPPA

1. Comment noted.

2. Comment noted. The alternatives referred to in this comment do provide subtidal habitat. However, they provide relatively little additional intertidal habitat – which has been determined to provide a more needed function than subtidal habitat through the habitat objectives established by the Pilot Team.

of the problems associated with contamination, but their costs are disproportionate to other feasible options. These options also forego opportunities to create valuable sub-tidal habitat.

Options 2A and 2B do not appear to be feasible because they leave significant amounts of sediment in the federal navigation channel. These solutions will
leave inadequate channel depth and prohibit fully-laden vessels from calling 3
the Port of Bellingham. These types of navigational constraints will preclude the Port of Bellingham from expanding or possibly even maintaining its levels of trade. For this reason, both options 2A and 2B are not acceptable alternatives.

We congratulate the agencies and local partners who have worked so hard to bring this document to this public review milestone. Thank you for this opportunity to comment on this important study effort.

Yours truly,

WASHINGTON PUBLIC PORTS ASSOCIATION

Eric D. Johnson
Environmental Affairs Director

c: Port of Bellingham
Lucy Pebles, Department of Ecology

WPPA

3. Comment noted.

September 17, 1999

Tom Fitzsimmons, Director
Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: Comments on July 1999 Draft Environmental Impact Statement "Bellingham Bay Comprehensive Strategy"

Dear Mr. Fitzsimmons:

On behalf of the Board of Commissioners of the Port of Bellingham, I am pleased to provide you Resolution No. 1113 (enclosed), recommending Alternative 2C "Full Removal from Navigation Areas with Confined Aquatic Disposal" for selection by Ecology as the preferred alternative for the Bellingham Bay Comprehensive Strategy. The resolution and additional comment presented below is provided, following our review of Ecology's July 1999 Draft Environmental Impact Statement (DEIS) on Bellingham Bay. 1

First, and importantly, the DEIS is a work product of the Bellingham Bay Demonstration Pilot. The Pilot concept was introduced to several Puget Sound communities in January 1996 by federal and state agencies as a new cooperative way to address local sediment cleanup requirements and associated habitat restoration. For over three years a Pilot Team of agencies, local government, tribes, and industry has been engaged in an intense effort to meet those objectives in Bellingham Bay. From the outset it has been apparent that state policy issues on the management of contaminated sediments would be a major challenge for the Pilot.

The Port and Ecology have acted as co-managers of the Pilot under interagency agreements that have provided over $2 million in MTCA grant funds to support the project. Additional funding and and/or expertise have been contributed by each Pilot Team member organization. Georgia-Pacific, in particular, has contributed significantly to the DEIS and has fully funded the Whatcom Waterway RI/FS. (Port comments on the Whatcom Waterway RI/FS are being submitted to Ecology under separate cover.)

PORT OF BELLINGHAM

1. Comment noted.

We congratulate Ecology and the other Pilot Team members on the publication of the DEIS. The document has been prepared in the spirit of cooperation 2
among federal, state, tribal and local parties. It relies on a comprehensive body of information on environmental conditions in Bellingham Bay. It takes advantage of years of agency and private sector experience managing similar problems throughout Puget Sound. It applies sound science and reliable engineering principles to develop site-specific remedial alternatives. And it presents a thorough and accurate evaluation of those alternatives, as required under SEPA, MTCA, and the Sediment Management Standards.

The result of this cooperative partnership is a DEIS that presents a range of alternatives and clearly ranks Alternative 2C highest in relation to the goals and objectives developed by the Pilot Team. These goals and objectives are founded 3
in the environmental requirements of MTCA and the State Sediment Management Standards. The high ranking of Alternative 2C also reflects a confirmation that in-water containment technologies can provide a safe and cost-effective solution to sediment contamination problems when applied appropriately in Bellingham Bay. In addition, Alternative 2C is compatible with local objectives for navigation and commerce, public access, and habitat restoration. It provides an innovative solution to the problem of sediment contamination by removing these low-level wastes from the federal channel, where capping would not be protective, and using it as building material for the restoration of shallow sub-tidal marine habitat along the shoreline of Bellingham Bay.

In contrast, the DEIS accurately explains that, while other alternatives are available for sediment remediation, they do not meet the threshold requirements of MTCA for environmental protectiveness or cost-effectiveness, nor are they compatible with federal, state, and local land-use designations for navigation and commerce.

Alternative 2A in the DEIS and many of the alternatives in the Whatcom Waterway RI/FS would leave extensive contamination in place within the federal 4
channel of Whatcom Waterway. The risk of exposure for such material is unacceptable over the long-term, because of possible breaching of an environmental cap from routine dredging operations, ship scour and propeller wash from tugs and large cargo ships. Alternatives which leave extensive contamination in federal channels should not be selected when safe, cost effective, and readily implementable options are available.

Alternatives that would require upland disposal of hundreds of thousands of cubic 5
yards of contaminated sediments (i.e., 2B, 2D, 2E) include construction costs

PORT OF BELLINGHAM

2. Comment noted.
3. Comment noted, see also General Comment responses 5 and 7 - CAD and cap design, respectively.
4. Comment noted. Part of the relatively low ranking of Alternative 2A was due to its inability to provide the certainty and flexibility to meet long-term land use needs associated with the water-dependent uses adjacent to the Whatcom Waterway.
5. Comment noted.

which are substantially and disproportionately higher than in-water options. In addition, empirical testing has demonstrated that whereas in-water disposal of sediments tends to immobilize contaminants of concern, upland disposal results in chemical changes that tend to increase contaminant leachability. Alternatives which require upland disposal of contaminants should not be selected when safer, more cost-effective, and more readily implementable options are available.

Alternative 2C clearly provides the best solution to contaminated sediment
problems in Bellingham Bay. However, the implementation of Alternative 2C is
still critically dependent on the resolution of state policy issues. Alternative 2C **6**
requires sediment disposal in two Confined Aquatic Disposal (CAD) facilities
along the Bellingham shoreline. One is in the Georgia-Pacific log pond which is
owned in part by the Port and in part by Georgia-Pacific. The other CAD facility
would be located on state-owned aquatic land near the Starr Rock disposal site.
These locations were selected for consideration as potential CAD sites by the
Pilot Team, in part because aquatic land in those areas is currently
contaminated at levels that exceed the State Sediment Management Standards.
As owners of aquatic land in these areas, the Port, Georgia-Pacific, and the State
stand to benefit by CAD sites that remediate existing contamination and provide
capacity for contaminated sediment that needs to be removed from federal
channels. If Alternative 2C is selected for implementation, the two CAD facilities
would represent a commitment of over 60 acres of shallow sub-tidal aquatic land
to in-water habitat along Bellingham's working waterfront.

The commitment of aquatic land for CAD facilities under Alternative 2C, as a
necessary component of a Comprehensive Strategy for Bellingham Bay, has
been extensively evaluated in the DEIS. The long-term land use implications are **7**
particularly important to the local community. Our determination is consistent
with that described in the DEIS. While there is a significant lost-use cost
associated with this commitment of aquatic land, the net impact to the community
is strongly positive. It provides a cost-effective means of addressing
environmental liability, it provides for the full and unencumbered use of our
federal channels, and it provides a substantial increase in habitat area and
function within the working waterfront.

The Port's recommendation of Alternative 2C, as the preferred alternative for the
Bellingham Bay Comprehensive Strategy, recognizes that it includes a necessary
and strategic commitment of aquatic land for the remediation of contaminated
sediment and associated habitat restoration. This commitment is reasonable and
acceptable to the Port, because of the valuable benefits it can provide quickly **8**
and over the long-term. **However, it requires the acceptance of state
agencies for implementation. We encourage your leadership in this
important decision by Ecology and the other agencies.**

PORT OF BELLINGHAM

6. With Pilot Team agreement on the Preferred Remedial Action Alternative that is evaluated in the final EIS, an important step has been taken towards addressing contaminated sediments in Bellingham Bay.

7. Comment noted.

8. Comment noted.

Thank you for your help in bringing us to this decision point and on to the next phase of the Bellingham Bay Demonstration Pilot. We look forward to working with you through the selection and implementation of the Comprehensive Strategy for Bellingham Bay. Please feel free to call me, or Mike Stoner, should you have any questions.

Sincerely,

James S. Darling
Executive Director

Enclosure

Cc: Lucille T. Pebles, Ecology
Chistine Corrigan, Ecology

RESOLUTION NO. 1113

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE PORT OF BELLINGHAM, WASHINGTON, RECOMMENDING A PREFERRED ALTERNATIVE AS DESCRIBED IN THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BELLINGHAM BAY DEMONSTRATION PILOT.

WHEREAS, the Board of Commissioners agreed to participate in the Bellingham Bay Demonstration Pilot as co-manager with the Department of Ecology; and

WHEREAS, the goals and objectives for the Bellingham Bay Demonstration Pilot are consistent with the mission of the Port of Bellingham for fulfilling regional transportation needs and stewardship of the waterfront; and

WHEREAS, the Department of Ecology has published a July 1999 Draft Environmental Impact Statement, describing a Comprehensive Strategy for source control, sediment cleanup and associated habitat restoration, for review and comment; and

WHEREAS, Alternative 2C provides for the safe and cost-effective management of contaminated sediments in the marine environment by either capping sediments in place, or by confined aquatic disposal in designated locations nearby; and

WHEREAS, Alternative 2C "Full Removal from Navigation Areas with Confined Aquatic Disposal" meets the current and future needs for navigation and commerce in the Whatcom Waterway by dredging sediments from the federally authorized channel; and

WHEREAS, Alternative 2C provides the highest potential for restoring marine habitat where it is needed along the shoreline in and near Whatcom Waterway; and

WHEREAS, a timely decision in 1999 on the Comprehensive Strategy for Bellingham Bay by the Department of Ecology is important to meet both the goals of the Bellingham Bay Demonstration Pilot and the mission of the Port of Bellingham,

NOW THEREFORE, BE IT RESOLVED by the Board of Commissioners of the Port of Bellingham, Washington, that Alternative 2C "Full Removal from Navigation Areas with Confined Aquatic Disposal" is recommended for selection by the Department of Ecology as the preferred alternative for the Comprehensive Strategy for Bellingham Bay.

ADOPTED by the Board of Commissioners of the Port of Bellingham this ______ day of ________, 1999, and duly authenticated in open session by the signatures of the Commissioners voting in favor thereof and the seal of the Commission duly affixed.

____
President

____
Vice President

____
Secretary

CITY OF BELLINGHAM WASHINGTON

MARK ASMUNDSON
Office of the Mayor
210 Lottie Street, Bellingham, WA 98225
Telephone: (360) 676-6979, FAX: (360) 738-7418

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September 17, 1999

Raymond Hellwig, Responsible Official
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Subject: Bellingham Bay Pilot

Dear Mr. Hellwig:

I am pleased to forward comments to you on the Draft Environmental Impact Statement (DEIS) for the **Bellingham Bay Comprehensive Strategy.** Known locally as the **Bay Pilot**, this three phase strategy represents an excellent example of a partnership between local, state and federal agencies, tribes, local government and businesses to develop solutions to the problem of contaminated sediments in Bellingham Bay.

In general my comments support Alternative 2C, Full Removal from Navigation Areas, including Confined Aquatic Disposal (CAD) as the preferred approach to managing contaminated sediments in Bellingham Bay. Several aspects of Alternative 2C will need to be further developed in subsequent stages of the Bay Pilot in order for this alternative to achieve Baywide Pilot goals.

Bellingham's on-going commitment to meeting multiple objectives in planning for our waterfront areas has put considerable emphasis on our ties to Whatcom Creek and its interface with Bellingham Bay at the Whatcom Waterway over the last 15 years. Whatcom Creek's significance to the community was brought home to us by the recent explosion and fire affecting the creek's upper reaches and historic Whatcom Falls Park.

Strengths of Alternative 2C

City of Bellingham support for Alternative 2C is contingent upon continued refinement as well as implementation, which recognize the significant asset that Bellingham Bay represents to its citizens.

The following excerpts from adopted vision statements developed, as goals for the Bellingham Comprehensive Plan will be used as a tool to measure how well the selected alternative addresses community objectives:

Bellingham Bay is a finite and valued resource. Alternative 2C responds by protecting the bay's ecological health, enhancing ecological resources in the bay and creating opportunities for improved aquatic habitat within the bay.

CITY OF BELLINGHAM

1. Comment noted.

2. Comment acknowledged. The final EIS and the Whatcom Waterway and Cornwall Avenue RI/FSs, will inform Ecology's selection of a remedy. The selected remedy will be articulated in a draft Cleanup Action Plan(s) that is issued for Pilot Team and public review.

Bellingham Bay is a working waterfront. Alternative 2C confines contaminated sediments through removal from Navigation Areas critical to the bay's continued role in shipping and commerce and through capping where sediments can be left in place or relocated. This combination of:

- Safe and effective removal and confined aquatic disposal in designated locations and
- Capping in place where natural tidal activity and low contamination levels permit constitutes a remedial action alternative which is a safe and cost-effective solution.

Bellingham Bay retains space for public access and recreation, preserves natural shorelines and beaches and makes use of public docks and railroad trestles in its public access system. Alternative 2C has excellent potential for maintaining and improving public access to Bellingham Bay. Stages Two and Three of the Bay Pilot will need to specifically address how this alternative will realize that potential, with particular attention to

- Waterfront views and viewing areas at the head of Whatcom Waterway/Citizens Dock
- Access for small boats and day use in Whatcom Waterway adjacent to Colony Wharf, Central Avenue and Citizens Dock.
- Trails and parks along the shoreline, including a possible boardwalk or other pedestrian connection(s) from the end of Cornwall Street to Boulevard Park and construction of Taylor Street Dock improvements

Continued Support and Next Steps

City of Bellingham's continued support for Alternative 2C depends in large part on its provision for enhanced public access to and along Bellingham Bay. At this stage of the process, it would be a mistake to preclude innovative approaches to design and implementation.

Subarea 3C – Head of Whatcom Waterway

This subarea located at the head of Whatcom Waterway has been the focus of considerable community attention. Successful implementation of Alternative 2C will need to address clean up, habitat restoration and innovative approaches to water viewing areas and day use for small pleasure boats and commercial vessels including passenger ferries and excursion boats. Specific suggestions to be pursued include:

- Removal of the remaining portions of historic Citizens Dock will be required due to its dilapidated condition. The right to relocate and reconstruct an area comparable to the current Citizens Dock "footprint" must be retained in order to replace its historic functions within Subarea 3C.
- Actions resulting in contaminated sediments have precluded dredging operations for many years at the head of Whatcom Waterway. Tidal action over the 30 to 40 years since the last dredging and the resulting sediment build up has eliminated opportunities for small boat commerce in areas adjacent to Colony Wharf dock and Citizens Dock and for small boat recreational day use in this portion of the Whatcom Waterway. Facilities for such small boat commerce and day use should be developed.

CITY OF BELLINGHAM

3. Comment noted, the references to views, day use activities around Citizen Dock, and trails/parks along the shoreline are all consistent with previous guidance provided by the City regarding the value of public access as a recognized land use around the waterfront.

4. The specific goals for public access within the Head of Whatcom Waterway have been incorporated into the Preferred Remedial Action Alternative evaluated in the final EIS to the greatest extent possible.

- Alternative 2C provides clear direction in those portions of the Whatcom Waterway that have continually been used for navigation and commerce, by identifying areas that are to be dredged and maintained at depths of 18' or 30'. Within Subarea 3C, the option for some dredging at lesser depths should be retained in conjunction with removal and reconstruction/relocation of Citizen's Dock.
- Subarea 3C is a priority area for habitat restoration, including removal of unsightly debris and remediation to create a productive habitat area that can also attract and educate citizens.
- Georgia Pacific should be required to construct functional public access docks and facilities that extend to suitable small boat depths in lieu of dredging the head of the waterway. Such a requirement would mitigate for the otherwise apparent loss of public access as a result of shoaling. This would result in the multiple benefits of public access, habitat preservation, minimization of handling of toxic sediment and reduced costs from avoiding dredging.
- Along the southern boundary of Subarea 3C, planned public access improvements and pedestrian amenities on Central Avenue west of Roeder, will be required as part of anticipated changes in truck access to the Georgia Pacific mill site. These plans should be considered and integrated into eventual solutions implemented by the Bay Pilot.

<u>Taylor Dock Area</u>

This area is located at the south end of the Bay. A funded project will repair and renovate the existing historic dock structure and rebuild/replace the over-water trestle connecting the dock to Boulevard Park providing major public access to the waterfront. This project is on hold awaiting direction from the Bay Pilot Project. Specific suggestions for this area are:

- Clean up state owned tidelands by removing contaminated pilings and capping contaminated sediments
- Provide a safe pedestrian crossing over the active rail line
- Preserve and enhance valuable eelgrass beds
- Provide interpretive and educational information about the Bay's cultural and natural features

I very much appreciate the opportunity to add these comments and specific suggestions to your comprehensive strategy for Bellingham Bay.

Sincerely,

Mark Asmundson

Mark Asmundson, Mayor

C: Christine Corrigan, Washington Dept of Ecology,
Tom Fitzsimmons, Washington Dept of Ecology
Patricia R. Decker, City of Bellingham
Chris Spens, City of Bellingham

CITY OF BELLINGHAM

5. See General Comment response #1 – Process for Implementation of the Comprehensive Strategy. The Bellingham Bay Comprehensive Strategy informs projects like Taylor Avenue Dock and it is up to each Pilot Team member to use this information. Beyond the near-term remedial actions, the Comprehensive Strategy does not resolve potential site-specific conflicts or opportunities. This would be done on a case-by-case basis using the Comprehensive Strategy to inform the discussion. As co-managers of the Pilot, Ecology and the Port of Bellingham are willing to facilitate dialogue between appropriate Pilot Team members regarding the Taylor Avenue Dock project.

Georgia-Pacific Corporation
Georgia-Pacific West, Inc.
A wholly owned subsidiary

P.O. Box 1236
Bellingham, Washington 98227-1236
Telephone (360) 733-4410
Fax (360) 676-7217

September 20, 1999

Washington State Department of Ecology
Northwest Regional Office
Attn: Christine Corrigan
6190 160th Avenue SE
Bellevue, WA 98008-5452

Re: Comments on July 1999 Draft Environmental Impact Statement
"Bellingham Bay Comprehensive Strategy"

Dear Ms. Corrigan,

Georgia-Pacific West, Inc. is proud to be a cooperative participant in the Bellingham Bay Pilot Project, a comprehensive and innovative project to define remedies for contaminated sediments in Bellingham Bay. We provide the following formal comments on the Bellingham Bay Comprehensive Strategy Draft Environmental Impact Statement (DEIS), demonstrating our support for remedies in Bellingham Bay that embody the elements contained in DEIS alternative 2A.

1 Georgia-Pacific West, Inc. supports a Comprehensive Strategy that complies with the State's Model Toxics Control Act (MTCA). With respect to the goals of the Baywide Pilot (page S-1), only two Integrated Near-Term Remedial Action Alternatives presented in the DEIS meet the substantive elements of all 6 goals of the Baywide Pilot; these are alternatives 2A and 2C.

2 We affirm that confined aquatic disposal (CAD) is a proven technology, used internationally, nationally and in Puget Sound for other sediment projects, that can be effectively designed and constructed to meet the long term disposal needs of dredged contaminated sediments. We fully support the use of CADs in the final remedy in Bellingham Bay, including the use of Georgia-Pacific owned aquatic lands.

3 Natural recovery (enhanced) should be used wherever it can be effectively implemented, because it minimizes the risk of re-contaminating the water column and effectively protects the environment and human health. Most solutions in the DEIS incorporate capping as a component of an effective remedy.

4 Alternatives that maximize the amount of habitat restoration are of great value and should be advanced in the preferred alternative. Alternatives 2A and 2C provide the most cost

GEORGIA PACIFIC-WEST

1. Comment noted.
2. Comment noted, see also General Comment response #4 - CAD Design.
3. Capping (including enhanced natural recovery) can be a viable component of sediment cleanups. Isolation technologies have been demonstrated to effectively eliminate or reduce exposure pathways, thereby protecting human health and the environment.
4. Comment noted.

effective and resource sensitive means of improving aquatic habitat of the five DEIS alternatives.

5 Georgia-Pacific West, Inc. would like to continue the cooperative spirit of the Pilot Project and move efficiently and rationally to a Bay that is cleaner, safer and more vibrant. To this end, we believe that DEIS alternative 2A best meets our cleanup obligation and is the most implementable of the five DEIS near-term remedial action alternatives.

Sincerely,

J. W. Cunningham
General Manager

Cc: Lucy Pebles, Department of Ecology, NWRO
Mike Stoner, Port of Bellingham

GEORGIA PACIFIC WEST

5. Comment noted.

PUGET SOUNDKEEPER℠ ALLIANCE

Protecting & Enhancing Puget Sound

September 15, 1999

Ms. Christine Corrigan
Department of Ecology
Northwest Regional Office
3190 - 160th Avenue SE
Bellevue, WA 98008

Dear Ms. Corrigan:

Puget Soundkeeper Alliance is a marine conservation organization focused on preventing pollution in Puget Sound. We recently launched a North Sound BayKeeper in partnership with RE Sources in Bellingham to enhance our organizations' efforts to protect North Sound's valuable marine resources.

5 W. Dravus
Seattle,
Washington
98119

Phone
06.286.1309

Facsimile
06.286.1082

Puget Soundkeeper Alliance also settled a lawsuit against Georgia-Pacific Corp. last year for their mercury discharges to Bellingham Bay. As a part of that settlement, Georgia-Pacific first committed to conducting an audit of all mercury sources and pathways to their pulp and paper mill waste stream, and then to closing the chlor-alkali plant where the mercury was generated. As you are aware, mercury will continue to be discharged to the bay by Georgia-Pacific while clean up of the chlor-alkali plant is being conducted.

We are distressed to see that the Bellingham Bay Comprehensive Strategy Draft
1 Environmental Impact Statement clearly favors confined aquatic disposal as a "clean up"
option for mercury contaminated sediments caused by Georgia-Pacific's historical
2 releases to the bay. We are further troubled by the DEIS' short-term (5 year)
consideration of the potential for re-contamination by ongoing sources, and the lack of
3 substance and detail in the discussion of how a CAD cap would be constructed, what
depth would be required to assure environmental and public health, and what would be
4 the long term costs of effectively retiring those aquatic lands by limiting future uses.

Puget Soundkeeper Alliance joins RE Sources in supporting dredging and upland
disposal over confined aquatic disposal, with suggested improvements as outlined in their
5 September 15, 1999 letter, a copy of which is attached. The voluntary, consensus-based
pilot process guiding the clean up of Bellingham Bay runs the risk of being compromised
and sacrificing its legitimacy if it becomes apparent that Georgia-Pacific's unwillingness
6 to pay is forcing a substandard clean up plan to prevail. We are hopeful that the Final EIS
and Preferred Alternative selected is based on sound science and environmental health,

PUGET SOUNDKEEPER ALLIANCE

1. See General Comment response #4 - CAD Design.

2. See General Comment response #7 – Source Control.

3. See General Comment response #4 - CAD design. CAD and cap design issues have been developed to a sufficient level of detail to analyze impacts. Further detail would be provided as appropriate in subsequent phases of the project (i.e., permitting and draft cleanup action plan). Public comment would be solicited during these subsequent phases.

4. See General Comment response #2 – Cost Estimating. Also, the Preferred Remedial Alternative evaluated in the EIS locates the CAD to achieve a balance between navigational, public, and tribal uses. In addition, the CAD will provide important intertidal and shallow subtidal habitat that is expected to be used by various marine organisms. Lastly, in terms of costs that a CAD may create through limiting future uses, the DNR could generate lease revenue from the land even if it used as a CAD site.

5. As directed under MTCA, Ecology would ultimately approve only those cleanup plans that are protective of human health and the environment. In addition, cost effectiveness and ability to be implemented are also criteria that Ecology must consider when selecting a remedy. This means that an alternative shall not be considered practicable if the incremental cost is substantial and disproportionate to the incremental degree of protection provided by the alternative over other lower cost alternatives. The rationale for the remedy that Ecology ultimately selects will be articulated in a draft Cleanup Action Plan for public review.

6. See response to Puget Soundkeeper Alliance comment #5 above.

and not on the cost Georgia-Pacific is "voluntarily" willing to pay for clean up of its decades of mercury disposal into Bellingham Bay..

I look forward to your response. If you have any questions, please feel free to call me at (206) 286-1309.

Sincerely,

BJ Cummings
Puget Soundkeeper

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SIERRA CLUB
MT. BAKER GROUP
P.O. BOX 1722
BELLINGHAM, WASHINGTON 98227

RECEIVED
SEP 20 1999
DEPT. OF ECOLOGY

Christine Corrigan
Dept. of Ecology
3190 160th Ave SE
Bellevue, WA 98008

Dear Christine:

The cleanup of Bellingham Bay represents one of the more important and significant environmental rehabilitation endeavors in the history of Washington State. I sincerely hope that all parties involved, both public and private, are committed to undertaking a recovery project that will result in the *most effective and complete* removal and/or containment of contaminated bottom sediments in the Bay.

The contamination in Bellingham Bay is severe. The burial of contaminated material by
effluent sediment deriving from the Nooksack River is a very slow natural process. In
addition, this newer effluent deposition along with the existing contaminated sediment is
1 disrupted, from time to time, through dredging operations which maintain shipping lanes
in the Bay. Subsequently, some toxic bottom material is re-released into the water column
and redistributed in the Bay further exacerbating an already dire situation. Given the recent
2 listing of Chinook salmon and the probable future listing of Pacific Herring, the proposed
cleanup of Bellingham Bay becomes an absolute and immediate necessity to maintain the
health and perpetuation of these fishes along with the entire marine biotic community.

The Mount Baker Group - Sierra Club believes that re-mediation efforts must focus
3 *primarily* on the removal and transport of contaminated sediments to upland disposal
sites. Aquatic lands should not be used as disposal sites. In our opinion, those areas of
high toxicity (e.g. Georgia-Pacific's log pond) where dredging will release very high
4 amounts contaminated materials, underwater capping must be applied in such way as to
permanently prevent the escape of pollutants back into the water column. In those areas
where contaminants do not exceed either SQS or BSL criteria, capping may be a viable
5 option. We further contend that removal or containment procedures be implemented with
the best available science and technology. Anything short of this will be shamelessly
irresponsible.

It is the opinion of the Mt. Baker Group that a Citizen's Oversight Committee be
6 established to:

Serving Whatcom, Skagit and San Juan Counties

SIERRA CLUB, MT. BAKER GROUP

1. Maintenance dredging of navigable waterways is conducted by the Corps of Engineers. Their maintenance program requires testing of the material for suitability of open water disposal (their default disposal sites) before dredging occurs. If material is not suitable for open water disposal, then an acceptable disposal location must be determined before dredging can occur. For this reason, dredging has not occurred in the Whatcom Waterway for more than 20 years. Dredging related release of contaminated sediments into the water column is a concern, and it is one of the reasons wide spread removal throughout the Bay is not a high-ranking alternative. However, in areas such as a navigation channel, it is the only viable option and operational controls (i.e., closed buckets, retrieval rates, silt curtains, etc.) would be considered when dredging contaminated sediments.

2. Ecology recognizes the importance of improving degraded habitat that continues to be impaired by contaminated sediments, and remediating contaminated sediments is a complex process. This is the reason why the Bellingham Demonstration Pilot was instituted. Following issuance of the EIS, the EIS and the remedial investigation/feasibility studies completed for the Whatcom Waterway and Cornwall Avenue Landfill sites will be used to inform Ecology's selection of a remedy.The selected remedy will be articulated in a draft Cleanup Action Plan(s) distributed for public review and comment.

3. Upland disposal has been evaluated in the EIS.

4. See General Comment response #6 - Cap Design. Also, cap thickness in the G-P Log Pond would average 5 to 10 feet for purposes of achieving desired habitat elevations consistent with the objective of creating intertidal habitat in this urban estuary area. This thick capping layer would provide added protection in isolating contaminated sediments in the Log Pond.

5. Ecology concurs with the need to use best available science and technology, see also responses to General Comments 3, 4 and 6, Treatment Options, CAD and Cap Design, respectively.

6. See General Comment response #1 - Process for Implementation of the Comprehensive Strategy. Also, public comment and input would occur during the permitting and cleanup action plan phases of the project. These phases of the project would define the monitoring requirements associated with remedial action(s) selected for the Bay.

1.) Monitor disposal sites to review and approve the method of disposal,

2.) To approve or disapprove companies bidding to clean up Bellingham Bay,

3.) Initiate periodic reviews of the removal process, and

4.) Establish a source point control plan to prevent future contamination of Bellingham Bay.

To reiterate, we believe that the best available science technology must be implemented for the following tasks:

- To remove contamination from the biotic community,
- To contain the contamination.

A Citizen's Oversight Committee be established to:

- To monitor the disposal sites,
- To ensure that further contamination is minimized to the largest extent possible.

I would like to thank the Department of Ecology for allowing us this forum to provide our input and comments on the draft EIS for Bellingham Bay.

Sincerely Yours,

Randy Walcott

Randy Walcott
Chair, Mt. Baker Group - Sierra Club

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Following is a review of Alternative D, in the format presented in Table 2.3-1 Summary of Integrated Near Term Remedial Action Alternatives in the DEIS. By and large, Alternative D is compatible with the Mt. Baker Group's collective opinion regarding a clean up strategy for Bellingham Bay. The far left column indicates the Mt. Baker Group's endorsement or recommended changes to Alternative D.

	Contaminated Sediment Cleanup Area	Alternative D As Presented in DEIS	Mt. Baker Group - Sierra Club Endorsement
	Whatcom Waterway Site		
	Mid/Outer Whatcom Waterway: 30' Federal Channel	Dredge with Upland Disposal (570,000 cu.yds.)	Endorse/no change.
	Head of Whatcom Waterway: 30' Federal Channel	Dredge & Cap with Upland Disposal (80,000 cu.yds.)	Endorse/no change.
7	**Head of Whatcom Waterway: 18' Federal Channel**	Dredge Existing Channel (excl. Citizens Dock) (40,000 cu.yds.)	Dredge all sediments exceeding SQS w/ Upland disposal. Restore valuable mudflat with clean sediments to depths allowing pleasure craft access of Citizen Dock.
	I & J Waterway	No Action	Endorse/no change.
	G-P Log Pond	Cap with armor/habitat layers	Endorse/no change.
	G-P ASB	Partial Dredge of Mercury BSL areas & Cap (200,000 cu.yds.)	Partial Dredge of Mercury BSL areas and areas exceec SQS; upland dis of dredge spoils Cap remaining area add habitat layers.
	Port Log Rafting Area	Partial Dredge for Chem. Dock/Cap (60,000 cu.yds.)	Partial Dredge for Chem. Dock w/ Upland Disposal

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7. Ecology appreciates the specific comments recommending modifications to Alternative 2D. This input was considered in generating the Preferred Remedial Action Alternative that is evaluated in the final EIS.

		Cap remaining contaminated areas in place.
Starr Rock	Partial Dredge of Mercury BSL Areas & Cap (130,000 cu.yds.)	Partial Dredge: all areas exceeding BSL & SQS criteria; Upland Disposa Cap remaining contaminated areas in place; ensure cap is extra thick because of proximity to public park and fishing/crabbing.
Cornwall Avenue Landfill	Cap	Dredge w/upland disposal of all contamir materials.
Harris Avenue Shipyard	Partial Dredge w/ Upland disposal & Cap (20,000 cu.yds.)	Dredge w/Upland Disposal (50,000).
G-P Outfall	No Action	Endorse/no change.
Other Sediment Sites	Dredge with Upland Disposal (40,000 cu.yds.)	Endorse/no change.

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RE Sources Comments

15 September, 1999

Christine Corrigan
Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Dear Ms. Corrigan:

RE Sources has worked with a variety of local citizens and scientists to review the Bellingham Bay Comprehensive Strategy Draft Environmental Impact Statement. Following are comments and concerns about this document and how it was prepared.

General Approach

We were disappointed in the whole approach of this DEIS. The format was confusing to the general reader, and even those citizens with technical expertise were hard put to understand the various alternatives as presented. Relying on 9 volumes of dense and technical documentation reports and Remedial Investigation/Feasibility Studies that are well beyond the comprehension and stamina of even well-educated and dedicated readers, does an end-run around the SEPA process and the EIS requirement. What is the point of printing an impact statement that contains very little solid data, no engineering detail, and omits all background documentation? Statements such as "to be completed at a later date" or "to be dealt with in final engineering" make the public involvement process an exercise in hoop-jumping. Very few citizens could possibly provide substantive comment on this document as it provides little substantive information.

We must also register our dissatisfaction that while there was no preferred alternative put forth, various work group members have been actively promoting what has essentially been alternative 2C for well over a year before we ever had an EIS. How fortuitous that this is the alternative that ranks the highest in meeting the goals of the pilot project. A few citizens have certainly commented to me that the goals of the pilot were engineered to support the chosen alternative, rather than the other way around. This does lead one to believe that the outcome for this entire process has been predetermined.

Source Control

We are concerned that the DEIS does not adequately address the issue of source control. As the agency responsible for issuing and enforcing NPDES discharges for point sources, Ecology must ensure that, through the NPDES process, no single source or combination of sources result in future contamination of sediments in the bay. There are currently several discharges releasing toxic chemicals that may have the potential to contaminate the bay. Contaminants of concern currently discharged into the bay or nearby waterways include pentachlorophenol, dioxins, furans and a variety of metals.

RE SOURCES

13. There is no comment #13.

14. See General Comment response #2 – Cost Estimating and 5 – CAD Design.

15. See General Comment response #2 – Cost Estimating.

16. See General Comment response #2 – Cost Estimating.

17. See General Comment response #2 – Cost Estimating.

18. See General Comment response #4 – CAD Design.

19. See General Comment response #4 – CAD Design.

20. See General Comment response #4 – CAD Design.

21. See General Comment response #4 – CAD Design. The original Denny Way cap was constructed prior to effective source controls at the adjacent combined sewer overflow outfall; source controls are now being performed at this site as a supplemental project. By contrast, source controls are now complete near the proposed Bellingham Bay CAD sites, and would be completed in other areas of Bellingham Bay prior to remedial action (see also General Comment response #7 – Source Control). Monitoring of the St. Paul Waterway has continued to demonstrate the effectiveness of this cap, while also serving as a base for a highly productive habitat restoration effort. Finally, initial cap placement at the Boston Harbor CAD used techniques that promoted mixing of the cap with underlying sediments. These problems could have been avoided if the cap were to have been constructed following existing Corps and EPA guidance (see also General Comment response #6 – Cap Design). Ecology (and other regulatory agencies) would only approve the Bellingham Bay CAD design if it has been developed to achieve these current standards; upland disposal has been identified as the contingent remedy in the event that the CAD cannot be designed to achieve these protection standards. Long-term monitoring would be performed to verify the protectiveness of the CAD and caps, and to determine the need for future contingency actions.

exposed four months after cap placement. Additionally, contaminants in the CAD mixed with cap material, resulting in uneven isolation of contaminants from the marine environment. Independent evaluation of this CAD is finding that the capping process was more complex than originally expected. It is unclear about the short-term or long-term success of the Boston Harbor CADs to isolate contaminants from biota. The Boston Harbor case is not included in the review of CAD sites for this DEIS.

Environment Canada has recently developed a policy based on RRH (rapidly rendered harmless) provisions, which bioassays to demonstrate that any harmful effects of the material for a proposed CAD would be 'rapidly rendered harmless by physical, chemical or biological processes of the sea.' These bioassays measure the level at which substances cause acute toxicity in amphipods, significantly reduce the success of fertilization in sea urchins and sand dollars, significantly reduce the bioluminescence of luminescent bacteria, and permanently accumulate in tissues (bioaccumulation). Some sediments that do not meet the RRH testing protocol are considered inappropriate for ocean disposal, even in a CAD. Depending on the amount and nature of the contamination, many contaminated sediments are considered inappropriate for CAD disposal by the Canadian government. This information is not included in any of the background or reference material we reviewed for this project.

Issues or cap/CAD erosion and anchor drag are barely discussed or discounted. Given that the
2 Cornwall Avenue Landfill site is known to have experienced sever erosion due to wave action,
this should certainly be better documented in the DEIS.

Additionally, we are concerned about documentation about CAD design and construction. Once
again, many of the details necessary to make an educated decision about the appropriateness of
CAD sites in our bay were left up to "final engineering." How can the public decide, for
3 example. whether it is appropriate to site a 40 acre CAD off a popular waterfront park, a CAD
that would create an inter-tidal beach of cap material and would most likely be easily accessible
from the shore, when we do not have details such as how deep the clean cap will be?
Additionally, the DEIS states that a cap approximately 2 feet in thickness will be placed on top of
4 the Starr Rock Cad. A cap of this thickness is hardly appropriate on a site that will include
publicly accessible tidelands. A child could easily dig 2 feet whilst building a sand castle at low
tide. Other CAD sites have included caps up to 15 feet thick.

The above issues certainly bring into focus the primary question posed by this DEIS, and indeed, by sediment cleanups throughout the Sound: should aquatic lands be used as dump sites? One local citizen summed up the nature of this question when he asked, "If our community had an upland site that was contaminated with these chemicals, what would we choose to do with them? Would anyone in their right mind propose dumping them in the Bay?"

If upland disposal of these toxic materials required the construction of a new hazardous waste
facility. there would be many serious implications to such an option. While there are certainly
5 still environmental impacts to upland disposal, we maintain that upland disposal is merited when
the majority of contamination is caused by methyl-mercury. which is highly toxic in the aquatic
environment and bioaccumlative. Given that there is a licensed hazardous waste disposal facility
that has indicated the ability to accept these sediments, many of the negative implications of

RE SOURCES

6. See General Comment response #7 – Source Control.

7. See General Comment response #7 – Source Control. Additionally, PAHs in stormwater do not appear to be an active on-going problem as PAHs have rarely been detected in elevated levels at any of the sediment sites in Bellingham Bay (see Bellingham Bay Demonstration Pilot Sediment Site and Source Control Documentation Report).

8. See General Comment response #2 – Cost Estimating.

9. See General Comment response #2 – Cost Estimating.

10. See General Comment response #2 – Cost Estimating.

11. See General Comment response #2 – Cost Estimating.

12. See General Comment response #2 – Cost Estimating. Long-term monitoring, maintenance, and repair costs included in the preliminary cost estimates presented in the final EIS have been calculated on a present worth basis for activities occurring for the next 30 years. Also, a detailed Operations, Maintenance and Monitoring plan would be developed and approved by Ecology as part of the implementation of a Cleanup Action Plan. It would likely include relatively frequent monitoring, followed by a summary report for Ecology review. Based upon the summary report the need for and frequency of continued monitoring would be determined by Ecology.

CAD and cap sites shows that aging caps and CADs are more likely to show the effects of wave
action, erosion, prop scour and shifting. It also seems that there is no funding built into these
14 budgets for CAD or cap repair, except a modest contingency/indirect cost line item. The tipping
fee at the upland disposal site covers on-going permitting, monitoring, and cell repair costs over
time. It also includes the cost of using the land upon which the landfill is built. The cost
15 estimates for CAD alternatives do not include the long-term cost of use of publicly-owned
tidelands. Thus we find that the cost estimates of Table 2.3-1 are not comparable, but rather a
comparison of "apples and oranges".

We believe that a full accounting of the estimated costs of each alternative including the detail
16 backup and sources for these estimates should be included in the main body of the EIS document.
We further request that these complete and full costs become part of valid comparison of
estimated costs of the alternatives or that costs be removed from consideration in the EIS
17 altogether.

Aquatic versus Upland Disposal:

Before addressing the alternatives presented in the DEIS in detail, we would briefly like to discuss the question of upland versus aquatic disposal. Given that the public is not offered an alternative that allows for natural recovery of the bay, it seems a given that at least some dredging will occur. Dredging may be appropriate as natural recovery is a slow process and aquatic organisms, particularly those in the benthos continue to be exposed to contaminants. Assuming that dredging is appropriate, the dilemma posed by the cleanup focuses on how much material should be dredged and what shall be done with the contaminated dredge spoils.

My organization's primary concern with this project is the health of the aquatic environment. We
want any alternative to remove the threat of further negative impacts to aquatic organisms from
the contaminants in the bay. We are distrustful of alternatives that rely on Confined Aquatic
Disposal (CADs). This is because of the uncertainty surrounding CADs. The DEIS did not give
18 enough information about the long-term viability of CADs. A brief study of CADs referenced by
the DEIS includes only a brief review of CAD sites in Puget Sound, most of which are too new
to draw any conclusion as to their long-term stability and effectiveness. While we understand that
19 sites outside the Puget Sound area may not share all of the same conditions affecting CAD
stability, it is certainly worth a brief review of other, older CADs. Additionally, while we respect
that it is often preferable to take advantage of emerging technologies, we feel that this DEIS has
20 not adequately documented the pros and cons of CADs, but has chosen to reference only CAD
sites that have been deemed successful.

A cursory review of CAD sites, both in the Sound and elsewhere shows that CAD containment of
21 contaminants is marginally reliable. For example, a CAD site near the Denny Street CSO in
Seattle was contaminated by discharges by the CSO; might this be an issue for the Cornwall
Avenue site? In the St. Paul Waterway, a CAD with a 15 foot cap that created an intertidal
mudflat has been bubbling methane gas, opening exposure pathways for other contaminants.

According to DAMOS, the Boston Harbor CAD experienced problems during cap placement. It was assumed in engineering that tidal currents would move clean sediments into their final place. However, this did not occur and contaminated sediments on the south end of this CAD remained

RE SOURCES

1. The format and packaging of the EIS and its companion documents was intended to enhance the SEPA process. The approach used was consistent with regulations governing integration of cleanup under MTCA and environmental review under SEPA, and was an attempt to provide the public with backup and supporting information to further their review of the EIS. In addition, the SEPA rules state that environmental impact statements shall be concise, clear and to the point, and that the purpose of an EIS is best served by short documents containing summaries of, or reference to, technical data.

2. Additional engineering information is provided in General Comment responses 4 and 6 - CAD and Cap Design, respectively. However, the environmental review process does precede final engineering, and some details are resolved in future phases of the project. The final design must ensure that the impact analysis and conclusions determined in the EIS would be met by the final design.

3. The EIS presents an array of alternatives developed during the Pilot project, and qualitatively evaluates them (see Table 2.3-2) according to how they meet objectives set forth by the Pilot project.

4. The Preferred Remedial Action Alternative evaluated in the final EIS was developed based upon public comment. Also, no remedial alternative has been selected at this time. The EIS and the remedial investigation/feasibility studies completed for the Whatcom Waterway and Cornwall Avenue Landfill sites (which were subject to public review) will inform Ecology's selection of a remedy. The selected remedy will be articulated in a draft Cleanup Action Plan(s) for public review and comment.

5. See General Comment response #7 – Source Control.

5 Additionally, the time-frame for modeling for suspected contamination resulting from a given point source should be relatively long. The modeling conducted by Ecology to determine that GP's current outfall would not result in a violation of SQS was predicated upon a five year time frame. This is certainly not a long enough window. It took more than 30 years of discharges for the contamination that is currently in place to occur; why should predicting future contamination use such short time frames?

7 Another important avenue for potential recontamination of sediments in the bay is storm water. This plan barely mentions this possibility, particularly the very real possibility of PAH contamination. Until Ecology seriously addresses contaminants carried in storm water, recontamination will occur throughout the Sound.

Cost

We are very concerned about the analysis of costs and the use of cost estimates in the DEIS. Estimated costs for each alternative are shown in Table 2.3-1, Summary of Integrated Near-Term Remedial Action Alternatives, and are referred to as "Approximate Construction/O&M
8 Cost". The document contains no discussion of the basis for determining these estimated costs or any mention of the detail backup or assumptions used in their calculation. Three different RI/FS reports are necessary to obtain any information on their derivation. In addition, the
9 "Aquatic Land Costs",
the costs associated with using state-owned land or privately-owned land for capping or disposal of contaminated sediments which are potentially substantial, remain undetermined and unknown. Table 2.3-1 presents these estimated costs for each alternative as a "bottom line" financial comparison that is obviously meant to have substantial influence on the readers choice of an alternative. We believe that presenting this cost information in this manner, in an incomplete form without explanation, is misleading.

We are further concerned with the accuracy of the derivation of the estimated costs for each
) alternative. The three RI/FS reports show their cost calculations in several different formats. Adding figures together from each of the three RI/FS documents is difficult because they do not
1 all
present the alternatives in the same format or amount as depicted in the DEIS. For example, using figures from the DEIS, the estimated cost is $37 million for Alternative 2C. When we go to the RI/FS documents, however, we find that clean-up of the Whatcom Waterway for this alternative will cost $35,974.000 (Table N-9, Whatcom Waterway RI/FS). Next, it is difficult to determine which of the alternatives presented in the RI/FS for the Cornwall Avenue Landfill is actually the alternative presented as 2C in the DEIS. The least expensive alternative for this site is $1,120,000. Adding these two amounts, the cost becomes $37,094,000, and we have yet to add in the Harris Avenue Shipyard site. The information in the DEIS and the RI/FS documents is presented in such a manner as to confuse anyone attempting to truly understand the estimated costs and their origin.

Finally, it is unclear just what costs are included in the cost estimates. The Cornwall Avenue
2 RI/FS states monitoring will be conducted quarterly for the first 2 years, and then annually for years 3-5. Should we take this to mean that monitoring will cease after year 5? Our review of

RE SOURCES

22. See General Comment responses 4 and 6 – CAD and Cap Design, respectively.

23. See General Comment responses 5 and 6 – CAD and Cap Design, respectively. Also note that the location of the CAD included in the Preferred Remedial Action Alternative evaluated in the final EIS has been moved north, away from Boulevard Park.

24. See General Comment responses 4 and 6 – CAD and Cap Design, respectively.

25. See General Comment responses 3, 4 and 6 – Treatment Options, CAD and Cap Design, respectively.

constructing a new facility do not need to be considered, making upland disposal a more attractive option.

Habitat Enhancement

26 Habitat restoration is certainly a worthy goal, however, the public must have assurance that habitat function will meet or exceed pre-disturbance conditions. In the absence of this assurance. characterization of aquatic resource benefits as presented in the Draft EIS may be misleading. It is especially important that aquatic resource benefits be characterized accurately because of the potentially sweeping nature of this strategy as a model for statewide mitigation activities. Providing this assurance may be difficult in instances where the long- term success of the restoration/mitigation measure is not well documented, as is the case for eel grass bed restoration. An assessment of the potential long-term performance of CAD facilities in Bellingham Bay acknowledges moderate or poor success of eel grass restoration projects in the Pacific Northwest
(Anchor Environmental, LLC, 1999). Success of large eel grass restoration projects more closely resembling some of the larger proposed habitat conversions is not documented.

27 Contrary to the presentations to the community and the optimistic and vague verbiage in this EIS, successful eel grass planting and enhancement should not be assumed. Our survey of literature on eel grass enhancement shows that this method of habitat enhancement meets with success in very specific circumstances.

- 28 Small restoration sites (less than 5 acres) in areas where native eel grass has historically grown. have shown the most success. Large sites, such as those presented in this EIS do not have a particularly high rate of success. One 200 acre site in our survey was deemed a success but only after 20 years of successive plantings and replantings!
- Substrate choice is also critical. CAD/Cap surfaces must very carefully mimic the size and character of nearby sediments where eel grass is established.
- Species choice will affect planting success. While the EIS references both types of eel grass to be found locally, it does not discuss the eel grass to be used in these planting efforts. Zoestra japonica, the introduced Japanese eel grass, is hardier and much easier to propagate that the native eel grass, Zoestra marina. Z. japonica, however, has much shorter blades that Z. marina, providing little hiding and cover habitat for juvenile salmonids. In fact, Z. japonica is virtually useless as salmon habitat. Z. japonica is an introduced species offering greatly reduced habitat value as compared to the native eel grass. If eel grass is to be planted as a part of this project. it should be restricted to the native Z. marina. If native eel grass would be transplanted, however, the EIS should document the impacts incurred at donor sites.
- Another problem encountered during eel grass restoration efforts is the destruction of newly planted eel grass by crabs. Projects in areas with thriving crab populations are plagued with this problem, which often results in project failure. This problem is not discussed mentioned in the DEIS or background documentation.

Since functional equivalency of the restored or created habitat is central to the success of habitat restoration. a functional equivalency model for Bellingham Bay and other bay-wide projects should be completed before selection of an alternative and presented in the EIS. Mitigation ratio formulas should also be developed prior to selection of an alternative and presented in the EIS. Monitoring of appropriate control sites is absolutely necessary to determine

RE SOURCES

26. The habitat analyses incorporate habitat function into the evaluation.

27. Reference to eelgrass restoration associated with some of the remedial measures has been qualified to indicate the potential for eelgrass is provided, recognizing it has not been implemented on a wide-scale basis in Puget Sound.

28. See response to comment 27 above,

29. The final EIS includes a Preliminary Draft Habitat Mitigation Framework that incorporates habitat ratios and functions. Resource agencies can elect to use this framework to inform their determination of mitigation requirements for the remedial action alternative that is ultimately selected by Ecology through the MTCA process. This work typically occurs during the permitting phase of a project, and includes public review.

30. See response to comment 29 above.

1 whether expected aquatic resource benefits are realized. The proposed mitigation framework as it stands appears far too risky for a community to count on for the benefits promised.

The creation of eel grass should be separated from disposal site construction. There are two reasons for this. First, we are concerned that eel grass roots will penetrate the cap and may uptake
2 contaminants, pulling them into the biologically active zone. Secondly, we do not feel that we can only restore this valuable habitat by linking it with Confined Aquatic Disposal. Why should we have to choose a hazardous waste dump with the possibility of habitat on top or no habitat at all? We suggest if Ecology is serious about habitat restoration in Bellingham Bay, the agency should bring clean sediments to build suitable subtidal substrate for eel grass, and then conduct its replanting experiments. They could also remove the toxic sediments that comprise the mudflat at the head of the Whatcom Waterway and then replace them with clean sediments, re-creating a clean mudflat in which intertidal organisms could thrive.

Another concern regarding eel grass and CAD placement, is the possibility of invasion of the
3 CAD site by the more aggressive Z. japonica, which can invade newly created bare patches within native Zostera meadows and now occupies formerly unvegetated flats, substantially altering the ecological role of these habitats. Even a well-meaning attempt to plant Z. marina could be de-railed by early colonization the area by Z. japonica.

Another issue is raised in the DEIS regarding habitat. A great deal of energy will be devoted to
4 creating eel grass beds that may be suitable habitat for migrating salmonids. Alternatives 2A, 2B, and 2C result in the loss of more than 30 acres of rearing habitat for flatfish, Dungeness crab and adult pandalid shrimp. Alternatives 2D and 2E result in far less destruction of bottom fish habitat. Several flat and bottom fish species are currently being considered for listing under the Endangered Species Act. We hope the planners of this project. in their zest to create salmon habitat. do not destroy habitat for other valuable fish species that are also on the verge of endangered status.

On-going Mercury Issues

On page 3-5 of the DEIS. it is stated that "outside the immediate discharge area of several urban streams. potentially toxic substances have not been detected in Bellingham Bay at concentrations exceeding state or federal water quality criteria." While toxics may not be detected throughout the Bay in quantities that exceed water quality criteria, there are certainly localized discharges beside those of local streams. Such localized discharges include the Georgia Pacific discharge, which reported 16 permit excursions for mercury in 1996, alone. The facility also reported several excursions in 1998 and 99. Mercury is certainly a toxic substance. and many of these discharges exceeded water quality criteria.

Additionally, the chronic compliance problems of this facility in 1996 brings into question the validity of the 1993 sampling at the outfall diffuser area. This data is referenced on page 3-14 of the DEIS. The 1993 sampling revealed that mercury concentrations exceeded criteria for "potential concern chemical criteria." Given the number and extent of permit excursions in 1996. this data should be re-assessed and confirmatory sampling conducted.

Page 3-10 states that the source of mercury into the bay from the GP facility has been controlled for nearly 30 years. This is only partially correct. This facility continues to discharge mercury

RE SOURCES

31. The Habitat Mitigation Framework has been updated as a Preliminary Draft, and incorporated into the final EIS.

32. Eelgrass roots do not typically penetrate more than a few inches into the sediment surface, and are not a concern for pathway exposure into underlying contaminated sediments beneath a cap. See response to DNR comment number #11 for information pertaining to bringing in clean sediments to build suitable intertidal and shallow subtidal elevations for eelgrass colonization.

33. A recent survey of the eelgrass along the Cornwall Avenue Landfill / Boulevard Park shoreline has indicated that some of the patchy eelgrass distribution historically occurring in that area has expanded substantially in recent years. This expansion has occurred with *Zoostera marina*, and there has been no indication that *Zoostera japonica* is invading the area. We are aware that *Z. japonica* has become more pervasive in other parts of the Bay.

34. See General Comment response #5 – Habitat Restoration and Mitigation. As with many habitat mitigation projects, there is always a need to understand the tradeoff between various types of habitat function that could potentially be created. The rationale for the shallow-water habitat was based primarily on the fact that it has historically been eliminated from the inner bay (see Bellingham Bay Demonstration Pilot Habitat Documentation Report). The shallow intertidal habitat, although used by outmigrating juvenile salmonids during specific months of the year, also provides valuable rearing habitat for juvenile flatfish and juvenile Dungeness crab.

35. See General Comment response #7 – Source Control. G-P closed the chlorine plant in 1999, ceasing further mercury discharges from this unit. An upland RI/FS at this site is scheduled to begin in late 2000, and will address ground water as a potential source of contamination.

36. See General Comment response #7 – Source Control. Recent NPDES sampling performed in 1999 demonstrated that sediments in the outfall area are now in compliance with SQS cleanup criteria.

37. See General Comment response #7 – Source Control.

into the bay, and, as noted above, has exceeded its permit limitations for this parameter on
8 numerous occasions. The GP chlor-alkalai facility, which has been responsible for the mercury
discharges, has been closed. However, this facility will be decommissioned and cleaned in the
coming years. It is important to take on-going mercury discharges during the cleanup of the
chlor-alkalai facility into account when planning the clean-up.

Errors and inconsistencies

The discussion on CAD facilities on page 2-4 of the DEIS states "CADs are designed and placed
9 in locations where they will always be underwater." However, on page 2-29, and again on page
2-34, the DEIS states "An additional 5 acres of intertidal and shallow subtidal mudflat would be
promoted within this general areas by finishing the surface cap of the G-P Log Pond CAD."
Table 2.3-1 Summary of Integrated Near-Term Remedial Action Alternatives (continued) also
references the creation of sub and intertidal habitat under Alternatives 2A and 2C, both of which
would be created as a result of CAD construction. Intertidal exposure of the Starr Rock CAD is
again referenced on pages 2-37 and 4-21. The intertidal nature of the CAD off Boulevard Park as
it is presented in the DEIS is very worrisome and inconsistent with the definition presented on
page 2-4.

Page 3-28 states that harbor seals "haul out on a small island north of the Portage Island spit."
While this is true, it should be pointed out that the Port Log-Pond site is also an active seal haul
) out. Harbor seals can often be found sunning themselves on the logs in this area and it is a great
location to observe seals from shore. Indeed young seal pups are often found alone on the logs,
while their mothers are hunting. This information may need to be taken account in timing
cleanup activities in this site and the Cornwall Avenue Landfill.

The issue of loss of contaminants is also downplayed in the DEIS. The DEIS states that 0.8-1.2% of the dredge spoils may be lost through resuspension in dredging and disposal action (page 4-10). According to the Puget Sound Confined Aquatic Disposal Study of February 1999, up to 5% of these contaminants may be lost under ideal conditions. A more thorough review of the impacts of potential contaminant loss is in order. Even at 1%, dredging would result in the loss of 4,200-23,190 cubic yards of contaminated sediment. Given the magnitude of the loss, the DEIS should more fully address the environmental impacts of resuspension of these quantities of methyl-mercury in the aquatic environment.

Alternatives

While we recognize that we are not yet at the stage where a preferred alternative has been chosen, we will take this opportunity to suggest which alternative might be most palatable to those concerned with aquatic health. We found that none of the alternatives quite met our goals, but that with some changes, Alternative D might be palatable to individuals and organizations concerned with aquatic health. On the following page, you'll find a review of Alternative D, in the format presented in Table 2.3-1 Summary of Integrated Near Term Remedial Action Alternatives in the DEIS. We have included suggested changes to this alternative in the right hand column. These suggestions should in no way be construed as a formal endorsement of this alternative, but as suggestions for ways to improve the alternative for consideration in the final EIS.

RE SOURCES

38. See General Comment response #7 – Source Control and responses #35 and #36 above.

39. See General Comment response #4 – CAD Design. Consistent with current design standards, contaminated sediment would only be placed within the permanently saturated zone. Also note that the Preferred Remedial Action Alternative evaluated in the final EIS excludes a CAD at the G-P Log Pond, and also shifts the Starr Rock CAD north, away from the Boulevard Park area.

40. The presence of seal haul-out areas in a number of areas throughout inner Bellingham Bay is acknowledged. The cleanup and habitat restoration actions described in the final EIS are expected to enhance populations of seals, as well as other marine life.

41. The EIS has been expanded to include additional discussion of potential sediment resuspension impacts during dredging. Dredging controls would be implemented, in any case, to ensure that water quality standards are attained and that the quality of adjacent sediments is protected.

42. See response to the Sierra Club, Mt. Baker Group comment # 7.

Contaminated Sediment Cleanup Area	Alternative D As Presented in DEIS	Suggested Improveme
Whatcom Waterway Site		
Mid/Outer Whatcom Waterway: 30' Federal Channel	Dredge with Upland Disposal (570,000)	no change
Head of Whatcom Waterway: 30' Federal Channel	Dredge & Cap with Upland Disposal (80,000)	no change
Head of Whatcom Waterway: 18' Federal Channel	Dredge Existing Channel (excl. Citizens Dock) (40,000)	Dredge all sediments exceeding SQS w/ Upland disposal Restore valuable mudflat with clean sediments to depths allowing pleasure cra access of Citizen Doc
I & J Waterway	No Action	no change
G-P Log Pond	Cap with armor/habitat layers	no change
G-P ASB	Partial Dredge of Mercury BSL areas & Cap (200,000)	Partial Dredge of Mercury BSL areas and areas exceeding SQS; upland disposal of dredge spoils Cap remaining area add habitat layers
Port Log Rafting Area	Partial Dredge for Chem. Dock/Cap (60,000)	Partial Dredge for Chem. Dock w/ Upland Disposal Cap remaining contaminated areas in place
Starr Rock	Partial Dredge of Mercury BSL Areas & Cap (130,000)	Partial Dredge areas exceeding BSL & SQS criteria: Upland Disposal Cap remaining contaminated areas in

		place; ensure cap is extra thick because of proximity to public park and fishing/crabbing
Cornwall Avenue Landfill	Cap	Remove all refuse and contaminated sediment from aquatic areas; capping the remainder acceptable if Contingent Actions on Page 4-16, including installation of a low-permeability cap with gas vent system, are implemented at time of cleanup
Harris Avenue Shipyard	Partial Dredge w/ Upland disposal & Cap	Dredge w/Upland Disposal of all sediments excee BSL and SQS; c. remaining in pla
G-P Outfall	No Action	Re-sample outfall area no action is sediment quality is the same as 1993 sample data
Other Sediment Sites	Dredge with Upland Disposal (40,000)	no change

Process Concerns:
Finally, we must register our concerns with the process that resulted in the creation of this document. While no Preferred Alternative has been put forth in this document, it has been obvious for well over a year which alternative many of the work group members would like. The fact that work group members have been out stumping for what is essentially Alternative 2C for at least a year before the EIS came out, raises serious concerns that the end product was pre-determined, undermining the SEPA process and the integrity of this DEIS.

13 We are also very concerned that the inclusion of Georgia Pacific Corporation, a private corporation that is liable for the majority of the contamination, as the only non-governmental work group member raises serious questions about the potential of conflict of interest as governmental agencies who also regulate the company, planned the clean-up. The corporation has a vested interest in ensuring the Preferred Alternative chosen is one it considers affordable. Having a party with this agenda as a member of a consensus-based work group undermines the spirit of consensus process as it is obvious in the resulting DEIS that alternatives that the company may not be willing to pay for are not given serious consideration.

Project Goals

14 "Faster, Better, Cheaper" assumes that achieving multiple objectives is both possible and desirable (Better). While dumping contaminated sediments into a CAD and then attempting to plant eel grass on it may be faster and cheaper, there is no sound science to suggest that alternatives using this approach will result in a better outcome for the aquatic environment. Setting goals such as this is also misleading, because the terms are not well defined -- Exactly what does "better" mean? Does that mean a better outcome for aquatic health? A better economic outcome? Or perhaps, it will result in a better political outcome? Without such clarity, such a goal should not be used as the basis of decision-making.

Thank you for the opportunity to comment on this DEIS. We hope that we might be more involved in later stages of the project, including choosing a Preferred Alternative, Design and Engineering, and, most especially, discussions about costs and financial liability. Thank you for your consideration.

Sincerely,

Robyn J. du Pré
North Sound BayKeeper

cc: Maria Peeler, Department of Natural Resources
Anne Robinson, EPA
Barbara Ryan, Bellingham City Council
Connie Hoag, Whatcom County Council
Mike Stoner, Port of Bellingham

RE SOURCES

43. G-P was included as a member of the Pilot Team in part because they are responsible for the largest area of contamination and they have been working with Ecology in the conduct of the Whatcom Waterway RI/FS, one of the high priority sites addressed in the EIS. In addition to G-P, other potentially liable parties are part of the Pilot Team – DNR, the Port of Bellingham, and the City of Bellingham. Inclusion of these parties, as well as the other 11 Pilot Team organizations has been key to the successful, timely resolution of a wide array of issues identified during the conduct of the Pilot. See also the response to the Puget Soundkeeper Alliance comment #5.

44. See General Comment response #s 4 and 6. All of the alternatives must result in a better outcome for the environment; if other goals can be met at the same time, then this is an added benefit.

    The EIS is not a decision document; rather it provides an environmental evaluation that informs future regulatory decisions. In terms of cleanup decisions, under the MTCA process the EIS and the RI/FS's completed for the Whatcom Waterway and Cornwall Avenue Landfill sites will inform Ecology's remedy selection. The selected remedy will be articulated in a draft Cleanup Action Plan(s) for public review.

September 20, 1999

Christine Corrigan
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Dear Ms. Corrigan:

People for Puget Sound is a citizen organization representing 10,000 members in the Puget Sound region. Our mission is to protect and restore Puget Sound through education and public involvement. Thank you for the opportunity to comment on the Bellingham Bay Comprehensive Strategy Draft Environmental Impact Statement. Following are our comments and concerns about this document. For more detailed concerns please refer to the comments submitted by ReSources, an organization that has been working closely with the Bellingham community on this and many other issues regarding the health of Puget Sound and Bellingham Bay.

People for Puget Sound believes that any process that adequately reflects the
concerns of the public, must involve the public from the beginning. The
1 Bellingham Bay Demonstration Pilot has chosen to craft a mission statement,
goals. and recommendations without adequate public/citizen representation. This
DEIS provides us with the first "official" opportunity to comment. We hope that
the Dept. of Ecology and other agencies repeating this process will revise this
strategy so that citizens can help shape the mission and goals of a cleanup plan,
not just pick from a selection of alternatives derived from goals set by resource-
strapped agencies and industries responsible for much of the pollution

We agree that comprehensive planning--thinking about how cleanup, restoration
and ongoing source control work together-- is the best way to approach a healthy
recovery of Bellingham Bay. While the Comprehensive Strategy seems to
embrace this approach, we have some concerns that the DEIS does not include
2 enough information to demonstrate that any of the cleanup alternatives. habitat
restoration, and source control measures will actually achieve the 6 stated goals of
the project. We understand there are numerous supporting documents and plans
that provide some further information. But we also understand that very
important decisions are still to be determined. such as the engineering and design
of most of the cleanup alternatives and habitat restoration projects, monitoring of
3 sediment quality and habitat function, and increased control of ongoing pollution
sources, such as stormwater. With this in mind. we urge the Department of
Ecology to make sure that there is meaningful public participation (i.e.. not just
notification) as these decisions are made.

PEOPLE FOR PUGET SOUND

1. The Pilot Team is made up of a wide variety of agencies, each with varying mandates of representing public interests. Additionally, Ecology provided a grant to RE Sources to heighten public awareness of the Pilot project. Prior to development of the draft EIS, Ecology held a public scoping meeting and comment period, soliciting feedback from the public. The alternatives presented in the draft EIS provided another official opportunity to comment. See also response to RE Sources comment #4.

   The EIS is not a decision document. Rather, it provides an environmental evaluation that informs future regulatory decisions. Public involvement is a key element of the regulatory decisions that will be made.

2. Public involvement is a key element of the regulatory decisions that would be made. The alternatives presented in the EIS were assembled by the Pilot Team, and were designed to be consistent with the Comprehensive Strategy and meet the Pilot's baywide goals.

3. Comment noted.

Source Control

4 When undertaking a project of this magnitude, it is irresponsible to underestimate the ongoing sources of pollution, and the potential for recontamination. Certainly, as any entity involved in the cleanup of toxics understands, prevention is the "faster, better, cheaper" way to deal with pollution. Ecology must ensure that, through the NPDES and other source control process, no single source or combination of sources result in future contamination of sediments in the bay. Modeling may show that current water and sediment quality standards will be met (for how long?) , except in localized areas. Unfortunately, with bioaccumulative, persistent and toxic chemicals, very small amounts in very localized areas can still have damaging effects on ecological and human health. Especially with increased population forecasts, the control and treatment of stormwater (and its related contaminants) becomes a piece of the comprehensive strategy that must not be trivialized.

5 Another specific source that is not specifically addressed is the cleanup of Georgia Pacific's chlor-alkalai facility. While long-term ongoing mercury discharges from the facility will no longer be an issue. there still is potential for further water and sediment contamination during the cleanup process.

Cost

6 People for Puget Sound understands that cost does play a role in determining how a cleanup plan is implemented. We also believe that cost should not be a driving criteria in deciding "how clean is clean." Cleanup. habitat restoration, and source control plans should be selected first and foremost based on protection of environmental and human health. Where science cannot establish protective measures, Ecology should use conservative assumptions, even if increased "costs" result. Substantial costs have been avoided by the entities that polluted the bay over that past 30 years--those savings should now go into paying for a cleanup whether or not they believe it is "affordable."

7 Because the Pilot has chosen to highlight costs of each alternative, we believe that a full accounting of the estimated costs of each alternative including the detail backup and sources for these estimates should be included in the main body of the EIS document. We further request that these complete and full costs become part of valid comparison of estimated costs of the alternatives or that costs be removed from consideration in the EIS altogether.

Habitat Enhancement

Habitat restoration in Bellingham Bay must happen if natural resources are to recover here. When restoration can happen in a coordinated, comprehensive strategy, it saves time and energy of all parties involved in the planning and implementation. People for Puget Sound would support a Baywide restoration plan that addresses the restoration opportunities and needs of the ecosystem independent of the proposed disposal and mitigation alternatives. Those project targets could then be evaluated in the context of in-water and upland disposal options. Instead, the habitat restoration projects identified in the DEIS are very much focused on making a few of the disposal alternatives have added mitigation value. The benefits of habitat restoration will only be realized when they are more independently analyzed, and meaningful adaptive management is employed. And since functional equivalency of the restored or created habitat is central to the success of habitat restoration, a functional equivalency model for Bellingham Bay and other bay-wide projects should be completed before selection of an alternative and presented in the EIS.

PEOPLE FOR PUGET SOUND

4. See General Comment response #7 – Source Control.
5. See General Comment response #7 – Source Control.
6. Comment noted. Also see response to Puget Soundkeeper Alliance comment #5.
7. See General Comment response #2-Cost Estimating.
8. See General Comment response #5-Habitat Mitigation and Restoration

Disposal Alternatives

It is unfortunate that there are not more reliable treatment methods for cleaning up contaminated sediment. We support all efforts to move in that direction, as other options usually fall short of achieving true cleanup. While there are certainly still environmental impacts to upland disposal, we maintain that upland disposal is merited when the majority of contamination is caused by methyl-mercury, which is highly toxic in the aquatic environment and bioaccumulative. Given that there is a licensed hazardous waste disposal facility that has indicated the ability to accept these sediments, many of the negative implications of constructing a new facility do not need to be considered, making upland disposal a more attractive option.

People for Puget Sound can not support the aquatic disposal alternatives at this time given the lack of information provided in the DEIS. Even with the added "bonus" of the possibility of restored habitat on the CADs, we are skeptical of the stability of the CADS, the ability to restore eelgrass on that amount of acreage, and the ability to control public access to the contaminated sediments if a 2-3 ft. cap is relied upon. We also believe there are other ways to achieve nearshore habitat restoration without relying on contaminated sediments as the fill. That alternative is not reflected in the DEIS.

Attached is a table created by ReSources that recommends changes to Alternative 2D, with which we concur.

Again, we thank you for the opportunity to comment on the Bellingham Bay Comprehensive Strategy DEIS. We encourage you to set precedents for future cleanup strategies by making sure the comprehensive nature of this project is reflected in long term results in the Bay, not just on paper. We would like to help you do that by remaining involved in all future decisions as an alternative is selected, designed, implemented and monitored.

Sincerely,

Pam Johnson
People for Puget Sound

PEOPLE FOR PUGET SOUND

9. See General Comment response #4 – Treatment Options, for more information on how treatment is addressed in the final EIS.

10. Comment noted. See also General Comment response #4-CAD Design, for more information on the protectiveness of CAD disposal options.

International Association of Machinists & Aerospace Workers District 160

Local Lodge 2379
P.O. Box 2569
5711 Vista Dr.
Ferndale, WA 98248

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SEP 20 1999
DEPT. OF ECOLOGY

September 17, 1999

Lucy Pebles
Department of Ecology
3190 160th S.E.
Bellvue, WA 98008

Re: Bellingham Bay Comprehensive Strategy

Dear Ms. Pebles:

I am writing on behalf of the members of the IAM&AW Local Lodge 2379 and the employees of Intalco Aluminum Corporation (ALCOA). We are in support of option 2-C of the Bellingham Bay Strategic Plan which, after committee study, appears to be the most viable plan for all parties concerned.

Our Industry and others are dependent on shipping and commerce, which uses the Bellingham Bay Waterway. If the Whatcom County area is to be a viable community into the future, action such as option 2-C is a necessity.

We would appreciate information as the pilot team develops an action plan.

Sincerely,

Bob Clunk

Bob Clunk,
Recording Secretary
Local Lodge 2379

Cc: Clarence Harper, Business Representative
Melody Rogers, Local Lodge President
Dennis Tucker, Political Action Chairman

INTERNATIONAL ASSOCIATION OF MACHINISTS & AEROSPACE WORKERS DISTRICT 160

1. Comment noted.

Bellingham
Marine
Industries, Inc.

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FAX 360 734-2417
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August 10, 1999

Lucy Pebles, Site Manager
Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008

Subject: Comments on the Bellingham Bay Demonstration Pilot.

Dear Ms. Pebles:

On July 26, 1999, Mike Stoner gave a presentation to the Rotary Club of Bellingham concerning the Bellingham Bay Demonstration Pilot. He asked that if anyone wanted to comment on the plan they were welcome to express any thoughts or suggestions they might have.

As you can see by our letter head, Bellingham Marine is located on the Whatcom Waterway and for a number of years we have seen the water quality improve with the efforts of Georgia Pacific, the Port of Bellingham and the City of Bellingham. Our company designs and constructs marina projects around the world and at times we are exposed to other cities that have similar problems with water quality.

In Bay Town, Texas we saw the city take contaminated dredge material to build an island that was 80% below the normal tidal range. It was then planted with sea grass and other plants and is now a very successful bird refuge.

During Mike's presentation he explained the five Integrated Near Term Remedial Action Alternatives. I prefer a combination of two, the shallow water confinement disposal and the confined nearshore disposal. I would like to see the Cornwall Avenue Landfill area capped and expanded to the north, a little, but mostly along the shoreline, to the south, making Boulevard Park larger and improving the offshore tidal area as well as increasing the publics ability to use the waterfront.

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This means that the shoreline from the Port of Bellingham Terminal area along the shoreline to the south end of the Boulevard Park would be made considerably wider. This seems to benefit the largest number of people, with the lowest cost and the least amount of transport of the materials.

The offshore areas could have eelgrass planted and the near shore could be used for water recreation. The onshore area could be capped and turned into public access park areas. This would seem to be the lowest cost alternative. I'm also in favor of removing the majority of the contaminated material from the Bellingham Bay area to storage in this newly created shoreline verses capping and leaving the material in place on the harbor bottom.

Please feel free to contact me should you have questions about my suggestions.

Sincerely,

Larry R. Halgren, Executive Vice President
Bellingham Marine

CC Mike Stoner, Port of Bellingham

BELLINGHAM MARINE

1. Ecology appreciates the specific nature of the input around the details of a cap at Cornwall Avenue Landfill. This input has been considered as the Preferred Remedial Action Alternative was developed for evaluation in the final EIS. Nearshore fills were considered but not evaluated (see Section 2.3.5.1 of the EIS).

OLD TOWN BUSINESS ASSOCIATION
700 W. Holly St. Bellingham, WA 98225~360-738-8535 wk~360-734-5347 hm

To: LUCY PEEBLES
DEPARTMENT OF ECOLOGY (DOE)

September 17, 1999

Dear Lucy:
The Old Town Business Association is aware of the complex nature of the Whatcom Creek Waterway cleanup. However, there are a number of issues that appear in the EIS draft (Environmental Impact Statement) for the Bellingham Bay Demonstration Pilot, that we, the citizens of Bellingham, would urge the DOE to review, **and request modification of**, to more appropriately reflect the public testimony presented during public hearings.

1) The only alternative that included removal of contaminated sediment at the head of the Federal Waterway (Citizens Dock) was alternative 2 E, which would be prohibitively expensive. **We recommend an amended version of 2 C to include removal of contaminated sediment at the head of Whatcom Waterway i.e. Citizens Dock.** We feel that the amended version would more closely reflect the needs
1 of the community, the goals of the Pilot project and the public testimony presented during the public hearings.

2) The added cost, based on volume of sediment, would only be approximately 8 percent of the total cost of the entire project. *This would be a bargain considering this is the only portion of the Waterway the general public can have access to.*

3) Table S.1 (Adverse impacts) listed under alternative 2E as "Loss of mudflat at head of Whatcom Waterway, thus losing use of area for Maritime heritage Park/Citizens Dock development." This statement is
2 completely inaccurate. Lack of removal of contaminated sediments under alternatives 2A, 2B, 2C, and *2D would ensure the loss* of "use of area for Maritime Heritage Park/Citizens Dock development". *Removal* of contaminated sediments would allow for both development of public access and development of "clean habitat, thereby achieving the stated goals of the Pilot Project.

OLD TOWN BUSINESS ASSOCIATION

1. The Preferred Remedial Action Alternative evaluated in the final EIS incorporates partial dredging at the head of Whatcom Waterway to facilitate future public access needs and existing navigational needs.

2. The depth of contaminated sediments below the current mudline is substantial at the head of the waterway. Removing these sediments would result in subtidal habitat, which is not functionally as productive as intertidal mudflat habitat in an estuary environment such as the mouth of Whatcom Creek.

OTHER AREAS OF CONCERN

1) Federal Waterways are a precious resource for the community, and are set aside specifically for public commerce, by not dredging the Whatcom Waterway to the Federally mandated dredge depths *the use of the Waterway by the public is severely compromised for current and future economic development and public recreational uses.*

2) Removal of the contaminated sediment from the head of the Whatcom Creek Waterway *now*, will remove the problem from the Waterway forever. However, not removing the sediment but only capping the contamination, opens up a host of potential problems and hazards for future generations and *severely limits, and/or prohibits future use of the head of the Waterway.*

3) If the contaminated sediments are removed from the head of the waterway, the negative impacts on habitat would be short term and controllable. We would be able to start with a clean slate and maximize the public use of the waterway and develop a clean and enhanced habitat for wildlife.

The public has overwhelmingly supported, in *both* the Whatcom Creek Waterfront Action Program, and The Downtown Development Workshops, the need for public access to the Whatcom Creek Waterfront. This removal of the contaminated sediments at the head of Whatcom Creek Waterway is a "**now or never**" issue. We now have a "**window of opportunity**" to correct the past damages to our waterfront. **Please, do not let this opportunity pass!**

Sincerely,

Mike Kimmich
President
Old Town Business Association

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International Longshore and Warehouse Union
Local 7
807 North State Street
Bellingham, Washington 98225
President; L. Rohde
Secretary; W. Roughton

To; Bellingham Bay Comprehensive
Stategy Committee;

My name is John Munson, I live at 2195 Lummi Shore Rd.in Bellingham. I am a member of the International Longshore and Warehouse Union Local 7 of Bellingham. The local would like to thank the committee for the endless hours of work and discussion that went into the preparation of this plan for Bellingham Bay Cleanup.After careful examination of the document it became apparent to the local that the only solution posed in the document that meets the current and future needs of the users of the Waterway is the position stated in item 2C.This solution not only removes the contaminated sediments from the waterway down to the clean native layer but it increases the depth of the shipping channel by two feet. While the increase in depth of the channel is an asset to shippers, cleanup to the depth of native soil will be valuable in the future when maintanence dredging needs to be done in the waterway. The community would no longer be faced with the thorny issue of disturbing contaminated sediments.

While proposition 2C solves the problem of having enough depth in the waterway for the present, the local would not object to the channel being dredged to a lower depth because vessels involved in the trade seem to be constantly increasing in size which requires deeper and deeper waterways.One of the things that also should have been presented in the list of options in the document should have been discussion of a nearshore disposal site that could be used for new industrial land rather than marine habitat. Nearshore disposal sites that created new industrial land have been tried and tested in Seattle, Tacoma and Everett. Discussion of this option was included under item 14.2.3.1 in the Whatcom Waterway Draft Draft Final RI/FS and should have been included in this document. While the economic drivers that would place this option into consideration don't exist presently because of the current decline in shipping revenues, creation of new nearshore industrial land is a good bet for the future.In 1962 the people of Whatcom County approved a bond issue of $2 million dollars for improvements at the Port. That investment has returned approximately $ 2 million dollars per year to the community since its

INTERNATIONAL LONGSHORE AND WAREHOUSE UNION

1. Comment noted.

2. Nearshore fills were considered, but not evaluated in detail (see Section 2.3.5.1 of the EIS).

completion. The added value of new industrial land could also help defray some of the costs of cleaning up the waterway. Because the contaminants are located right next to the Georgia-Pacific log pond that site would serve as an ideal spot for nearshore confined disposal of dredge spoils. While there would be some loss of marine habitat with the filling in of the logpond, area to area mitigation could occur with no net loss of marine habitat.

The local would like to once again thank the Committee for the hard work they've done on the project, and like the committee, hopes this project can proceed in a timely manner.

Respectfully yours,

John Munson

John Munson ILWU Port Committee

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BELLINGHAM STEVEDORING

Bellingham Stevedoring Company
Harbor Center
1801 Roeder Avenue, Suite 156
Bellingham, WA 98225-2200
360-734-0680
Fax: 360-734-6963

September 10, 1999

Ms Lucy Peebles
Department of Ecology
3190 160th S.E.
Bellevue, Washington 98008

Re: Bellingham Bay Comprehensive Strategy DEIS

Dear Ms Peebles:

We are writing to provide comment on the Draft Environmental Impact Statement for dredging contaminated sediments from the Whatcom Waterway in Bellingham Bay.

It is important that either Alternative 2C or 2D is selected. We understand that the type of disposal method (either CAD or upland) is a significant decision, but the navigation needs of Bellingham Bay must remain the critical component of the coming decisions.

Re-establishing and maintaining the navigation depths in the Whatcom Waterway is an extremely important outcome of this project. It is as important as removal of the contaminated sediments.

Commercial navigation of the Whatcom Waterway is a critical mainstay of the Bellingham and Whatcom County economy. Not only are the Port of Bellingham's and Georgia Pacific's shipping facilities along the Whatcom Waterway currently supporting significant industrial activity, but are poised to expand that important economic role in this community when the depths are re-established. For example, within the past two months, we have missed a cargo transshipment opportunity at the Port of Bellingham's Shipping Terminal because the water depth was too shallow to accommodate the shipper's fleet of ocean-going vessels. These ships could have docked at the Port of Bellingham if the Whatcom Waterway was operating at its authorized depth. At least six new living-wage jobs were lost to this community.

Career-oriented jobs are dependent upon a safe and efficient shipping terminal. Currently hundreds of individuals work on and around the Whatcom Waterway. These jobs would be placed in jeopardy if this project does not proceed.

We encourage you to insure that the project proceeds unabated, and that debate over the most acceptable disposal option does not obstruct completion of this most important task.

Sincerely,

C. Roger Sahlin
President

BELLINGHAM STEVEDORING

1. Comment noted. The Preferred Remedial Action Alternative evaluated in the final EIS incorporates dredging to native sediments to provide future navigational flexibility.

September 10, 1999

Ms. Lucy Pebles
Site Manager
Department of Ecology
3190 10th Ave SE
Bellevue, WA 98008

Dear ms. Pebles,

Please allow this email to be the official public comment from New West Fisheries, Inc regarding the above mentioned project.

We are not environmental specialist but we are property holders on the Whatcom Creek Waterway. This waterway as you well know is heavily polluted by Georgia Pacific with mercury. Since the site has not been able to be dredged the Federal waterway has become almost unusable and hence our property also. We attempted several years back to dredge our immediate area and were denied the opportunity by the U.S. Army Corps of Engineers.

Any dredging proposal that envisions a full 100% dredge up to the mouth of Whatcom Creek and 100% of the Federal Waterway including all of the areas up to and including our waterfront frontage must be undertaken. Otherwise New West Fisheries, Inc will lose all of its use of this property due to the pollutant contamination. It is paramount that the contaminated sediments in front of our property be removed and put into the allowable disposal site at the time of the whole cleanup.

Question, please call me direct at 360-734-9050

Regards,
Robert E. Seidel
President
New West Fisheries, Inc.

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SEP 13 1999
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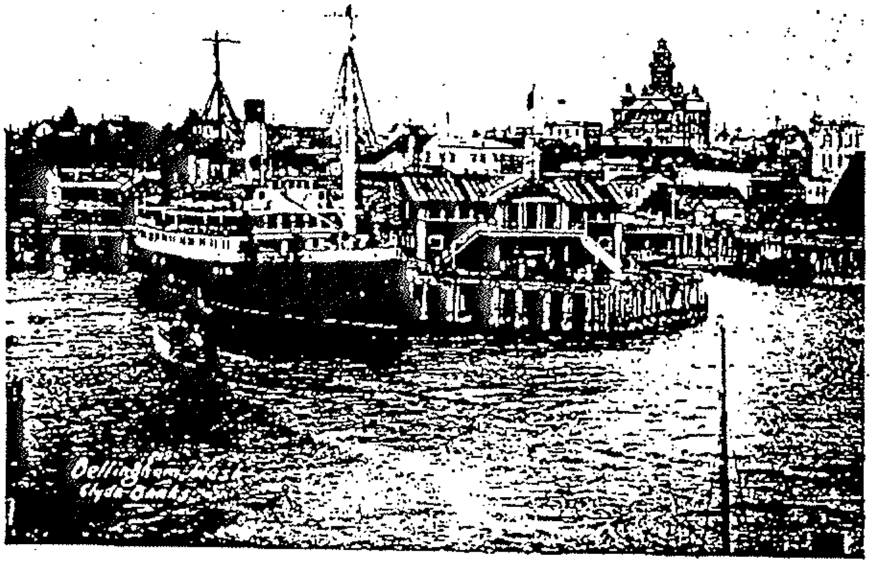
NEW WEST FISHERIES INC.

1. The Preferred Remedial Action Alternative evaluated in the final EIS incorporates partial dredging at the head of Whatcom Waterway, including the area in front of New West Fisheries.

DON'T MISS THE BOATS!

Presented by

Whatcom Maritime Historical Society



We, the undersigned residents of Whatcom County, believe
That if Whatcom Creek Waterway is dredged:

1. Contaminated sediments should be removed up to Roeder Avenue
2. Public access to the waterway should be created
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Name	Address	Phone #	e-mail
[illegible]	Squalicum Harbor	6478050	
Marlyn Kelly	4084 Saltspring Dr	384-3458	
David Clarke	3227 Cherrywood Av	647 8185	
Norrin Heggem	165 S. Garden	671-4331	
Gordon Harris	1006 Longtree Ct.	715-3220	
Jason Sanders	2811 Kewst Bellingham	7584390	
John [illegible]	780 N. Lk Samish	7337885	
[illegible] Christensen	1905 Washington	647-2331	
Richard A Veldi	4728 Sucia Dr. Ferndale WA 98248	380-7390	
[illegible]	General Delivery	733-2520	
Ed McManus	2315 Electric Av.	676-4663	
[illegible]	2441 Crestline Rd	384-3876	
[illegible]		5420383	
James M [illegible]	1851 Emerald Lake Way	671-3782	
Carol Maher	1851 Emerald Lake Way	671-3782	
Joseph [illegible]	1210 32nd St Bham	676-1815	
Mich [illegible]	2621 Harbor Loop #1	647-3893	

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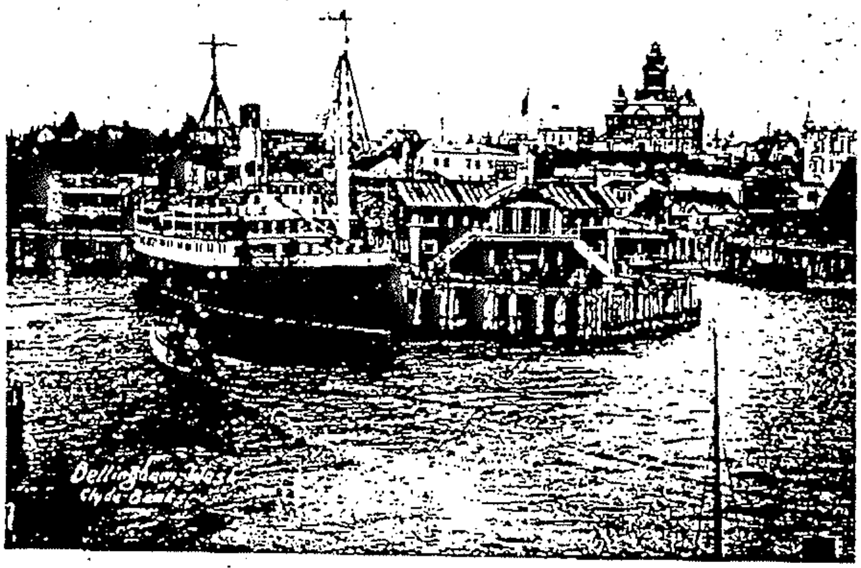

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Name	Address	Phone #	e-mail
[illegible]	1590 Seacrest Lummi Island	758-2413	
[illegible]	1590 Lummi Seacrest	758-2413	
[illegible]	2222 W. Birch B-ham	6765047	—
[illegible]	1451 Shore Dr B'ham	7347154	[illegible]@Hotmai
[illegible] Gus Hodge	579 16th St B'ham	7331796	
[illegible]	16612 45 Rd Arlington Wa	(360) 652 3966.	
[illegible]	16612 45 Rd Arlington Wa	6523966	
[illegible]	701 Roeder Way, B'ham	671-1247	
Richard G Konkler	1425 25th St S.E Auburn, Wa 98002	253 939-7321	
Ron Hodge	1340 Bonanza Way, B'ham, WA 98226	733-5873	
Edradine Hodge	1340 Bonanza Way B'ham 98226	733-5873	
[illegible]	3888 [illegible] Rd B'ham	671 5050	
[illegible]	354 Viewcrest Rd. Bellingham WA. 98226		
[illegible]	2468 Lakeway Dr. B'ham	734-8770	
[illegible]	2468 Lakeway Dr. B'ham	734-8770	
[illegible]	1460 Iron St. Bellingham	671-0092	
[illegible]	4148 Rural Ave B'ham 98226	7334057	[illegible]@hotmail.com
[illegible]	P.O. Box 95, Lummi Island, WA 98262		

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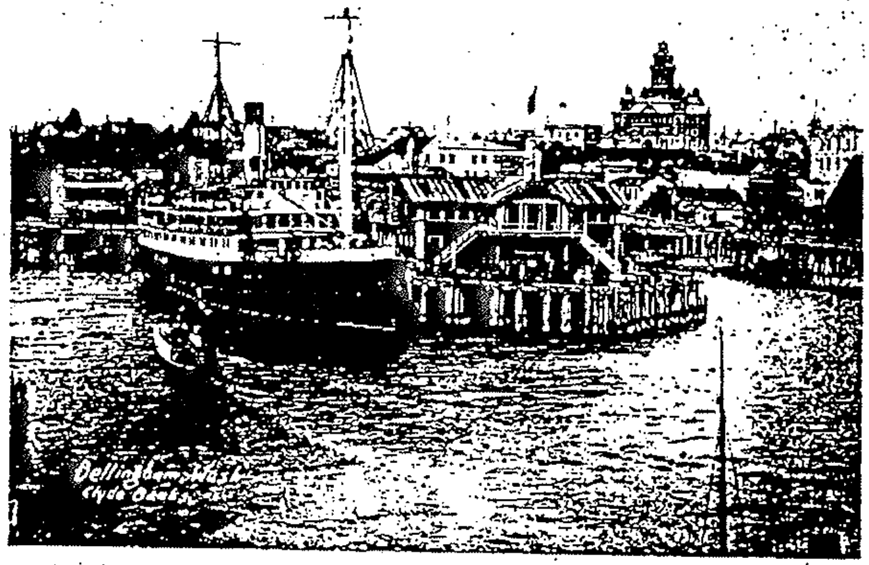

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Name	Address	Phone #	e-mail
Gary R. Hedberg	3715 Lakeway Dr.	733-5331	
LES KEITHLEY	1200 LINCOLN	676-682[illegible]	
Richard Gulick	2320 Cherry	733-9283	
[illegible]	2945 NW Ave	734-7469	
[illegible]	745 Chuckanut Shore Rd	[illegible]-4124	
[illegible]	1400 Moore St	752-9110	
Dan O'Donnell	2411 Elizabeth St.	733-6924	
SHERI JAMES	2650 SALMON RD. BHAM.	None	
David Florence	1124-38th		Ragnarf@AOL
Ken [illegible]	2151 Dellesta Dr	733-1048	
Rig [illegible]	2307 Tuttle Ln	758-714	
Basil Atkinson	"	"	
PETER FRYE	2402 30th St B'Ham	733-8049	
Brian [illegible]	5874 CEADER PL. Ferndale	384-3779	
[illegible]	Yacht Adagio	PO Box 2305 Bellingham	
Bernd S. Muller	528 Rainbow Rd	Lynden, Wash 98264	
R L Berry	2431 Williams St.	Bellingham, WA 98225	
[illegible]	8634 Custer School Rd	Custer WA 98240	

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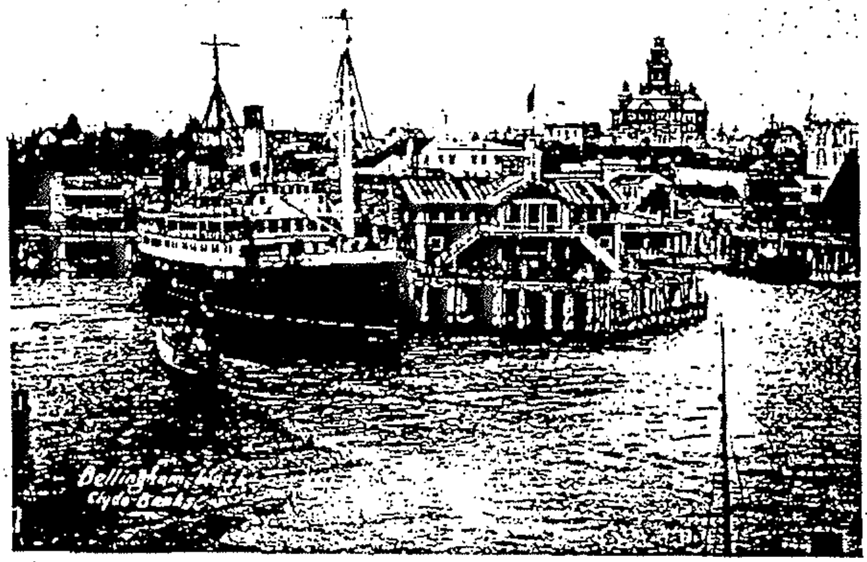

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Name	Address	Phone #	e-mail
Terrence Smithson PENG	209-814 Lakeway	961-9161	TRAEKOATJT
RANDY GERMAN	2015 OLD FAIRHAVEN PARKWAY	671-3804	
Tom Dronen	6319 Niw. Dr.	384-1840	
Jim Swatzen	4279 Sucia Dr	380-3861	
Don Rumph	PO Box 1254 B'ham	425-327-9867	puckotmail.com
Roger Schjelderup	16 Harbor mall	671-7022	
Ken McNew	269 Sudden Valley	647-0126	
Ed Mutschler	P.O. Box 1050 LaConner	421-1849	
Donna J. Morin		733 5120	
Terry Peterson	721 Chuckanut	734 0804	
AL ANDERSON	2920 OAKES AVE ANACORTES	299-0764	
Stephen Brooks	1219 11ST Anacortes 98221	299-2956	
[illegible]	2321 Williams St, B'ham 98226		
[illegible]	PO Box 6098 Bham 98227		
Jed Clark	3609 Britton Rd, Bham 98226	671-4341	
Roberta Clark	3609 Britton Rd B'ham 98226	671 2550	
[illegible]	1810 Eldridge Bham 98225	671-[illegible]	
Dale [illegible]	PO Box 2262 OAK HARBOR	675-2122	

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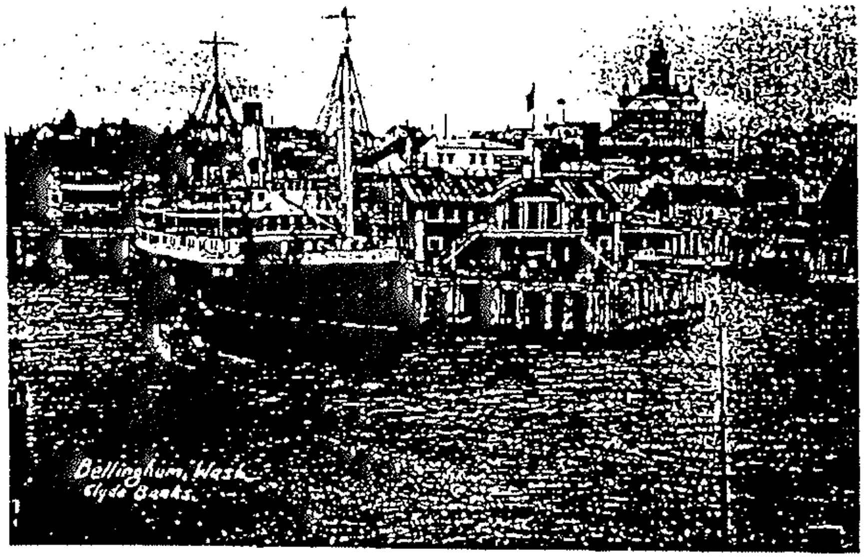

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Name	Address	Phone #
Bruce Jorgensen	2213 Ontario	733-5696
Curtis Dalrymple	813 Racine	676-5643
Linda Goodrich	4004 Jones Ln	671 8643
Brad Clure	2750 S. Park Dr.	734-6913
Michael O. Smith	[illegible] Roundell St.	671-3123
Rick A. Dutton	3222 Spyglass Dr.	671-8886
Harold W. Scott	1804 E. Lopez Ct.	734-9870
Greg Pierce	421 Morey	671-9975
Lex Lutke	3001 Racine St	676-1031
Russ VanBrunen	428 15th St.	647-2464
Jack Schuman	935 Gleneagle	371-7070
Lynne S. Naslund	616 N Forest St. Blume	676-9821
[illegible]	4072 Linnell	592-2286
[illegible]	4648 Lakeway Drive	647-5603
Mark [illegible]	250 N State #115	756-0604
[illegible]	1388 Chuckanut	734-4596
Nancy DeSelarie	1203 Sudden Valley	671-0161
Frank Lee		[illegible]

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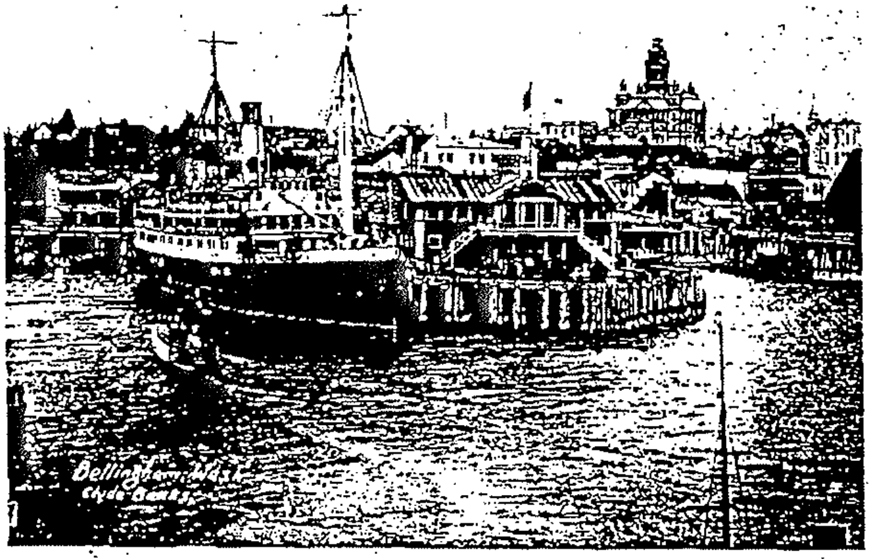

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Name	Address	Phone #	[redacted]
Ron Browne	4103 Motia Dr. Ferndale, Wa	384-4139	
Steve Papadakis	781 Old Samish Rd	Bell	98226
Steve Reynolds	1705 E. Lopez Ct.	Bellingham,	98226.
Kathleen Rich	208 Bayside Rd	B'ham	98225
Randy Carroll	PO Box 2113	B'ham 98227	
Jeff Fairchild	929 13th St.	Bellingham	98225
Bill Meriereau	1100 Lakeway Dr.	Bellingham 98226	
Bonnie Hines	1816 North Shore Dr.	Bellingham	98226 676-3737
Stan Larson	5698 Sand Rd	B'ham	98226
[illegible]	3467 [illegible] St	"	"
Michael Nucco	3977 Griffith A.	B-Ham	98225
[illegible]	3977 Griffith Ave	647-2122	B'ham 98225
[illegible]	620 N Forest	676-8659	B'ham 98225
Russ Karas	1535 Fairview	733-0592	BHM 98226
Thomas Crosley	1254 Sudden Vly	671-8401	B'Ham 98226
R.F. Picillo	665 Sudden Valley	671-7057	B'ham 98226
Frank Travis	402 Boulevard #207	733-7629	B'ham 98225
Dorcas Cox	4200 King Ave. B'ham		

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P.O. B[illegible]

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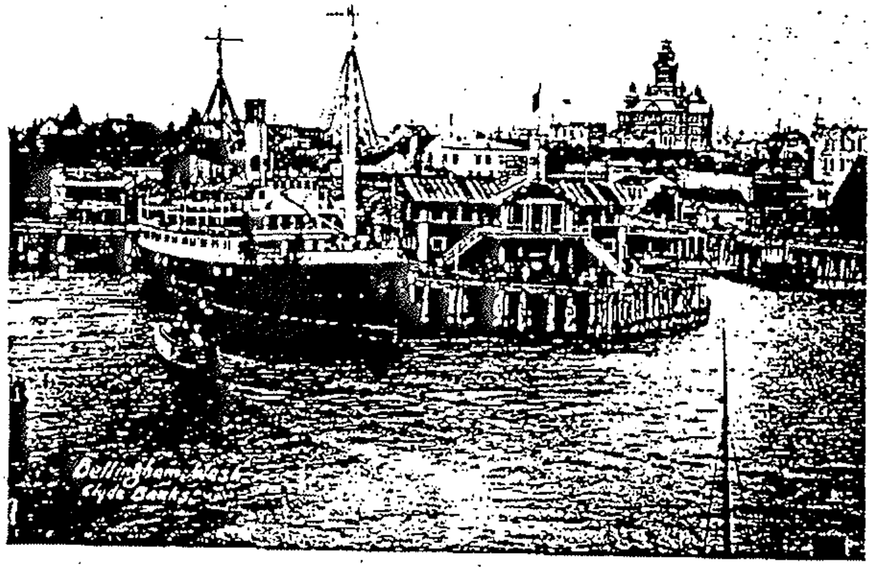

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Name	Address	Phone #	e-mail
Steve Paus	1601 Euclid	676-0884	
CAREY WORTHEN	2317 Electric Ave	734-4643	
Dorothy Worthen	2317 Electric Ave.	734-4643	
Ted Livingston	1724 Euclid Ave	647-5232	
Russ Karns	1535 FAIRVIEW ST	733-0582	
Mary A. Unrau	#2 928 11th St Bellingham	752-0517	
[illegible]	1445 Mt Baker Hwy "	733-1199	
Mary E Kimmich	2326 Henry St B'ham 98225	734-5347	
[illegible]	2326 Henry St " "	734-5347	
Fritz Willits	3925 40th " 98226	671-9218	
Noel Paus	1601 Euclid B'ham 98226	676 0884	
Steve Maiefski	517 Briar Rd B ham 98225	752-9814	
Elaine Snapper	1200 W. Oregon, B'ham 98225	733-1575	
Clifford Van Dyk	[illegible] DONOVAN #3 B'ham 98225	756-1706	
[illegible]	3895 Ft Bham Road Bham 98225	671-3670	
Larry Stiles	1227 Independence B Sedro Woolley 98284	856-6499	
GEORGE DIXON	435 W Holly St. B'ham	734-9226	
Lauren Dixon	" "	"	

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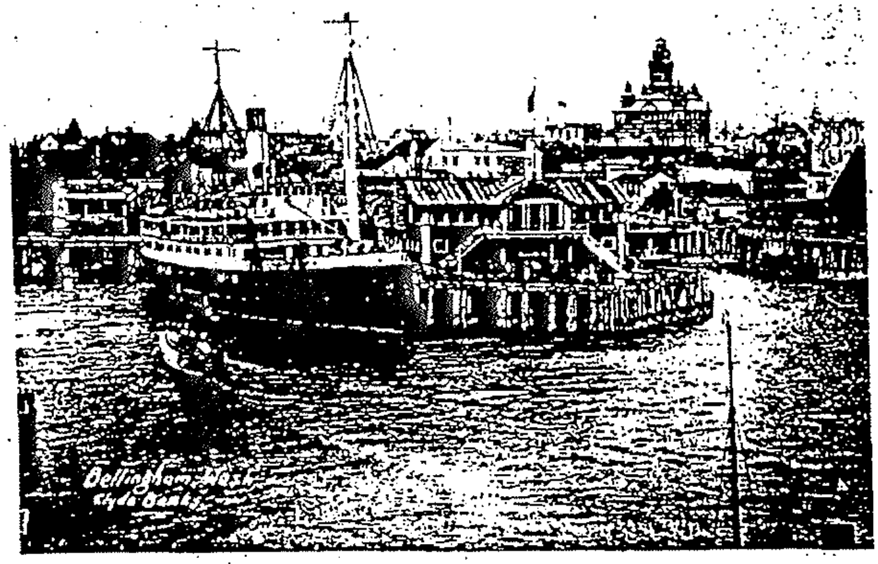

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Name	Address	Phone #	e-mail
[illegible] Thompson	Bellingham		lisat@gbadesign
Stephen Thompson	Bellingham		stephjs@nas.com
[illegible]	Bellingham		
[illegible]	Ferndale		
Elbert M [illegible]	Bellingham		
Robert [illegible]	Bellingham		
[illegible]	BELLINGHAM		
[illegible]	Bellingham		
[illegible]	"		
[illegible]	Bellingham		
[illegible]	Bellingham		
[illegible]	"		
[illegible]	Everson WA.		
[illegible] Zimmerman	Bellingham, WA		
[illegible]	Bellingham, WA	738-8831	
[illegible]	B'ham WA	676-5205	
[illegible] Scott	Bellingham WA	676-1373	
[illegible]	Bellingham WA	733-1231	

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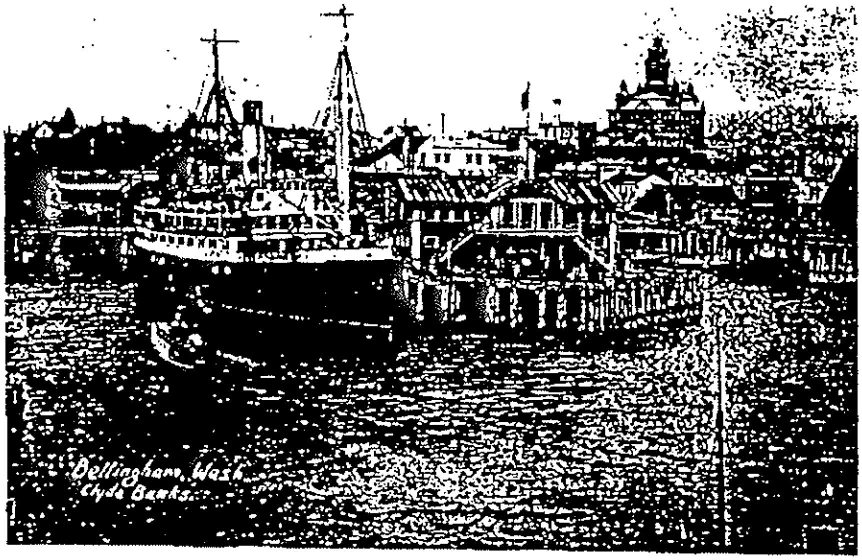

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Name	Address	Phone #
Ian O'Callaghan	2284 N. Nugent	758-7243
Mike McRory	1781 N Shore Rd	734-9422
Lowell English	505 Grand Ave	676-6920
James R. Gillies	5363 Bellaire Way	384-9158
Barbara Rombold-Gillies	5363 Bellaire Way	384-9158
Jeff Jewell	2800 Kulshan St.	647-8927
Mary Jewell	2601 "E" St #708	714-0301
Jim Lewis	321 Kelly Rd	734-4744
Michael Burnell	4828 Beachway Ferndale	384-6168
Jon R. Nagel	2415 I St.	647-6964
Sherry Gustafson	628 Fieldston	734-7124
Katharine Jacobson	2778 N Nugent Rd LT	758 2817
John Hansen	4806 Sucia Dr. Ferndale	380-6409
Robert Hall	600 17th	734 6486
Lanny Little	301 W. Holly U3	647-6772
A.M. Peterson	2830 Cornwall	715-9289
Perry Paus	1333 Lowe Ave	650-1652
[illegible]	1333 Lowe Ave	650-1652

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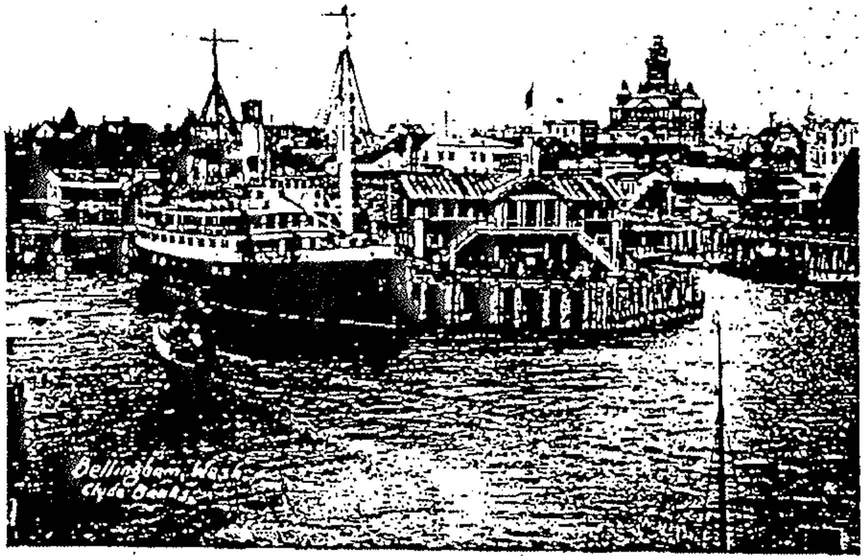

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Name	Address	Phone #	e-mail
Judy Kirkland	3853 Welling Ct	733-0869	
Bob Herrman	1303 38 St	734 9790	
Terry Bornemann	903 Mason	671-3082	terryb@nas.com
Jennifer Richmond	903 Mason	671-3082	
[illegible]	3796½ Bancroft Rd	671-6937	
[illegible] C-Meecham	1117 Lenora Ct	671-9079	
John P. McKee	" "	"	
Vance & Elliott	1659 Birchwood #208	676 8238	
Steve Clancy	4505 Whitney Bham	671-2543	
Judy Andrews	2790 North Shore Rd	671-6373	
[illegible]	1263 Roy Rd	676-8278	
[illegible]	4725 E Oregon St	715 9570	
Sue Jimpse	2136 28th St 98225	738-4750	
Renee Klauzgost	2104 Old Lakeway Dr. Bham		

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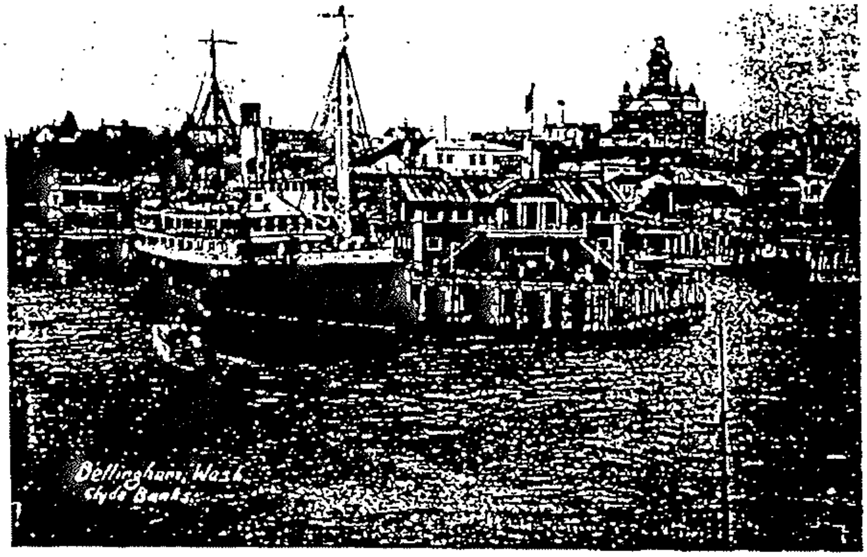

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Name	Address	Phone #
Terry Wilcox	3821 Toad Lk Rd	671-8368
William [illegible]	2184 Thornton St	384-6907
J C Walden	311 Grand Ave.	676-6780
Martha [illegible]	311 Grand Ave	676-6780
Christina Eldridge	311 Grand Ave	676-6780
Ken Mason	311 Grand Ave.	676-6780.
Grey Foster	311 " "	" .

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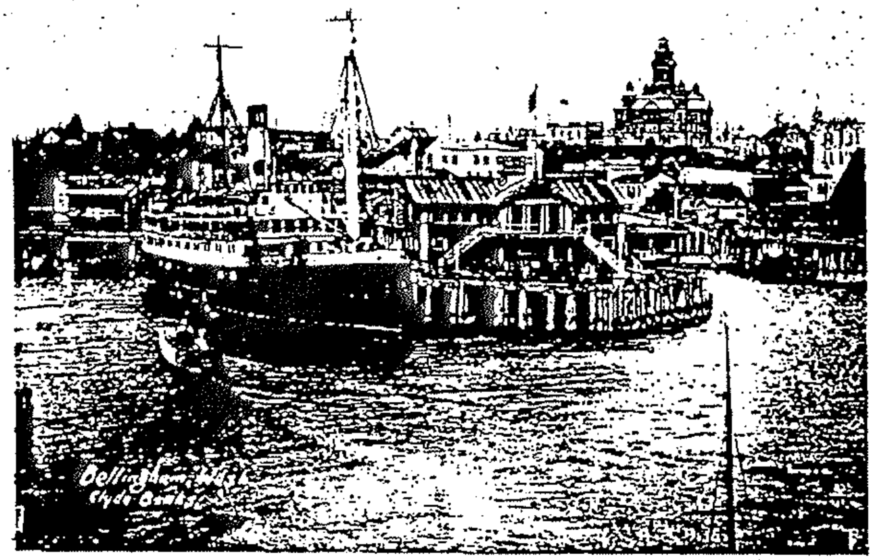

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Michael Weidkamp	725 E Magnolia Av	755-0216	
Rob Smethurst	2216 Huron St	647-1606	
Matt R. Miller	6066 Williams Lk. Rd.	592-6741	
[illegible]	512 Highland Dr.	734-2456	
D. Berg	2009 N Shore Dr	738 9182	
Albert M. Seamer	619 Clark Rd	758-7863	
[illegible] M.D.	4017 Hampton St.	552-9094	
[illegible]	2003 Woodlyn Rd Ferndale	303-2415	
[illegible]	3364 [illegible]		
John Sands	4100 W Holly St	734-5555	
Rhonda C. Summerville	2330 Elizabeth St.	647-1546	
Andrea Boyd	3065 E. Bakerview Rd. Bellingham WA 98226	733-6194	Bookworm2K@Yahoo.com

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WHATCOM MARITIME HISTORICAL SOCIETY

1. The Preferred Remedial Action Alternative evaluated in the final EIS includes partial removal of contaminated sediments at the head of waterway to facilitate future public access needs and existing navigational needs. However, the sediments at Citizens Dock would not be dredged under this alternative, in order to protect existing valuable aquatic habitat.

2. Public access was addressed in all of the alternatives in the EIS, and is also a key component of the Preferred Remedial Action Alternative evaluated in the final EIS.

3. Final plans have not been made as to the configuration and uses of the public access. However, the dredging that has been targeted anticipates day moorage uses in this portion of the waterway.

Eugenia M. Becker
3014 Windtree Court
Bellingham, WA 98226-5937
(360) 647-0687 eugeniabecker@home.com

September 19, 1999

Christine Corrigan
Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Dear Ms. Corrigan:

COMMENTS RE: BELLINGHAM BAY COMPREHENSIVE STRATEGY DEIS

As a regular visitor to Bellingham since 1970 and a resident since 1996, I have spent many happy days boating on Bellingham Bay and observed its many-faceted importance to the community. Maintaining and restoring the aquatic health of the Bay is a goal of supreme importance, and I applaud the effort to develop a comprehensive strategy to guide dredging and cleanup in the Bay. Coordinated planning should lead to more efficient and effective cleanup, through economies of scale and through the pooling of resources to incorporate the best scientific and technological knowledge.

1 As a member of the RE Sources Citizen Work Group, I strongly endorse all the comments made by RE Sources. I also wish to express my personal opinions on the proposal.

Purpose

Although the polluted state of Bellingham Bay sediments is extremely regrettable, in many cases it would be best for the environment not to disturb these sediments, as any disturbance will lead to the dispersal of toxic substances into the water and surface sediments where they will be absorbed by living organisms. In the absence of continuing pollution, natural forces will eventually cover this over. Capping in place would accelerate the process.

However, this desirable approach cannot be used in areas where it is necessary restore the depth of federally-mandated navigation channels and otherwise maintain an active commercial and recreational port. I support this effort, but I believe it should be openly acknowledged, and the costs which would otherwise be incurred in maintaining the depth of the channels should not be considered "clean up" costs. (This is in no way to lessen the obligation of Georgia Pacific to underwrite any costs involved in the clean

EUGENIA BECKER

1. See responses to the RE Sources comments.

2. Capping is identified in four of the five alternatives in the EIS, and is also a significant component of the Preferred Remedial Action Alternative evaluated in the final EIS.

3. The Corps of Engineers is a Pilot Team member and they are currently evaluating their potential financial role.

up and environmentally sound disposal of its own toxic waste, hitherto simply dumped into the Bay.)

Disposal of Sediments

Given the desire to maintain an active port, I believe that this should be done in the most environmentally sound way possible. Upland disposal is preferable for dredged sediments to Confined Aquatic Disposal (CAD): The Bay is not an acceptable dumping ground for refuse of any sort!

If, at a later time, it is deemed necessary to dredge the CAD area for future use, contaminants would once again be dispersed into the ecosystem, an inexcusable further act of pollution.

Sediment treatment methods have perhaps not reached the technical stage to be seriously considered at this time. It is likely, however, that they will in the not too distant future. If the contaminated sediments are enclosed in an upland landfill, they could be treated in place at a later date and the contamination problem solved rather than just displaced. If the sediments are in CADs within the Bay, it would be much more difficult, costly and polluting to access them for treatment.

Costs of Project

As an economist by training and by profession for 20 years, I feel the need to stress that in evaluating alternatives given in the report, no decisions should be based on the costs included in the report.

The upland disposal costs quoted include the cost of land filling the dredged material in an established landfill, which would include the value of the land utilized and long-term monitoring of the landfill; disposal costs for Confined Aquatic Disposal (CAD), however, include neither. Therefore, the stated costs for upland vs. CAD disposal are in no way comparable and should not be used to justify a choice of alternatives. Any estimate of the cost of disposal by CAD must include the cost of recompensing the people of Washington for the use of aquatic lands to be utilized for CADs and the cost of long-term monitoring (at least 30 years) of the CAD's and any habitat created over them.

In addition, since there has been no "contingent evaluation" to estimate the monetary value of environmental or other "soft" costs or benefits, it is impossible to evaluate the true costs or benefits of the alternatives based on this report. To favor one method of disposal over another based on stated costs would be quite erroneous.

Preferred Alternative

Given the need to maintain navigation channels at acceptable depths, and given the need to dispose of the sediments in the least environmentally harmful way possible,

EUGENIA BECKER

4. See General Comment response #s 3 and 4, Treatment Options and CAD Design, respectively.

5. See General Comment response #2 – Cost Estimating.

6. Comment noted.

I support the adoption of alternative 2D, with those amendments suggested by RE Sources, as the lesser of evils. Especially:

(1) Sediments dredged from the Port Log Rafting Area should be disposed of in an upland landfill, rather than in a CAD at Starr Rock or elsewhere within the Bay. Only where

(2) For the 18' Federal Channel at the Head of Whatcom Waterway, I believe that all sediments exceeding the Sediment Quality Standards (SQS) should be removed if the area is dredged, and that ecologically valuable mudflats should be restored through re-filling with clean sediments.

<u>Long-Term Monitoring</u>

If the final decision includes the use of CADs, the plan should specify and finance long-term monitoring for at least as long as would be required in upland landfills, where far more scientific information is available on long term effects.

7

In addition, where marine habitat areas are created, restored or enhanced for the purpose of compensatory mitigation, provision should be made for long-term monitoring and management, as establishment of these areas is known to be difficult and to require multiple attempts over a number of years before final success is achieved. Where habitat is replaced or encouraged, native species of eel grass and any other plantings which provide maximum habitat value should be chosen, as opposed to non-native species which might be considered easier to establish.

Thank you for the opportunity to comment on the Draft Environmental Impact Statement. I applaud the effort that has gone into investigating the alternatives presented, and I hope that a similar effort will go into seeing that the most environmentally sound method is used to deal with contaminated sediments.

Sincerely,

Eugenia M. Becker

Cc: Robyn J. du Pré, RE Sources
Barbara Ryan, Bellingham City Council

EUGENIA BECKER

7. If the remedial alternative ultimately selected by Ecology through the MTCA process includes containment of contaminated sediments, a monitoring program will be required to ensure the long-term protectiveness of the remedial action. If compensatory mitigation is a component of future remedial actions, it is Ecology's understanding that the natural resource agencies with jurisdiction would require monitoring.

July 21, 1999

Christine Corrigan
Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008

RE: Draft EIS - Bellingham Bay Comprehensive Strategy

I have read and reviewed the proposal for disturbance of Bellingham Bay. This is truly a case of someone deranged or who has an objective beyond ordinary safety.

This bay and material should be left as it lies. As is where is!

To disturb it will only increase the problem disproportionately. We can now see life coming back not seen in 100 years. Little harm done!

Sincerely,

Joel Douglas

Coachman Inns of America
Hospitality Products
Harbor Lands Co.
Harbor Enterprises
Pacific Resources, Inc.
P.O. Box 4082
Bellingham, WA 98227
(360) 734-8191 734-2222
FAX (360) 647-9223

JOEL DOUGLAS

1. In the absence of navigation and commerce needs, the material could be left in place and capped with clean material to isolate contaminated sediments. However, the Whatcom Waterway Federal Navigation Channel has been federally designated for navigation and commerce purposes and, as such, must be maintained. In addition, ships have the potential to resuspend existing contamination in shallow areas. For these reasons, dredging is likely to be a component of the remediation of Bellingham Bay.

Yes, I would like to comment on the Bellingham Bay Comprehensive Strategy Draft EIS before the end of the comment period on **September 20, 1999.**

Please write your comment below and either:
1) give it to Ecology at the open house or public hearing or
2) fold and mail it to the address on the back.

I would like to object to the use of the Phyllite Quary located North of Alger WA and just south of Lake Samish as a potenc upland disposal side for contaminaded sediments from Bellingham Bay.

Reasons for this:

1) Subject side is currently NOT a landfil side and significant dollars and Permit time would be required in order to make is as such.

2) This side is only projeceded to hold 200,000 CY of contaminated sediments far less than what is required. It is No Economical to develop this side as a upland landfill when a more economical side is already available too handle all of t material at the Klicitat County landfil side.

Date: 9-9-99 (PLEASE PRINT LEGIBLY)

Name: Jeff Feemster

Mail Address: 647 E. Lake Samish Drive
Rellincham WA 98226

JEFF FEEMSTER

1. Comment noted. Disposal at the Phyllite Quarry is not an element of the Preferred Remedial Action Alternative evaluated in the final EIS.

2. Comment noted. Disposal at the Phyllite Quarry is not an element of the Preferred Remedial Action Alternative evaluated in the final EIS.

-----Original Message-----
From: Corrigan, Christine M.
Sent: Monday, September 20, 1999 4:10 PM
To: Pebles, Lucy
Subject: FW: Comments: Bellingham Bay Comprehensive Strategy, Draft EIS

-----Original Message-----
From: Mark J. Herrenkohl [mailto:markherr@premier1.net]
Sent: Monday, September 20, 1999 3:26 PM
To: csun461@ecy.wa.gov
Subject: Comments: Bellingham Bay Comprehensive Strategy, Draft EIS

September 20, 1999

Christine Corrigan, Washington Dept. of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Dear Ms. Corrigan:

After reviewing the Draft EIS for Bellingham Bay dated July 19, 1999, I would like to make the following comments. First of all, I believe in-water disposal is the best alternative(s) for the contaminated sediments in Bellingham Bay. It makes sense to me, both practically and economically, that containerizing the problem in either an in-water nearshore fill scenario (Cornwall Landfill area) or CAD site (Bellingham Bay) is the best solution for Bellingham Bay. Transporting contaminated sediments to an upland facility just moves the problem from one location to another, posing potentially more environmental harm and significantly increasing costs. Consequently, I think Alternatives 2A and 2C are the best solutions for Bellingham Bay.

MARK HERRENKOHL

1. Comment noted.

> I am strongly against the use of one potential upland disposal site: the
> Alger Quarry located near Exit 242 off I-5. I understand the site is
> close to the highway for accessibility and their is a private owner
> willing to accommodate a large volume of contaminated sediments. However,
> this area of southern Whatcom County and northern Skagit County is a
> growing area where most of its residents utilize surface water and shallow
> groundwater for drinking and other uses. There are also significant
> salmon spawning runs on Friday Creek (including the State Fish Hatchery)
> and Samish River located near the proposed upland disposal site. The
> potential contamination of these valuable water resource(s) to the Lake
> Samish/Alger area from the disposal of contaminated Bellingham Bay
> sediments is not worth the risk.
>
> In conclusion, I appreciate how far this large group of industries,
> regulators, municipalities, and tribe representatives have come to
> complete the draft EIS. With so many different agendas it is quite the
> accomplishment. Please keep the contaminated sediments in Bellingham Bay
> in a contained environment (CAD or Nearshore Fill) and away from
> potentially impacting the environment and human health. Thank you.
>
> Sincerely,
>
> Mark J. Herrenkohl
> 321 Summerland Road
> Bellingham, WA 98226
> (360)756-9296
> email: markherr@premier1.net
>
>
>

MARK HERRENKOHL

2. Comment noted. Disposal at the Phyllite Quarry is not an element of the Preferred Remedial Action Alternative evaluated in the final EIS.

Elizabeth Pernotto
3112 Alderwood Avenue
Bellingham, WA 98225
September, 11, 1999

Lucy Peebles
Department of Ecology
3190 160th S.E.
Bellevue, WA 98008

RECEIVED
SEP 2 0 1999
DEPT. OF ECOLOGY

Dear Ms. Peebles:

I am writing to support the dredging of the shipping channel on Bellingham Bay to allow for continued use of the channel for shipping and to allow for future deepening of the existing channel. This shipping facility is an important source of revenue, approximately $2 million a year, for both the Port and Whatcom County. Whatcom County has a dearth of living wage jobs, and the Port, through this shipping channel, helps to provide such jobs.

I support the removal of mercury-contaminated sediments from the bay to facilitate future dredging to keep the shipping channel open. The cleanup of the waterway and dredging of the channel is critical to the future operation of the Port. If the contaminated sediments are not removed, they will continue to be a problem each time the channel needs dredging in the future. I also support full financial liability for Georgia-Pacific in removal of these contaminated sediments. They have profited for many years from their operation in Bellingham, and justice requires that they bear the cost of rectifying any environmental damage that they caused.

I appreciate your attention to this matter.

Sincerely,

Elizabeth Pernotto

Elizabeth Pernotto

ELIZABETH PERNOTTO

1. The Preferred Remedial Action Alternative evaluated in the final EIS includes removal of contaminated sediments to native material in Whatcom Waterway, providing future navigation feasibility. Georgia Pacific will incur their fair share of the costs of cleanup.

Pebles, Lucy

From: darofkar@dukeengineering.com
Sent: Wednesday, September 15, 1999 4:19 PM
To: Lpeb461@ecy.wa.gov
Subject: Bellingham Bay Pilot comments

Hi Lucy,

You sounded a bit frazzled on the phone earlier. I hope things aren't too bad. Although, I'd like to add some comments to the pool. This may not be helping your situation; sorry.

To whom it may concern,
I would like to take this opportunity to provide comment on the draft EIS for the Bellingham Bay Comprehensive Strategy. There are only a few subjects I feel should be addressed. I will provide my address and phone if there is any need to contact me for clarification or what have you. I would appreciate it if WDOE and the rest of the pilot team would consider the following comments for review.

I am under the impression that several of the organizations involved in the Bellingham Bay Clean-up pilot feel the CAD option is the better alternative, both in terms of costs, impacts, and potential outcomes. Of the five remedial action alternatives, I would give the nod to one of the CAD options as well.

A 'No Action' alternative should have been listed as an option in the draft EIS. Not having this alternative listed can lead to the false impression that such an action, or rather non-action, is not an option. It is imparative that all interested party's understand that 'No Action' is an alternative, even though it may not be the best option for the Bay or the community.

Alternatives 2A and 2C provide for variable amounts of dredging. These amounts seem to be based on economics (both present and potential future) rather than the actual contamination loads. I would like to see an alternative whose basis is in contamination load as opposed to dollar signs. Is alternative 2A the minimum for contaminant removal to achieve SQS in the bay?

I have to agree with Mr. Servais in that Star Rock is an inappropriate dumping site. This is an area that should be cleaned up and prioritized for habitat enhancement. I realize enhancement of the CAD site is part of the plan and that Star Rock is already quite contaminated, but the Star Rock location is inappropriate for too many reasons. Originally, I thought it was a good idea considering then that less contaminant removal would be required because it would just be covered up as part of the CAD design. But Star Rock is too close to one of Bellingham's most used parks and the populus in general. Is it possible to place the CAD near the outflow of either the Nooksack or one of the creeks where natural capping can continue? Is it feasible to dig out a fairly large pit (perhaps a half mile or so from the mouth of the Nooksack) for the CAD and use those 'cleaner' sediments to enhance the Star Rock area for Whatcom Creek smolts?

have talked to several people who are directly involved in the project and ave found them to be very knowledgeable and open to discussion. From what I an tell the team assembled for this project is worthy of the task and should be ommended for their efforts. I appreciate the opportunity to add inputs into ie process and hope to continue my, minor as it is, involvement.
hank you for your time,

ean Rofkar
522 Franklin St.

DEAN ROFKAR

1. Comment noted.

2. A no action alternative was presented and evaluated via the No Comprehensive Strategy alternative (see section 2.2). A remedial action must occur to comply with state standards established to protect human health and the environment. No remedial action is not an option.

3. Alternative 2A is the minimum removal in the Whatcom Waterway to achieve compliance with SQS. Alternative 2C provides a greater removal depth (i.e., larger volume of sediment removed), and therefore provides greater flexibility to meet future deeper navigation needs.

4. The Preferred Remedial Action Alternative evaluated in the final EIS locates the CAD site north of Starr Rock, a greater distance from Boulevard Park.

5. A pit CAD was not considered because it did not provide the opportunity to build important shallow water habitat that has been historically lost in the urbanized portion of the bay, or to place dredged contaminated material on existing contaminated material (e.g. Cornwall Avenue Landfill site). A pit CAD would have placed contaminated dredged material entirely on clean state-owned aquatic lands.

August 26, 1999

From: Ken Speer
dba SPEERIT WORKS
1220 Central Ave.
Bellingham, Wash. 98225
(360) 961-4849

To: Bellingham Bay Clean-up Project.

Despite Georgia Pacific Corp. (G.P.)'s continuing colonization of downtown Bellingham's waterfront, the Whatcom Creek waterway remains as one of the most important potential economic assets for our community.

The colonization I refer to is the current warehouse construction on the west side of the waterway and the demolition of the old historic granary at the corner of Central Ave. and Roeder.

Folks from out of town frequently stop by my store and want to know where Bellingham's waterfront is. People from this community who come into my store almost universally support the idea of creating a sort of "inner harbor" on the Whatcom Creek waterway.

There are no guarantees that G.P. will be here forever. Unless we get all the pollution out now, our community's potential to use the waterway

KEN SPEER

1. Comment noted.

will be critically limited in the foreseeable future.

At some point (and perhaps that time has already passed) the site upon which G.P. sits will be more valuable redeveloped and integrated into our community then used as a location to house an industrial dinosaur that gobbles up our town's best assets.

Please leave the waterway and our bay as clean as possible. It is the best solution for us all. Thank-you for your consideration.

Sincerely,

Ken Speer

Ken Speer.

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Wendy Steffensen
2709 W Maplewood Ave, #102
Bellingham, WA 98225

Christine Coorigan
Department of Ecology
3190 160[th] Ave. S.E.
Bellevue, WA 98008

September 17, 1999

Dear Ms. Coorigan,

I am writing to you regarding the Draft EIS on Bellingham Bay. I attended the work group meetings held at Resources and, in general, I agree with Resources recommendations. In addition to the recommendations, I have additional concerns regarding the EIS process and the ultimate Bay cleanup.

The stakeholders and decision group should have included a representative from the community. The
citizens of this area are the biggest stakeholders in the bay clean-up, and have been in essence,
marginalized, by being kept out of the decision making process. A citizen representative could have
digested material for the community, explained the different perspectives around each of the viable and
non-viable alternatives, and answered questions with candor, in the absence of a hidden agenda.
1 Although I applaud Mike Stoner's efforts to make the citizenry aware of the process and to answer all
questions, he was a representative of the Port, and he was not truly objective. We needed to have
someone in the stakeholders meetings, who had the time and education to follow and keep up with the
decision making process- and to be the citizen's eyes, ears and voice. The citizenry and environmental
community were not well served by the process.

In the Draft EIS, many times, I noted that future plans were still being developed, especially in the
implementation of the plan, and in the monitoring of the containment site. I would like the community
2 to have oversight in choosing the contractor, choosing an on-site inspector to oversee the contractor, and
in monitoring all containment sites. Extensive oversight by the community is necessary so that problems
can be addressed in a timely manner and so that misconceptions do not propagate. If the remediation is
done well, the community could be assured by its oversight role; and if the remediation is not done well,
damage to the environment may be prevented by community oversight.

I remain skeptical of the technology proposed to remediate the Cornwall Avenue landfill. I believe the
entire landfill should be removed from the Bay and the shoreline. Both environmentally and
economically, it makes sense to remove the landfill and to replace it with clean fill to restore habitat and
3 economic opportunity.

In closing, I urge you to appoint a citizen member for the remainder of the negotiations among the stakeholders, and to provide the community with real oversight capability. I look forward to commenting on future proposals.

Sincerely,

Wendy S. Steffensen

WENDY STEFFENSEN

1. See response to People for Puget Sound Comment 1.
2. See General Comment response #1 – Process for Implementation of the Comprehensive Strategy, for reference about citizen involvement.
3. See General Comment response #s 4 and 7, CAD design and Cap Design respectively.

RECEIVED
SEP 1 4 1999
DEPT. OF ECOLOGY

3989 Legoe Bay Road
Lummi Island, Washington 98262
September 13, 1999

Ms Lucy Peebles, Northwest Regional Office
Department of Ecology
3190 160th Avenue S.W.
Bellevue, Washington 98008-5452

Dear Ms Peebles:

After reviewing the EIS for the Bellingham Bay Clean-up Pilot Project, I would like to say that I believe that 2C is the best proposal.

Dredging down to native soil now, will insure that Bellingham can remain a commercial port. Allowing an existing sheltered port to silt in because we might get one somewhere else, is foolish.

Dredging down to native soil now, means that toxic contaminants will not be released into the waters of Bellingham Bay every time maintenance dredging is necessary in the future. It is a responsible action for the future.

I believe 2C is the best choice.

Sincerely,

Patricia Wales

Patricia Wales

PATRICIA WALES

1. The Preferred Remedial Action Alternative evaluated in the final EIS includes removal of contaminated sediments to native material in Whatcom Waterway.

September 18, 1999

Christine Corrigan
Department of Ecology
3190 160th Ave. SE
Bellevue, WA 98008

RECEIVED
SEP 20 1999
DEPT. OF ECOLOGY

Re: Bellingham Bay Cleanup DEIS

Ms. Corrigan,

I wish to make a couple of brief comments on the DEIS for the Bellingham Bay contaminated sediment clean-up plans. I was not able to locate a copy of the DEIS and was discouraged to find out that citizens were being charged $50 to have a copy made when the original supply ran out. It's beyond me how that is supposed to enhance public participation in this important review process. Nevertheless, I was able to get a glance at a copy, as well as attend the public hearing in Bellingham a few weeks ago. I have also discussed the proposal with others who were able to review the documents, and can offer the following:

First and foremost, the selection of alternatives is fundamentally flawed due to an over-reliance on aquatic disposal options. It is clear that the driving forces behind this plan are more concerned about cost-savings than doing what is best for the long-term health of the bay. I object to using the bay as a hazardous waste site, as proposed in most of the alternatives. It's unimaginable to think that if we had a million cubic yards of poisoned sediments stockpiled somewhere on land that we would choose to dump them in the bay. For the higher risk material, that is not an acceptable solution. For the lower risk material, it's at least arguable.

Therefore, I can only support Alternative E, or Alternative D with modifications that assure proper upland disposal at a suitable location with long-term monitoring. Capping the low-risk material may be acceptable is it helps to minimize disturbance of the bay and facilitates more rapid recovery of the bay ecosystem (I realize that natural recovery is a very long slow process). Cost, though important, should be a secondary consideration. I am particularly opposed to the emphasis on aquatic disposal and capping of the high-risk contaminants at Starr Rock just offshore of Boulevard Park, the most popular public access area on the Bellingham waterfront.

At a minimum, the alternatives need to reflect the fundamental need to get the worst stuff out of the bay altogether.

Thank you for considering my comments.

Sincerely,

Ken Wilcox
3900 Fraser Street
Bellingham, WA 98226
(360) 733-7014

KEN WILCOX

1. The Preferred Remedial Action Alternative evaluated in the final EIS contains provisions to treat the worst material slated for dredging should treatment technologies become viable, and locates the CAD further away from Boulevard Park. See General Comment response # s 3, 4 and 6 – Treatment Options, CAD Design and Cap Design respectively. Also see response to Puget Soundkeeper Alliance comment #5.

REFERENCES

REFERENCES

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GLOSSARY
ACRONYMS AND ABBREVIATIONS

GLOSSARY

Acute Toxicity. Any toxic effect that is produced within a short period of time, generally 96 hours or less. Although the effect most frequently considered is mortality, the end result of an acute effect could be any harmful biological effect.

Aerobic. Living, active or occurring only in the presence of oxygen. For example, soil microorganisms which degrade sewage effluent from septic systems need oxygen in order to function.

Algae. Aquatic, nonflowering plants that lack roots and use light energy to convert carbon dioxide and inorganic nutrients such as nitrogen and phosphorus into organic matter by photosynthesis. Common algae include dinoflagellates, diatoms, seaweeds and kelp. An algal bloom can occur when excessive nutrient levels and other physical and chemical conditions enable the algae to reproduce rapidly.

Anadromous Fish. Species, such as salmon, which hatch in fresh water, spend a large part of their lives in the ocean, and return to freshwater rivers and streams to reproduce.

Aquatic Disposal. Placement of dredged material in rivers, lakes, estuaries, or oceans via pipeline or surface release from hopper dredges or barges.

Aquatic Ecosystem. Bodies of water, including wetlands, that serve as the habitat for interrelated and interacting communities and populations of plants and animals.

Bathymetry. Physical configuration of a sea bed; the measurement of depths of water in a large water body.

Bellingham Bay Demonstration Pilot. Project sponsored by the Cooperative Sediment Management Program to develop sediment cleanup priorities for Bellingham Bay.

Benchmark Organism. Test organism designated by Corps and EPA as appropriately sensitive and useful for determining biological data applicable to the real world. Test protocols with such organisms are published, reproducible and standardized.

Beneficial Uses. Placement or use of dredged material for some productive purpose. Beneficial uses may involve either the dredged material or the placement site as the integral component of the beneficial use.

Benthic and Epibenthic Infauna. Organisms that live in or on the bottom of a body of water.

Berm. Narrow shelf of ground left undisturbed; usually at the base of a levee.

Best Management Practice (BMP). A method, activity, maintenance procedure, or other management practice for reducing the amount of pollution entering a water body. The term originated from the rules and regulations developed pursuant to Section 208 of the federal Clean Water Act (40 CFR 130).

Bioaccumulation. The process by which a contaminant accumulates in the tissues of an organism. For example, certain chemicals in food eaten by a fish tend to accumulate in its liver and other tissues.

Bioaccumulation Factor. The degree of which an organism accumulates a chemical compared to the source. It is a dimensionless number or factor derived by dividing the concentration in the organism by that in the source.

Bioassay. A test procedure that measures the response of living plants, animals or tissues to potential contaminants. For example, marine worms have been exposed to the sediments of Puget Sound, and their responses have been used to determine areas in the Sound where the sediments may be harmful to life.

Biota. The animals, plants and microbes that live in a particular location or region.

Bulkhead. A retaining wall along a waterfront.

Capping. The controlled, accurate placement of contaminated material at an open-water site, followed by a covering or cap of clean isolating material.

Chronic Toxicity. Any toxic effect on an organism that results after exposure of long duration (often 1/10th of the life span or more). The end result of a chronic effect can be death, although the usual effects are sublethal (e.g., inhibited reproduction or growth). These sublethal effects may be reflected by changes in the productivity and population structure of the community.

Cleanup Activities. Actions taken by a public agency or a private party to correct an environmental problem. Activities generally consist of the treatment or removal from the environment of contaminants introduced by past practices (for example, capping part of a public park contaminated with carcinogenic compounds or digging up and incinerating soil contaminated with dioxin).

Cleanup Screening Level (CSL). Criteria set forth in the Sediment Management Standards (SMS; Chapter 173-204 WAC) that identify sediments that may represent minor adverse effects to some sensitive species, and is sometimes used by the Ecology as the enforceable sediment cleanup standard. CSL values are often higher than the sediment quality standards (SQS).

Coastal Zone. Includes coastal waters and the adjacent shorelands designated by a State as being included within its approved coastal zone management program. The coastal zone may include open waters, estuaries, bays, inlets, lagoons, marshes, swamps, mangroves, beaches, dunes, bluffs, and coastal uplands. Coastal-zone uses can include housing, recreation, wildlife habitat, resource extraction, fishing, aquaculture, transportation, energy generation, commercial development, and waste disposal.

Confined Aquatic Disposal (CAD). Form of capping which includes the added provision of some form of lateral containment (for example, placement of the contaminated and capping materials in bottom depressions or behind subaqueous berms) to minimize spread of t he materials on the bottom.

Confined Disposal Facility (CDF). An engineered structure for containment of dredged material consisting of dikes or other structures that enclose a disposal area above any adjacent water surface, isolating the dredged material from adjacent waters during placement. Other terms used for CDFs that appear in the literature include confined disposal area, confined disposal site, and dredged material containment area.

Contaminated Sediment. Sediment that has been demonstrated to cause an unacceptable adverse effect on human health or the environment.

Delta. Alluvial deposit (i.e., sediments moved and deposited by water) at the mouth of a river.

Disposal. Methods by which unwanted materials are relocated, contained treated, or processed. Unless contaminants are converted to less harmful forms or removed from the material before disposal, they may be released again into the environment.

Dissolved Oxygen. Oxygen that is present (dissolved) in water and therefore available for fish and other aquatic animals to use. If the amount of dissolved oxygen in the water is too low, then aquatic animals may die. Wastewater and naturally occurring organic matter contain oxygen-demanding substances that consume dissolved oxygen.

Dredged Material. Material excavated from inland or ocean waters by dredging.

Dredging. Any physical digging into the bottom sediment of a water body. Dredging can be done with mechanical or hydraulic machines, and it changes the shape and form of the bottom. Dredging is routinely done in many parts of Puget Sound in order to maintain navigation channels that would otherwise fill with sediment and block ship passage.

Erosion. Wearing away of rock or soil by the gradual detachment of soil or rock fragments by water, wind, ice and other mechanical and chemical forces.

Estuary. A coastal water body where ocean water is diluted by out-flowing fresh water.

Feasibility Study (FS). Performed at the same time as Remedial Investigations, Feasibility Studies are the process of developing and evaluating remedial action alternatives. The evaluation criteria are effectiveness, implementability, and cost.

Gravel. A loose mixture of pebbles and rock fragments coarser than sand, often mixed with clay, etc.

Groundfish. Fish (also known as bottomfish) that live on or near the bottom of water bodies, for example, English sole.

Groundwater. All subsurface water, especially that in the saturation zone (i.e., area where water fill all space between soil particles. Groundwater is created by rain that soaks into the ground and flows down until it is collected at a point where the ground is not permeable. Groundwater then usually flows laterally toward a river, lake or the ocean. Wells tap the ground water for use.

Growth Management Act. The state law (RCW 36.70A) that directs local governments to adopt revised comprehensive land-use plans and development regulations. Local governments can incorporate many water quality and habitat protections into their growth management program.

Habitat. The specific area or environment in which a particular type of plant or animal lives. An organism's habitat must provide all the basic requirements for life and should be free of harmful contaminants. Typical Puget Sound habitats include beaches, marshes, rocky shores, the bottom sediments, intertidal mudflats, and the water itself.

Hazardous Waste. Any solid, liquid or gaseous substance which, because of its source or measurable characteristics, is classified under state or federal law as hazardous and is subject to special handling, shipping, storage and disposal requirements. Washington State law identifies two categories, dangerous and extremely hazardous. The latter category is more hazardous and requires greater precautions.

Human-Health Risk. The risk or likelihood that human health will be adversely affected. Estimating health risks is a complex and inexact practice.

Hydraulic Project Approval (HPA). Under the Hydraulic Code Rules, approval is required from Washington State Department of Fish and Wildlife for certain activities in state waters that support fish life. A project approval is required for activities affecting state waters such as certain forest practices; culvert construction; bridge, pier, and piling construction; bulkheads; boat launches; dredging; etc.

Hydrocarbon. An organic compound composed of carbon and hydrogen; for example, petroleum compounds.

Hydrology. A science dealing with the properties, distribution, and circulation of surface water, groundwater, and water in the atmosphere.

Intertidal Area. The area between high and low tide levels. The alternate wetting and drying of this area makes it a transition between land and water and creates special environmental conditions and habitats.

Land Use. The way land is developed and used in terms of the types of activities allowed (agriculture, residences, industries, etc.) and the size of buildings and structures permitted. Certain types of pollution problems are often associated with particular land-use practices, such as sedimentation from construction activities.

Leachate. Water (often precipitation) that has flowed through soil or sediments and therefore may contain dissolved, soluble chemicals.

Level Bottom Capping. A form of capping in which the contaminated material is placed on the bottom in a mounded configuration.

Loading. The total amount of material entering a system from all sources.

Mean Lower Low Water. A tidal datum. The arithmetic mean of the lower low water heights of a mixed tide observed over a specific 19-year cycle.

Metabolism. All chemical processes occurring within an organism, including both synthesis and breakdown of organic materials.

Metals. Metals are elements found in rocks and minerals that are naturally released to the environment by erosion, as well as generated by human activities. Certain metals, such as mercury, lead, nickel, zinc and cadmium, are of environmental concern because they are released to the environment in excessive amounts by human activity. They are generally toxic to life at certain concentrations. Since metals are elements, they do not break down in the environment over time and can be incorporated into plant and animal tissue.

Monitor. To systematically and repeatedly measure conditions in order to track changes or to verify continued compliance with regulatory standards or requirements.

Municipal Discharge. Effluent from a municipal sewage treatment plant.

Nearshore Areas. Areas between the upland and subtidal zones.

National Pollutant Discharge Elimination System (NPDES). A part of the federal Clean Water Act, which requires point-source dischargers to obtain discharge permits. These permits are referred to as NPDES permits and are administered by the Washington Department of Ecology.

Nonpoint Source Pollution. Pollution that enters water from dispersed and uncontrolled sources (such as surface runoff) rather than through pipes. Nonpoint sources (e.g., forest practices, agricultural practices, on-site sewage disposal, and recreational boats) may contribute pathogens, suspended solids, and toxicants. While individual sources may seem insignificant, the cumulative effects of nonpoint source pollution can be significant.

Nutrients. Essential chemicals needed by plants or animals for growth. If other physical and chemical conditions are optimal, excessive amounts of nutrients can lead to degradation of water quality by promoting excessive growth, accumulation, and subsequent decay of plants, especially algae. Some nutrients can be toxic to animals at high concentrations.

Outfall. The outlet of a drain or sewer.

Parameter. A quantifiable or measurable characteristic. For example, height, weight, sex and hair color are all parameters that can be determined for humans. Water quality parameters include temperature, pH, salinity, dissolved oxygen concentration, and many others.

Pathogen. An agent such as a virus, bacterium or fungus that can cause diseases in humans. Pathogens can be present in municipal, industrial and nonpoint-source discharges to the Sound.

Pathway. In the case of bioavailable contaminants, the route of exposure (e.g. water, food).

Persistent. Compounds that are not readily degraded by physical, chemical, or biological processes.

Pesticide. A general term used to describe chemical substances that are used to destroy or control pest organisms. Pesticides include herbicides, insecticides, algicides, fungicides, and others. Many of these substances are manufactured and are not naturally found in the environment. Others, such as pyrethrum, are natural toxins which are extracted from plants and animals.

Pilot Team . Established in September 1996, the Pilot Team is made up of fourteen agencies working collaboratively on a comprehensive strategy for Bellingham Bay.

Point Source Pollution. A source of pollutants from a single point of conveyance such as a pipe. For example, the discharge pipe from a sewage treatment plant or a factory is a point source.

Pollutant. A contaminant that adversely alters the physical, chemical or biological properties of the environment. The term includes pathogens, toxic metals, carcinogens, oxygen-demanding materials, and all other harmful substances. With reference to nonpoint sources, the term is sometimes used to apply to contaminants released in low concentrations from many activities which collectively degrade water quality. As defined in the federal Clean Water Act, pollutant means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water.

Polychlorinated Biphenyls (PCBs). A group of manufactured chemicals including about 70 different but closely related compounds made up of carbon, hydrogen and chlorine. If released to the environment, they persist for long periods of time and can biomagnify in food webs because they have no natural usage in the food web. PCBs are suspected of causing cancer in humans. PCBs are an example of an organic toxicant.

Polycyclic or Polynuclear Aromatic Hydrocarbons (PAHs). A class of complex organic compounds, some of which are persistent and cancer-causing. These compounds are formed from the combustion of organic material and are ubiquitous in the environment. PAHs are commonly formed by forest fires and by the combustion of gasoline and other petroleum products. They often reach the environment through atmospheric fallout and highway runoff.

Practicable. Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Puget Sound Dredged Disposal Analysis (PSDDA). A federal (Corps, EPA) and state (Ecology, DNR) interagency program to regulate the evaluation and unconfined open-water disposal of dredged material.

Remedial Investigation (RI). Collection of data to adequately characterize a site for purposes of developing and evaluating effective remedial alternatives (40 CFR Section 300.403(d)). RIs generally involve field studies, including treatability studies, and a baseline risk assessment. Feasibility studies are often performed at the same time.

Remediation. The act or process of relieving or curing a problem.

Restoration. The act or process of bringing back to a former condition or position.

Revised Code Of Washington (RCW). The compilation of the laws of the state of Washington published by the Statute Law Committee. For example, the law that created the Puget Sound Water Quality Authority is incorporated in the code as Chapter 90.70 RCW.

Riparian Habitat. Riparian ecosystems include the transitional areas between aquatic and terrestrial environments and contains all of the environmental elements that directly contribute to the structural and functional processes of a body of water..

Rip-Rap. A foundation or sustaining wall of stones or chunks of concrete often used along an embankment.

Salinity. A measure of the quantity of dissolved salts in water. The salinity of ocean water ranges between 33 and 35 parts per thousand.

Salmonid. A fish of the family Salmonidae (as distinct from a salmonoid which is merely a fish that resembles a salmon). Fish in this family include salmon and trout. Most Puget Sound salmonids are anadromous.

Sand. Soil particles having a grain size ranging between approximately 63 micrometers and 2,000 micrometers.

Sediment. Material, such as sand, silt, or clay, suspended in or settled on the bottom of a water body. Sediment input to a body of water comes from natural sources, such as erosion of soils and weathering of rock, or as the result of anthropogenic activities such as forest or agricultural practices, or construction activities. The term "dredged material" refers to material which has been dredged from a water body, while the term sediment refers to material in a water body prior to the dredging process.

Sediment Management Standards (SMS). Standards developed by Ecology (Chapter 173-204 WAC) to determine sediment quality in terms of chemical concentrations and ecological concerns. The SMS defines two levels of chemical criteria: Sediment Quality Standards (SQS), and Cleanup Screening Level (CSL).

Sediment Quality Standards (SQS). Criteria set forth in the Sediment Management Standards (SMS; Chapter 173-204 WAC) that provide a regulatory goal by identifying sediments that are predicted to have no adverse effects (chronic or acute) on biological resources. SQS criteria are often lower (more conservative) than cleanup screening level (CSL) criteria.

Shellfish. An aquatic animal, such as a mollusk (clams and snails) or crustacean (crabs and shrimp), having a shell or shell-like exoskeleton.

Shoreline Management Act (SMA). The state law (90.58 RCW) that requires local governments to develop a shoreline master program, and requires permits for water and associated land uses. Many local governments promote the protection of wetlands, habitat, and water quality through their shoreline master program.

Sole Source Aquifer. The single source of ground water for human use in any one area. Areas with a sole source aquifer have no other source of ground water; any contamination of the aquifer could contaminate the entire water supply.

Source Control. A practice, method or technology that is used to reduce pollution from a source; for example, best management practices or end-of-pipe treatment.

State Environmental Policy Act (SEPA). A state law (Chapter 43.21C RCW) that requires state agencies and local governments to consider environmental factors when making decisions on activities, such as development proposals over a certain size, and comprehensive plans. As part of this process, environmental impacts are documented and opportunities for public comment are provided.

Storm Water. Water that is generated by rainfall and is often routed into drain systems in order to prevent flooding.

Subarea Strategy. Approach defining priority actions that should be integrated in the Near-Term Remedial Action Alternatives for a geographic subset within the bay.

Subtidal Area. The marine environment below low tide.

Suspended Solids. Organic or inorganic particles that are suspended in and carried by the water. The term includes sand, mud and clay particles as well as solids in wastewater.

Total Maximum Daily Load (TMDL). Analysis required under Section 303(d) of the federal Clean Water Act (40 CFR 130) of waterbodies that fail to meet water quality standards after application of required technology-based controls. The goal of a TMDL is to ensure the listed water will attain water quality standards by allocating pollutant-loading capacity among pollutant sources.

Total Suspended Solids. The weight of particles that are suspended in water. Suspended solids in water reduce light penetration in the water column, can clog the gills of fish and invertebrates, and are often associated with toxic contaminants because organics and metals tend to bind to particles.

Toxic Substances and Toxicants. Chemical substances such as pesticides, plastics, detergents, chlorine and industrial wastes that are poisonous, carcinogenic or otherwise directly harmful to life.

Treatment. Chemical, biological or mechanical procedures applied to an industrial or municipal discharge or to other sources of contamination to remove, reduce or neutralize contaminants.

Turbidity. An optical measure of the amount of material suspended in the water. Increasing the turbidity of the water decreases the amount of light that penetrates the water column. High levels of turbidity can be harmful to aquatic life.

Unconfined, Open-Water Disposal. Discharge of dredged material into an aquatic environment, usually by discharge at the surface, without restrictions or confinement of the material once it is released.

Washington Administrative Code (WAC). Contains all state regulations adopted by state agencies through the rulemaking process. For example, Chapter 173-201 WAC contains water quality standards.

Water Column. The water in a lake, estuary or ocean which extends from the bottom sediments to the water surface. The water column contains dissolved and particulate matter, and is the habitat for plankton, fish and marine mammals.

Waters of the U.S. In general, all waters landward of the baseline of the territorial sea and the territorial sea. Specifically, all waters defined in the CWA 404(b)(1) guidelines.

Watershed. The geographic region within which water drains into a particular river, stream or body of water. A watershed includes hills, lowlands and the body of water into which the land drains. Watershed boundaries are defined by the ridges of separating watersheds.

Zoning. To designate by ordinances areas of land reserved and regulated for different land uses.

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Appendix A
Subarea Strategies

APPENDIX A

BELLINGHAM BAY COMPREHENSIVE STRATEGY

SUBAREA STRATEGIES

SUBAREA STRATEGIES

DEFINING SUBAREAS AND SHORELINE SEGMENTS

Nine subareas are defined as distinct geographic units in Bellingham Bay, and are consistent with designations called out in the City of Bellingham's Shoreline Management Program (Figure A-1). Three of these subareas, West Bay, South Bay, and Marine, are large uniform areas of relatively undeveloped shoreline. The other six areas have a wide range of shoreline uses. In these six subareas, the areas are further separated into shoreline segments that reflect difference in uses along the shoreline within a subarea. The number of shoreline segments varies depending on the number of times shoreline uses and/or habitat features change within a subarea.

DEVELOPING THE STRATEGY

Each project element has been inventoried within a subarea – sediment sites and source control, sediment disposal siting, habitat, and land use. Following the inventory, an analysis was made to determine whether or not there are overlapping issues within a subarea or shoreline segment. If an overlap occurred, an effort was made to determine if the overlap represented a conflict between two or more competing uses, or if it represented an opportunity to combine two or more complementary uses. Using an overlay matrix, areas of conflicting or competing uses were identified. The Subarea Strategies provide guidance and direction on how to resolve these conflicts. The strategies also help determine which project element(s) are the critical ones given a shoreline segment, and identify where a balance may need to occur within a subarea.

The Subarea Strategies consist of the following components:

- ***Subarea Description*** –Defines the geographical extent of the subarea, the key features, the character of the shoreline at the land/water edge. The description also identifies the general ecological functions within the subarea and the prominent land uses.
- ***Recommended Strategy*** – Key strategy statement for the subarea
- ***Primary Uses*** – Defines the existing primary use(s) within a subarea.
- ***Project Elements*** – A list of activities/opportunities that are consistent with the recommended strategy is presented separately for each of the four project elements. Those activities that are part of the Near-Term Remedial Action Alternatives are identified.

Two of the key features of the Subarea Strategies are balance and flexibility. Frequently, conflicting uses require that Subarea Strategies reflect a balance between land use and habitat. Due to the configuration of the inner bay – with two federally-authorized navigation channels terminating in urban stream estuaries – striking a balance between habitat and land use is often noted as important component of the Subarea Strategies. Flexibility is an important part of the Subarea Strategies because of the difficulty in predicting with any certainty what the future land use development scenarios will be. Maintaining flexibility is achieved in some of the subareas by the strategy statements for a subarea often reflecting a water-dependent commercial land-use orientation, without pointing to a specific project.

The Subarea Strategies are presented in this Appendix. A map that identifies the key characteristics of the subarea accompanies each strategy. Examples of restoration opportunities within each subarea are shown on these maps with numerical references. The brief description of these restoration opportunities is provided in Table A-1. A detailed explanation of the development of this list of restoration actions is provided in the Habitat Restoration Documentation Report.

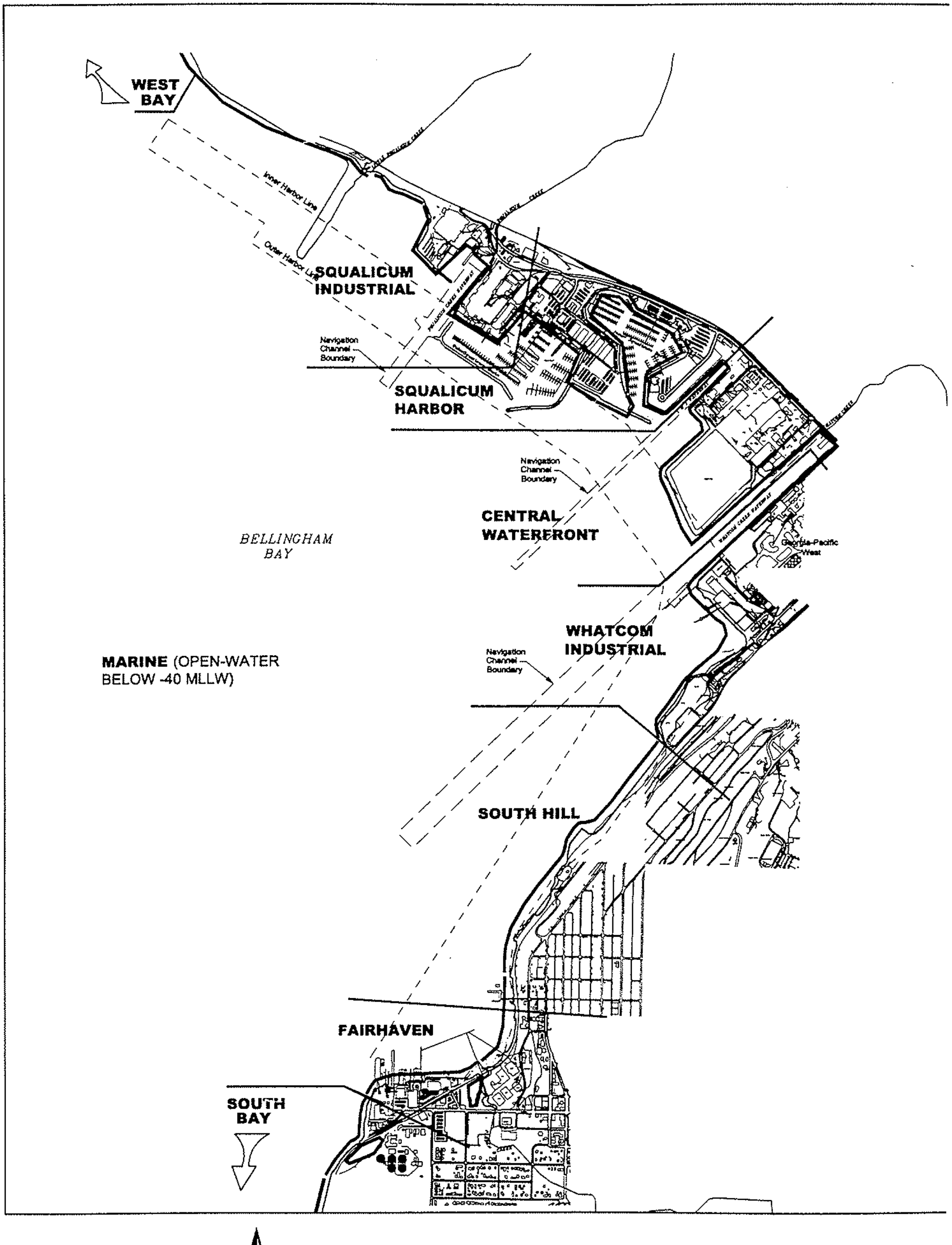

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Figure A-1
Comprehensive Strategy Subareas

Table A-1 Habitat Action Descriptions (Refer to the attached maps for location of numbered actions)

No.	Habitat Area to be Gained in ft² (acres)[1]	Name	Description
1	38,000 ft² (0.87)	Cement Co. Dock	The cement company dock is a relatively wooden structure near Little Squalicum Creek. It extends through intertidal and shallow subtidal water. The primary action would be removal of the treated wooden piles (probably cut below the mud line) to remove creosote from the aquatic environment and restore substrates.
2	30,000 ft² (0.68)	Mt. Baker Plywood West	The beach area west of Mt. Baker Plywood consists of large boulders and rocks. Opportunities at this site include either removing the large boulders and rocks to expose underlying sediments and supplement with finer mixed coarse gravel and sand, or placing finer mixed coarse gravel and sand over the large boulders and rocks to fill interstices.
3	30,000 ft² (0.68)	Mt. Baker Plywood Northwest	A portion of the shoreline appears to be fill. The fill could be removed and the area graded to support marine buffer, possibly salt marsh and sand/mud flat.
4	120,000 ft² (2.75)	Mt. Baker Plywood - South	The fill could be removed and the site graded to provide habitat suitable for sand/mudflat and salt marsh habitat with a marine buffer fringe.
5	20,000 ft² (0.45)	Squalicum Crk. Waterway - A	This action would involve the removal of treated wooden piles, a pier, log rafting structures, and log rafts.
6	200,000 ft² (4.6)	Squalicum Crk. Waterway – B	The elevations in this portion of the creek estuary could be raised to provide intertidal and shallow water habitat such as eelgrass, kelp or salt marsh and associated functions. Shoreline buffer could also be established.
7	50,000 ft² (1.1)	Bellingham Cold Storage	The fill could be removed and the site graded to provide estuary habitat suitable for marine buffer, saltmarsh and/or intertidal mud/sandflat.
8	640,000 ft² (14.7)	Squalicum Harbor Breakwater	Elevations off portions of the breakwater could be raised from about -18 ft MLLW to provide gently sloping intertidal and shallow subtidal habitat and functions. Side slopes on the seaward edge of the breakwater could be modified to incorporate finer grained material to provide intertidal/shallow water functions.
9	70,000 ft² (1.6)	Squalicum Marina	The substrates along the marina margins could be modified to incorporate finer grained material to provide intertidal/shallow water functions.
10	160,000 ft² (3.6) (area available outside of existing eelgrass bed)	Port-Hilton Harbor	Shallow water habitat could be established by raising the elevation next to the ASB. Marine buffer fringe habitat could be established at high elevations and/or site elevations could me modified to meet the elevations of the existing eelgrass bed. Allow for natural eelgrass colonization or do limited eelgrass transplanting.
11	280,000 ft² (6.4)	G-P ASB – East	Shallow water habitat could be established by raising the elevation next to the ASB. Marine buffer fringe habitat could be established at high elevations and the site could support either marsh plants or eelgrass at lower elevations.
12	960,000 ft² (22)	G-P ASB – South	Elevations could be raised or modified to expand the existing eelgrass bed on the west side of the ASB. About 200, 000 CY would be required to create habitat at elevations suitable for eelgrass.
13	1,430,000 ft² (33)	GP – ASB	This action would consist of removing the ASB from the water and establishing intertidal and shallow subtidal habitat, and marine buffer and/or eelgrass.

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description
14	30,000 ft^2 (0.68)	Sash & Door	This action would involve removing fill from the Sash and Door site and establishing estuarine riparian buffer, marsh, and mudflat banks.
16	<10,000 ft^2 (<0.23)	Lower Whatcom Creek	The action would involve removing wooden structures, derelict floats, etc. in the vicinity.
17	60,000 ft^2 (1.4)	Head of Whatcom Waterway	The concept would be to modify elevations and substrates in the head of the waterway to establish estuarine riparian buffer, mudflat benches, and marsh. Perhaps introduce rootwads or other structure to the head of the waterway.
18	270,000 ft^2 (6.2)	G-P Log Pond	The concept would be to modify the shoreline elevations to provide a gently sloping or terraced slope from the top of the bank to the pierhead line in the Whatcom Waterway. Remove and debris, treated wooded structures. Establish marine buffer fringe, mudflat banks and/or saltmarsh.
19	1,080,000 ft^2 (24.8)	Port Log Raft	Remove wood/bark debris, and sunken logs. Modify the shoreline edge and modify elevations to support intertidal and shallow subtidal habitat (sloped or terraced bench). The site may provide an opportunity to provide substrates suitable for macroalgae attachment establish and/or an eelgrass bed.
20	350,000 ft^2 (8)	Cornwall Avenue Landfill - Shoreline/Upland/in-water	Remove garbage from the in-water portion of the landfill. Cut back bank along shoreline and remove garbage. Re-grade upland to intercept an appropriate shallow water elevation. Establish intertidal habitat, marine buffer fringe, possibly a saltmarsh, and potentially expand the sparse eelgrass patches (0.25 acre) just offshore of the seaward extent of the garbage.
21	45,000 ft^2 (1.03) (1st action) 360,000 ft^2 (8.3) (2nd action)	Boulevard Park	Two actions could occur along the shoreline and offshore from about 600 to 800 ft north of Boulevard Park to the south end of the Park. The first action is shoreline substrate modification. Substrates consist of rip-rap and large rock and concrete debris. These substrates could possibly be removed and replaced with coarser grain sand and gravel to provide surf smelt and sand lance spawning areas. Alternatively, finer grained substrates could be placed in the interstices to provide some epibenthic habitat. The second action would occur offshore and consist of potentially restoring eelgrass or providing substrates to support kelp.
22	18,000 ft^2 (0.41)	Taylor Street Dock and Associated Structures	Remove the treated wooden structure and associated pilings and pier structures to remove creosote from the aquatic environment. Either allow eelgrass to naturally recolonize or conduct eelgrass transplant.
23	8,000 ft^2 (0.18)	Padden Creek - North Shoreline	Remove shoreline fill and create mudflat and/or saltmarsh.
24	1,500 ft^2 (0.03)	Padden Creek - North - In-Water	Remove treated wooden pier to remove creosote from the environment. This may provide an opportunity for existing eelgrass beds to expand. Remove a small filled area that protrudes waterward of the OHW line at the landward end of the pier structure.
25	120,000 ft^2 (2.75)	Padden Creek – Upland	Remove fill and establish connection to Padden Creek. Excavate fill to create tidally influenced brackish marsh. Provide habitat buffer.
26	80,000 ft2 (1.8)	Post Point – Upland	Excavate upland next to a small open water embayment containing eelgrass. Grade excavated area to provide saltmarsh and mudflat bench.
27	900 ft2 (0.02)	Post Point – Shoreline	Modify existing structure under railroad crossing to open it up and replace existing concrete debris that has been used to armor

No.	Habitat Area to be Gained in ft² (acres)[1]	Name	Description
			the shoreline with rock.
28	900 ft2 (0.02)	Post Point – South	Modify existing structure under railroad crossing to open it up.
29	900 ft2 (0.02)	Chuckanut Spit	There is apparently a closed culvert under the rail trestle. The action would involve either opening the culvert or replacing the culvert with a new culvert that was bigger and more open.
30	7,500 ft2 (0.17)	Chuckanut Breach	There is one rail trestle allowing exchange between Bellingham Bay and the embayment in the north end of Chuckanut Bay. The action would consist of either installing a large open culvert under the rail line or building another trestle along the eastern end of the rail bed.
31	21,200,000 ft2 (486)	Post Point to Chuckanut Protection	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.
32	75,000,000 ft2 (1,722)	Portage Island Protection Area	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.
33	900,000 ft2 (20)	Lummi Peninsula	Portions of the shoreline along this area are armored with rip-rap and large boulders. The action that could be implemented here would consist of restoring upper intertidal substrates to coarse sand and gravel suitable to support surf smelt and sand lance spawning habitat. (the Lummi Nation, Corps, and County are proposing to armor the entire beach for road protection. Mitigation for maintaining surf smelt spawning habitat and functions lost from the revetment will be required by WDFW. This opportunity may not be a viable option for the Pilot).
34	140,000,000 ft² (3,214)	Nooksack Delta Protection Area	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.
35	170,000 ft² (3.9)	Nooksack Delta - East	Decaying wood deposits have apparently blanketed much of the higher intertidal area. The action would be to remove the wood deposits and if necessary import appropriately sized gravel to support surf smelt and sand lance spawning habitat.
36		East Shore Padden Creek	Remove fill, asphalt, and rock along the east shore and modify elevations to provide estuarine riparian buffer, mudflat benches, and marsh.

NSF = nearshore fill
CAD = confined aquatic disposal site
ASB = aerated stabilization basin

WEST BAY SUBAREA

Subarea Description

This subarea (Figure A-2) extends from Portage Island, along the east side of the Lummi Peninsula, past the Nooksack delta, to the beginning of the Harbor Area designation west of Little Squalicum Creek. The shoreline is predominately undeveloped in this subarea. The water/land interface from the eastern end of the subarea to the west side of the Nooksack River delta is generally gently-sloped beach consisting of sand, gravel, and

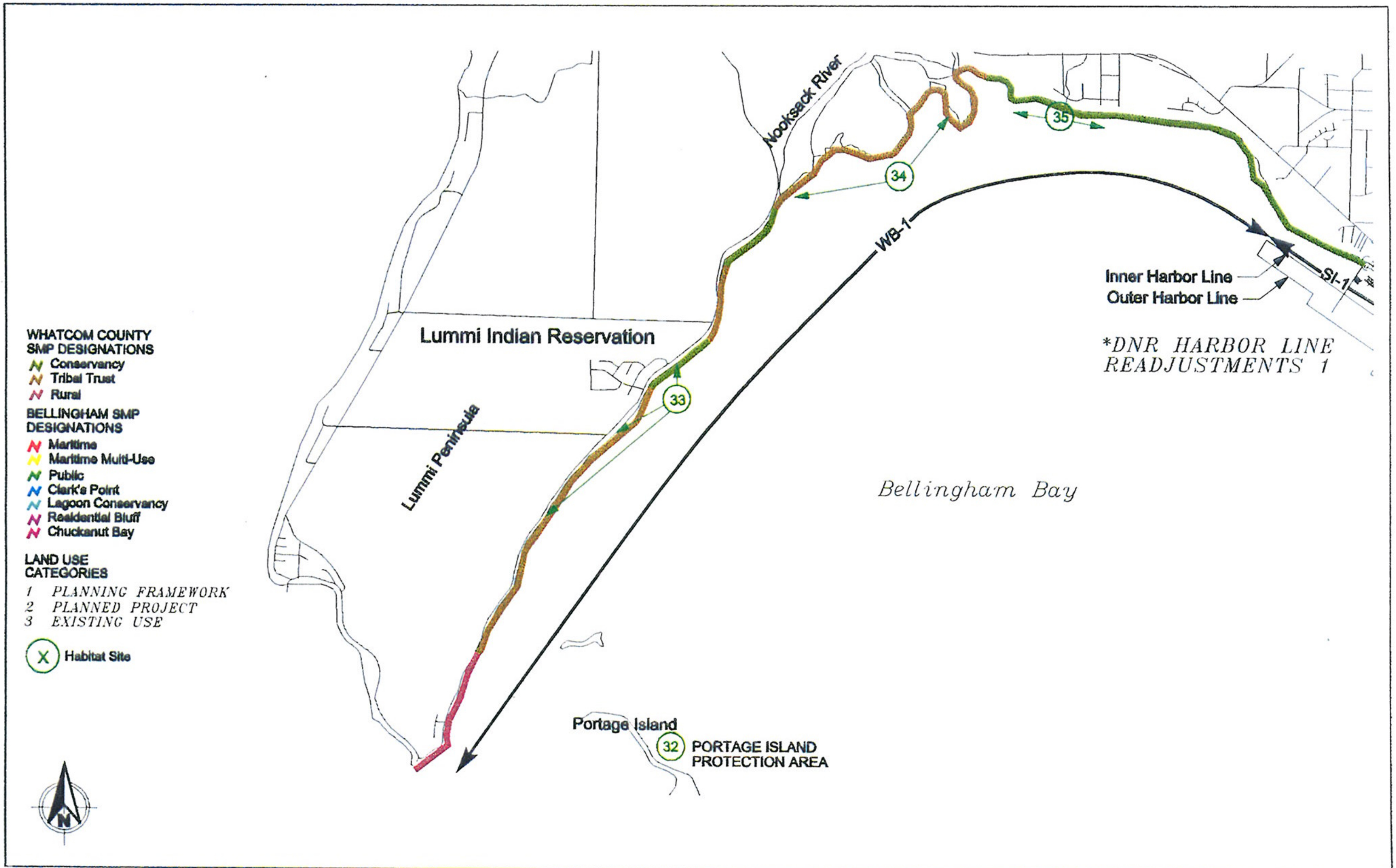

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Figure A-2

West Bay Subarea

cobble with boulders at the landward edge. The Nooksack River delta is predominately sand and mudflat and salt marsh. From the western edge of the Nooksack River delta to the southern end of Lummi Peninsula, the shoreline is relatively gently sloped gravel and cobble beach with rip-rap at the landward edge. Portions of higher beach within this subarea are documented surf smelt and sand lance spawning grounds. The Nooksack River delta and its associated habitats support feeding and refuge for finfish and shellfish, and transitional habitat for outmigrating juvenile salmonids. The majority of this subarea is designated as Conservancy under the County SMP, and the Nooksack River delta and Lummi Peninsula are Tribal Trust lands. Some homes have also been built along the Lummi Peninsula shoreline.

Recommended Strategy

Protect and enhance habitat and natural resource production in this area; support County Conservancy designation, and support tribal and local government efforts to address Nooksack River water quality, sediment, and flooding issues.

Primary Uses

The primary uses in this subarea are (1) natural resource production and habitat protection and enhancement, and (2) subsistence, cultural and ceremonial uses associated with the Lummi and Nooksack tribes.

Land Use

Land use activities/opportunities present in this subarea consistent with the recommended strategy are:

- Provide for environmentally compatible public access.
- Support sustainable subsistence/ceremonial/spiritual tribal uses.
- Provide for recreational opportunities such as fishing, bird watching, and other types of recreational uses compatible with this subarea's environmental designation.
- Provide for aquaculture opportunities that do not degrade habitat and water quality.
- Continue to provide for commercial, recreational, and tribal fishing.
- Coordinate with Whatcom County to ensure that any future SMP designation changes are compatible with the recommended strategy for this subarea.

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Support the habitat protection status "enforced" by the Lummi Nation in the area in the vicinity of the Nooksack River estuary and in the vicinity of Portage Island (should be implemented as a near-term action)
- Protect eelgrass habitat
- Protect natural processes that create and maintain habitat
- Provide for no net loss and/or a net gain of marine aquatic habitat area/function consistent with the Draft Mitigation Framework
- Protect existing herring, surf smelt, and sand lance spawning habitats in this subarea and in particular, protect surf smelt and sand lance spawning habitat along the

Lummi Peninsula shoreline through beach nourishment (should be implemented as a near-term action)

- Upland watershed planning efforts by the tribe and local government efforts should continue to address Nooksack River water quality, sediment, and flooding issues

Sediment Sites, Cleanup, Disposal, and Source Control

No contaminated sediment site issues occur in this subarea. Sedimentation issues are of concern due to the high volume of sediments that are carried into the bay from associated land management practices in the Nooksack River watershed.

- Upland watershed planning efforts should continue to address point and non-point source contribution to water and sediment quality degradation. The *Sediment Site and Source Control Documentation Report* further addresses the linkage between this issue and other regional efforts/programs.

SQUALICUM INDUSTRIAL SUBAREA

Subarea Description

This subarea (Figure A-3) extends from the beginning of the existing Harbor Area designation west of Little Squalicum Creek to the change in shoreline designation from Maritime Multi-Use to Maritime at the eastern boundary of the Weldcraft site. The shoreline along this subarea is predominately developed for commercial and industrial uses. The shoreline (approximately 800 feet) east of the Cement Plant Dock is gently sloped sand and gravel beach with boulders at the landward edge. The shoreline in the remainder of the subarea is primarily artificial (e.g., bulkheads, rip-rap). The Little Squalicum and Squalicum creeks drain into the bay in this subarea. Some salt marsh and mudflat habitat occurs in the Squalicum Creek estuary. These creeks and their estuaries, although relatively altered, provide some habitat function such as feeding and transitional habitat for finfish. The shoreline is designated as Conservancy west of the Cement Plant Dock, and shoreline is relatively undeveloped. East of the Cement Plant Dock, there are two shoreline designations: Public and Maritime. Characteristics of this subarea include:

- Harbor Area Designation
- Cement Plant Dock
- Public Trail System
- Mt. Baker Plywood
- Federal Navigation Channel
- Bellingham Cold Storage
- Weldcraft Sediment Site
- Squalicum Shipyard Site

Recommended Strategy

Integrate current and future land uses with habitat and natural resources occurring in the area by using innovative project and source control designs for water-dependent and maritime uses. Restore habitat associated with the two urban estuaries at Little Squalicum and Squalicum creeks (emphasis on Squalicum Creek) and balance this with the maritime and water-dependent commerce uses associated with the Squalicum Creek Waterway federal navigation channel. It is recommended that this balance be achieved

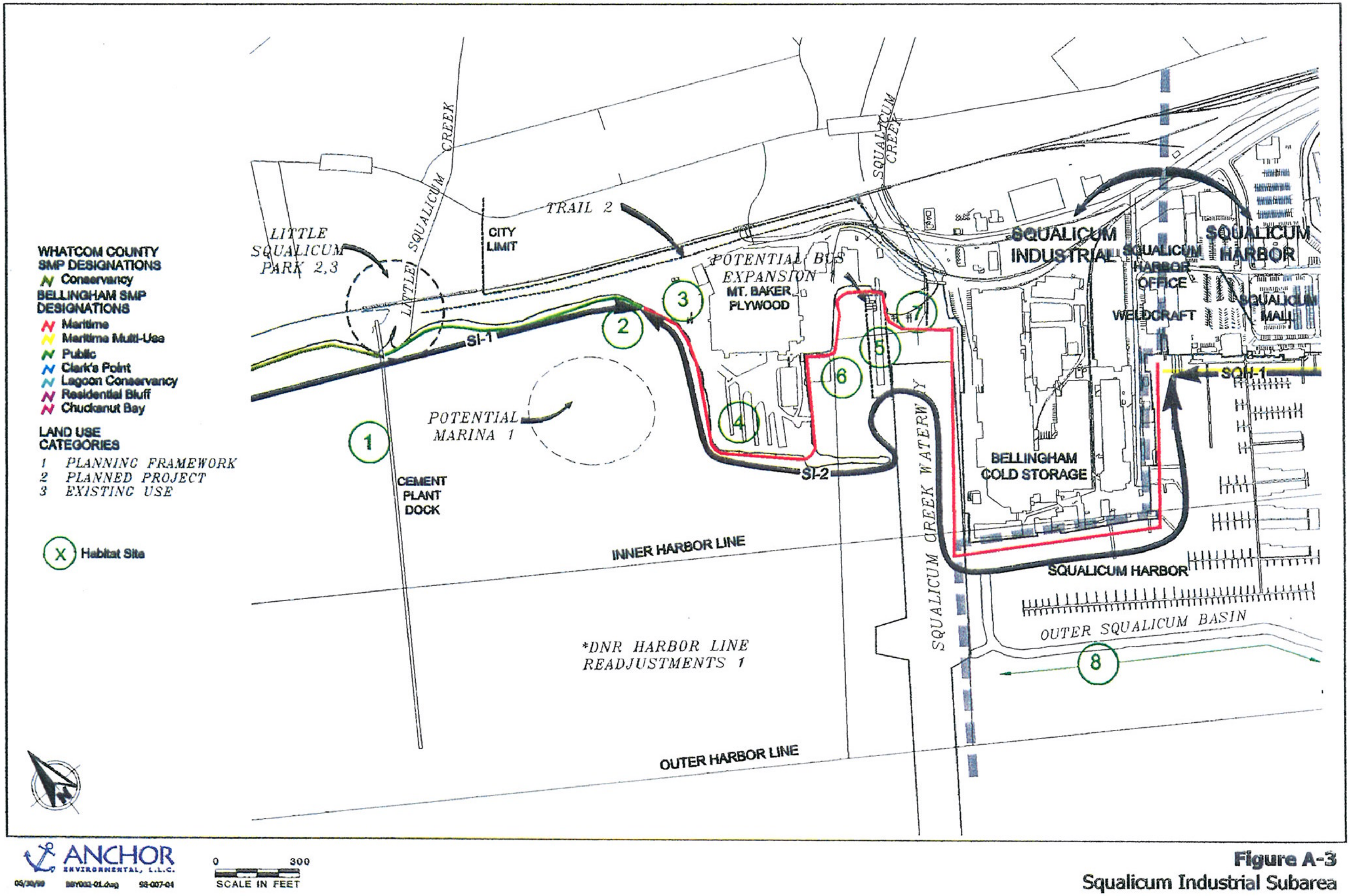

Figure A-3
Squalicum Industrial Subarea

by developing innovative projects and plans that incorporate habitat restoration and enhancements. Habitat restoration may be accomplished independent of land uses.

Primary Uses

Two distinct shoreline segments were identified within this subarea, and they have different primary uses.

- Shoreline Segment SI-1: Natural resource production, habitat protection and enhancement, and public access, consistent with the Public designation used in the SMP
- Shoreline Segment SI-2: Navigation and commerce uses consistent with the Maritime designation used in the SMP, water-dependent commerce uses associated with the federal navigation channel, ongoing maintenance dredging of the federal channel to support navigation and commerce, and protection of estuarine habitat functions associated with Squalicum Creek

Land Use

Land use activities/opportunities present in the subarea that are consistent with the recommended strategy include:

- Evaluate the option of adjusting the Harbor Area boundary to end just west of the Cement Plant Dock (should be implemented as a near-term action)
- Future uses at the Cement Plant Dock should consider a range of options that include leaving the structure for different water-dependent commercial uses, removing it to improve habitat, modifying it to accommodate public access, or a combination of the above
- Recommend future marina development that incorporates designs to avoid, or protect and enhance the nearshore marine environment
- Provide for ongoing commercial, tribal, and recreational fishing
- Provide opportunity for future public access trail that is environmentally consistent with habitat resources or improvements made in this subarea
- Recommend future upland/shoreline development proposals incorporate designs that avoid, or protect and enhance the nearshore environment through implementation of estuarine restoration goals.
- Recommend future railroad developments incorporate designs that avoid, or protect and enhance, the nearshore marine environment

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Restore estuary habitat functions and area at Squalicum Creek by possibly relocating the stream mouth to the northwest, through changes in shoreline or in-water land uses through proposed developments, and possibly through voluntary efforts
- Restore and protect natural processes that create/maintain habitat
- Provide for no net loss and/or a net gain of marine aquatic habitat area/function consistent with the Draft Mitigation Framework
- Protect existing smelt and sand lance spawning habitats

- Restore habitat functions by removing existing structures or fills through redevelopment projects, or through voluntary efforts
- Enhance habitat connectivity along the shoreline by incorporating habitat restoration and enhancements into proposed shoreline or in-water development projects

Sediment Sites, Cleanup, Disposal, and Source Control

Sediment sites, cleanup opportunities, and source control needs for this subarea include:

- Plan for potential need to remediate the Weldcraft site in this subarea (should be implemented as a near-term action)
- Evaluate potential woody debris in the sediments at the Squalicum Shipyard in the vicinity of Mt. Baker Plywood
- Support the evaluation of potential sources of water quality and sediment degradation associated with the Oeser site in the Little Squalicum Creek Watershed (should be implemented as a near-term action by Ecology)
- Upland watershed planning efforts in both creeks should continue to address non-point source contribution to water and sediment quality degradation. The *Sediment Site and Source Control Documentation Report* further addresses the linkage between this issue and other regional efforts/programs
- Develop stormwater treatment plan for adjacent upland areas that currently are untreated, and control sources associated with existing and proposed land uses through the use of BMPs for operations that require a discharge permit
- Evaluate the presence of phenol and 4-methylphenol in the sediments adjacent to stormwater discharges (should be implemented as a near-term action)
- Permitted NPDES discharges should remain controlled and in compliance with permit limits
- Support the evaluation of the need to modify DNR leases and uses allowed under leases if log rafting no longer occurs within the DNR lease area within this subarea

SQUALICUM HARBOR SUBAREA

Subarea Description

This subarea (Figure A-4) extends from the change in shoreline designation from Maritime Multi-use to Maritime at the eastern boundary of the Weldcraft site to the head of the I&J Waterway. Nearly the entire shoreline along this subarea is developed for commercial and industrial uses, and consists of artificial (e.g., bulkheads, rip-rap) substrate. A small mudflat occurs at the head of I&J Waterway. No creeks drain into this subarea. Despite the developed character of the shoreline in this area, it is used as a movement and migration corridor for salmonids as part of the nearshore habitat continuum, and its substrates support some feeding function for salmonids. The shoreline is designated primarily as Maritime Multi-Use and a small area around Zuanich Park is designated as Public. Characteristics of this subarea include:

- Harbor Area Designation
- Inner and Outer Squalicum basins
- Public boat launch
- USCG station

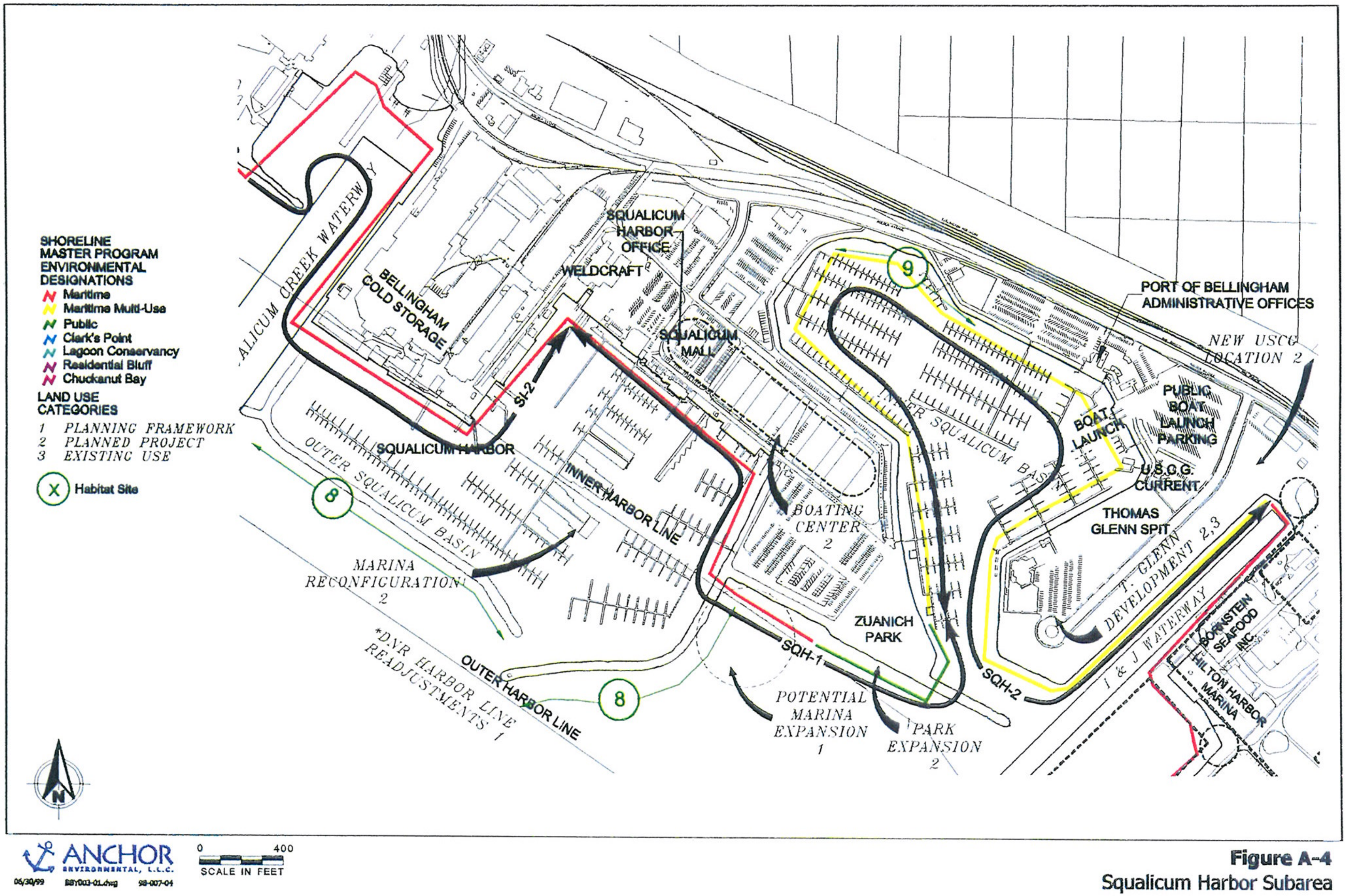

Figure A-4
Squalicum Harbor Subarea

- Zuanich Park
- Thomas Glenn Spit
- Port of Bellingham offices
- Federal Navigation Channel

Recommended Strategy

Retain and support current marina and maritime-oriented uses. Enhance habitat connectivity across this subarea through future marina and park expansion efforts.

Primary Uses

Water-dependent and water-oriented commerce and navigation including maintenance dredging for berthing and maritime uses; with public access and recreation opportunities at the planned Zuanich Park and Thomas Glenn Spit facilities.

Land Use

Land use activities/opportunities present in this subarea that are consistent with the recommended strategy include:

- Provide opportunity for potential future marina reconfiguration and expansion
- Provide opportunity for park expansion that is compatible with maritime uses
- Provide opportunity for maritime uses along the I&J Waterway (see Central Waterfront subarea)
- Evaluate the option of adjusting the Outer Harbor Line further waterward to increase the size of the Harbor Area

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Enhance the migratory corridor and connectivity through the shallow-water zone between Squalicum Creek and Whatcom Waterway Creek through modifying substrates and/or tidal elevations
- Provide for no net loss and/or a net gain of marine aquatic habitat area/function that is consistent with the Draft Mitigation Framework
- Restore habitat functions by removing existing structures or fills through redevelopment or voluntary projects
- Anticipate potential marina expansion locations when implementing habitat measures such that habitat sites and functions do not become impacted/eliminated by future expansion

Sediment Sites, Cleanup, Disposal and, Source Control

Sediment sites, cleanup opportunities, and source control needs for this subarea include:

- Remediate the Squalicum Harbor Inner Boat Basin contaminated sediment site (should be implemented as a near-term action)

- Evaluate the Tide-Grid site as a potential sediment site (should be implemented as a near-term action)
- Develop stormwater treatment plan for adjacent upland areas that currently are untreated, evaluate the presence of phenol and 4-methylphenol in the sediments adjacent to stormwater discharges (should be implemented as a near-term action)
- Permitted NPDES discharges should remain controlled and in compliance with permit limits

CENTRAL WATERFRONT SUBAREA

Subarea Description

This subarea (Figure A-5) extends from the head of I&J Waterway to the northeast side of the Whatcom Waterway at the point where the authorized navigation depth in Whatcom Waterway changes from -18 to -30 feet MLLW. Nearly the entire shoreline along this subarea is developed for commercial and industrial uses, and consists of artificial (e.g., bulkheads, rip-rap) substrate. A small mudflat occurs at the head of I&J Waterway; a 1 to 2-acre mudflat occurs at the head of Whatcom Waterway, and a small sand/mudflat is located on the shoreline at the northwest corner of the G-P ASB. In this subarea, Whatcom Creek transitions to the Whatcom Creek estuary which drains into Whatcom Waterway. The creek, its estuary, and the shoreline fringe is nearshore habitat for juvenile salmonids migrating out of Whatcom Creek, and is used for feeding, possibly for refuge, and as a migration corridor. Other shoreline edges in this subarea also act as a migration corridor. The shoreline is designated as Maritime, and characteristics of this subarea include:

- Harbor Area Designation
- Federal Navigation channels
- Hilton Harbor Marina
- Bornstein Seafood, Inc.
- G-P ASB
- Citizens Dock (dilapidated)
- Central Waterfront properties
- Eelgrass bed east of the I&J Waterway and west of the G-P ASB

Recommended Strategy

Remediate Whatcom Waterway Site sediments. Foster navigation and water-dependent commerce uses through sediment remediation strategies that provide access to the navigation channels' authorized depths. Protect critical estuarine habitat (e.g., eelgrass bed and Whatcom Creek estuary) and habitat functions by having land use, public access and sediment remediation strategies build in habitat connectivity between the Whatcom Creek stream mouth and adjacent shoreline uses, and support habitat protection and enhancement in the Whatcom Creek estuary. Provide public access opportunities at the head of Whatcom Waterway.

Primary Uses

The primary uses in this subarea are maritime uses and water-dependent commerce and navigation; balanced with habitat protection, Whatcom Creek estuary restoration at the

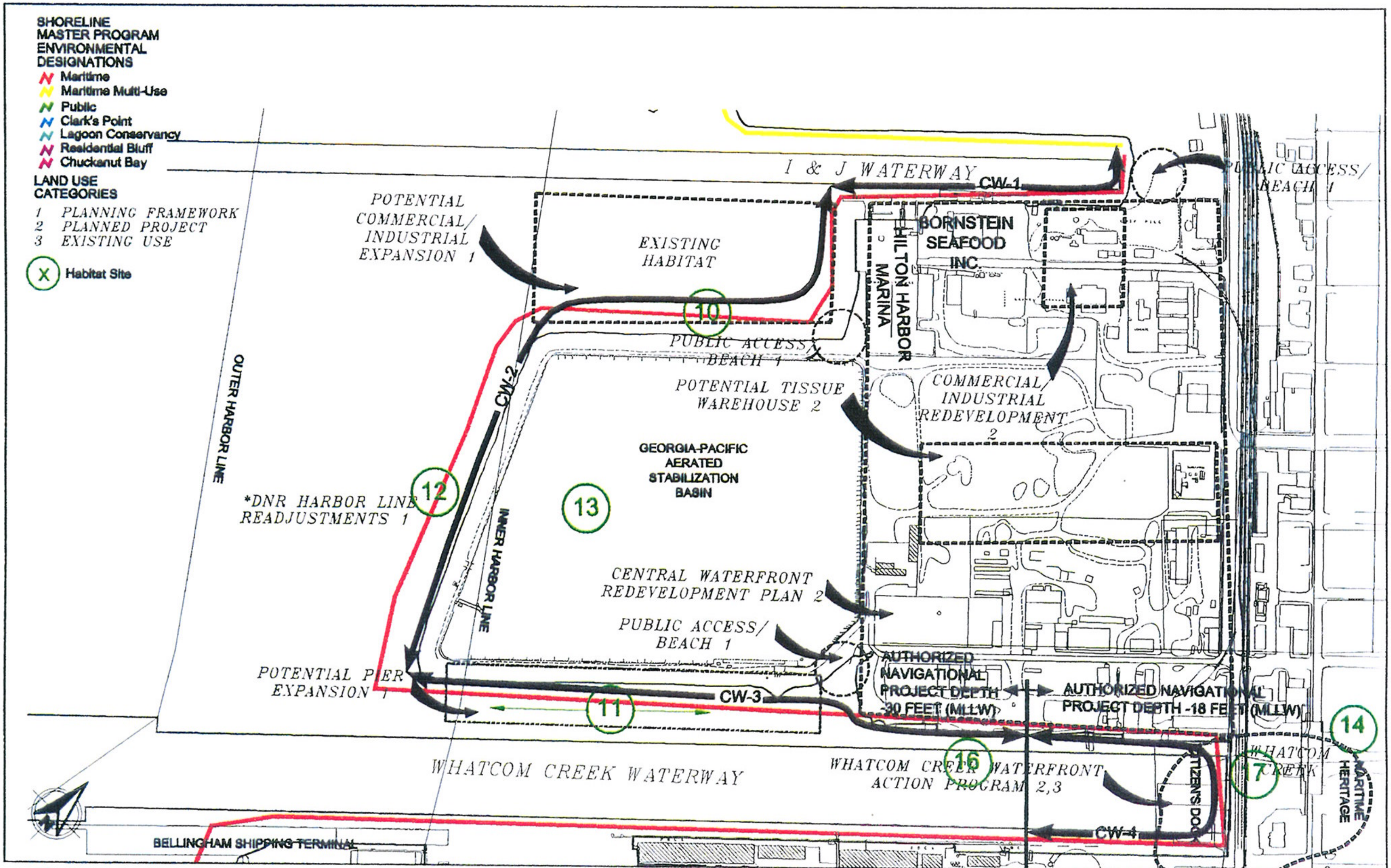

Figure A-5
Central Waterfront Subarea

stream mouth, and possible eelgrass restoration, and public shoreline use and access at the head of Whatcom Waterway.

Land Use

Land use activities/opportunities present in the subarea that are consistent with the recommended strategy include the following recommendations:

- Evaluate the option of adjusting the Harbor Area boundary offshore of the G-P ASB (should be implemented as a near-term action)
- Provide opportunities for potential water-dependent commercial and industrial expansion along the central waterfront
- Support efforts to consider innovative designs that avoid impacts to existing habitat and incorporate habitat enhancements as identified in the Habitat Documentation Report for future maritime and water-dependent development activities
- Provide for public access to the shoreline that is compatible with maritime uses and habitat restoration/connectivity measures, as identified in the Aquatic Land Use Documentation Report

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Protect and restore Whatcom Creek estuary habitat functions and area through implementation of a Near-Term Remedial Action Alternative
- Combine sediment cleanup with habitat creation and/or enhancement through implementation of a Near-Term Remedial Action Alternative
- Restore habitat functions by removing or modifying existing structures or fills through redevelopment and/or voluntary projects
- Enhance habitat connectivity along Whatcom Creek and Whatcom Waterway
- Protect and restore eelgrass habitat between I&J Waterway and the G-P ASB

Sediment Sites, Cleanup, Disposal, and Source Control

There are several sediment sites, cleanup, disposal options, and source control measures within this subarea including:

- Remediate the following sediment and adjacent upland sites that are known or potential sources of contamination:
  - Whatcom Waterway Sediment Site (segregated into a number of discrete units that include: Federal Navigation Channel (-30 MLLW), Head of Whatcom Waterway (-30 MLLW), Head of Whatcom Waterway (-18 MLLW), G-P ASB, and possibly I&J Waterway) (Should be implemented as part of a Near-Term Remedial Action Alternative)
  - Olivine Sediment Site
  - Roeder Avenue Landfill Site
  - Chevron Site
  - Colony Wharf Site
- Control permitted NPDES discharges and comply with permit limits

- Ensure the stormwater discharge from the C Street outfall does not contribute to sediment or water quality degradation and evaluate this outfall as a potential source of phenol and 4-methylphenol (should be implemented as a near-term action by City)
- Support upland watershed planning efforts in Whatcom Creek that address non-point source contribution to water and sediment quality degradation, and habitat restoration and enhancement opportunities. The *Sediment Site and Source Control* and *Habitat Documentation* reports further address the linkage to other regional efforts/programs.
- Confirm with the Corps of Engineers that sediments on the surface of I&J Waterway meet the Puget Sound Dredged Disposal Analysis (PSDDA) guidelines and that these sediments may be an effective mechanism in isolating contaminants from the environment allowing a no-action approach to remediating that sediment site unit (should be implemented as a near-term action). If the results of sediment testing indicate the sediments do not pass PSDDA requirements, the recommendation is to dredge and dispose of these sediments at a CAD or upland disposal site (should be implemented as part of a Near-Term Remedial Action Alternative).
- Control disturbance to capped areas from temporary and permanent anchorage, if capping is selected method of remediation

Cleanup options within this subarea include the following. These actions are under consideration as represented by the range of Near-Term Remedial Action Alternatives:

- Removal of all contaminated sediments (where technically feasible) within the Whatcom Waterway navigation channel and outside the navigation channel
- Removal of sediments and capping within the channel sufficient to provide access to the currently authorized navigation depths; capping of areas outside the channel
- Removal of sediments and capping within the channel exclusive of the shallow areas at the head of the waterway; capping of areas outside the channel
- No action in the I&J Waterway (pending conformational biological testing)

No specific disposal site options occur in this subarea.

WHATCOM INDUSTRIAL SUBAREA

Subarea Description

This subarea (Figure A-6) extends from the Whatcom Waterway at the point where the authorized navigation depth changes from -18 to -30 feet MLLW to the south end of the Cornwall Avenue Landfill. Nearly the entire shoreline along this subarea is developed for commercial and industrial uses, and consists of artificial (e.g., bulkheads, rip-rap) substrate. Seaward of the rip-rap shoreline at the Cornwall Avenue Landfill, the beach is primarily large cobbles and gravels with some sand. A pocket sand/mudflat occurs north of the Cornwall Avenue Landfill in the location of a potential public access beach. Juvenile salmon use the nearshore areas as migration and movement corridors and for feeding. Substrates along the shoreline at Cornwall Avenue Landfill support Pacific oysters. The shoreline is designated as Maritime, and characteristics of this subarea include:

- Harbor Area Designation
- Federal Navigation Channel
- G-P facilities including log pond

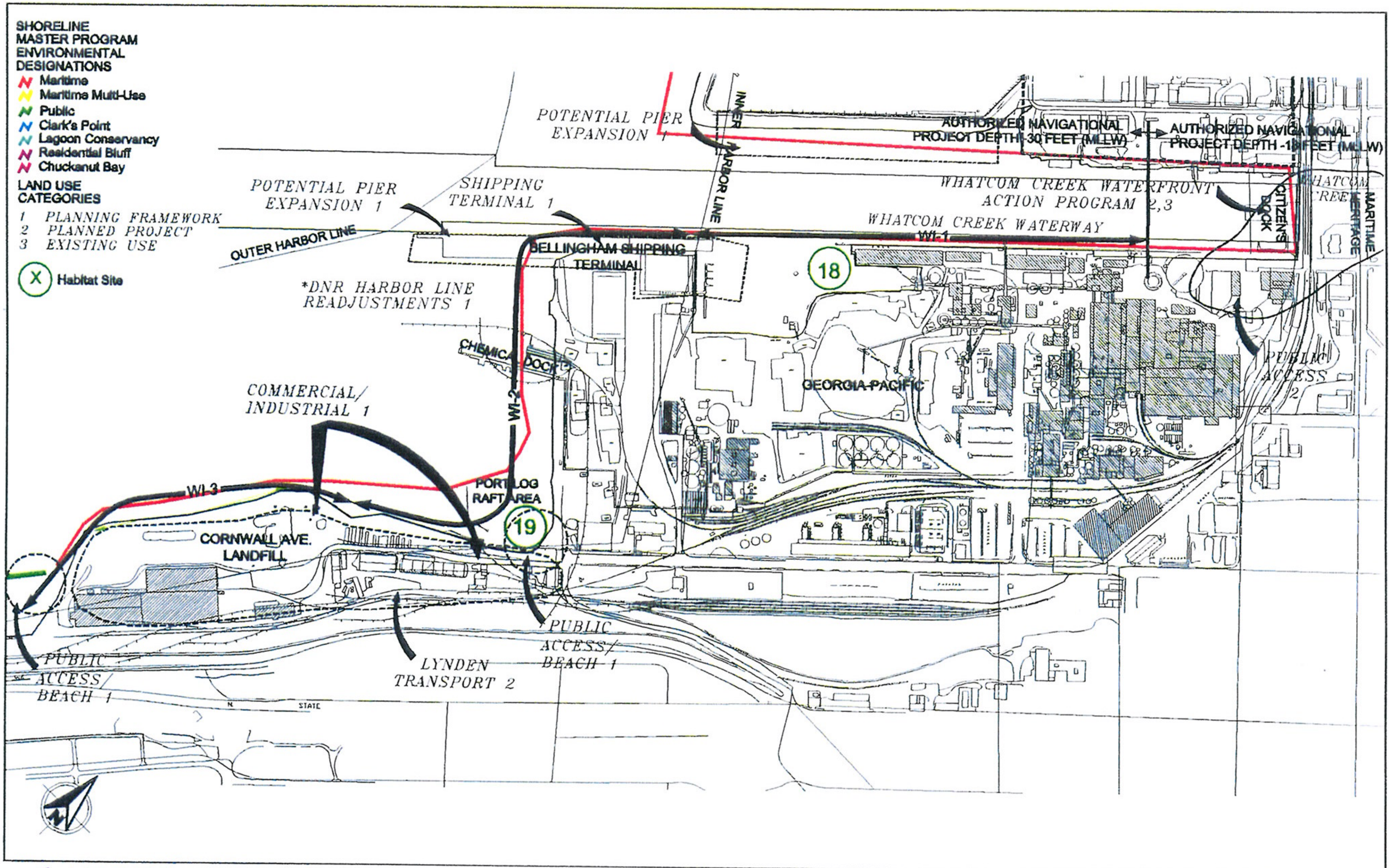

Figure A-6
Whatcom Industrial Subarea

- Bellingham Shipping Terminal
- Cornwall Avenue Landfill

Recommended Strategy

Promote maritime uses adjacent to the Whatcom navigable channel and in the vicinity of the Port Log Raft area through remediation strategies that improve access to those areas. Remediate the G-P Log Pond and Cornwall Avenue Landfill in a manner that improves estuarine habitat and connectivity between the Whatcom Waterway stream mouth and adjacent shoreline areas. In the Cornwall vicinity, consider at least one alternative that would balance maritime water-dependent uses in the northern portion of the landfill area with habitat and public shoreline access benefits in the southern portion while remediating sediment and upland solid waste conditions at the landfill.

Primary Uses

The primary uses in this subarea are maritime, water-dependent commerce, and navigation; balanced with providing habitat connectivity and public access.

Land Use

Land use activities/opportunities present in the subarea that are consistent with the recommended strategy include the following:

- Evaluate the option of adjusting the Harbor Area boundary around the Cornwall Avenue Landfill area (should be implemented as a near-term action)
- Provide opportunities for potential maritime and water-dependent activities that are designed to avoid habitat impacts and enhance habitat functions as identified in the Habitat Documentation Report
- Provide for public access to the shoreline that is compatible with maritime and navigation uses and habitat restoration/connectivity measures, as identified in the Aquatic Land Use Documentation Report

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Combine sediment cleanup with habitat creation and/or enhancement through implementation of the Near-Term Remedial Action Alternative
- Enhance habitat connectivity
- Protect and restore eelgrass habitat
- Restore and protect natural processes that create/maintain habitat
- Provide for no net loss and/or a net gain of marine aquatic habitat area/function consistent with the Pilot Project mitigation framework

Sediment Sites, Cleanup, Disposal, and Source Control

Remediate the following sediment and adjacent upland sites:

- Whatcom Waterway Sediment Site (segregated into a number of discrete units that include: Federal Navigation Channel (-30 MLLW), Head of Whatcom Waterway (-

30 MLLW), G-P Log Pond, and Port Log Raft Area) (should be implemented as part of a Near-Term Remedial Action Alternative)

- Cornwall Avenue Landfill Site
- Evaluate the contribution of woody debris from the log rafting operations
- Ensure the stormwater discharge from the Laurel Street Drain does not contribute to sediment or water quality degradation
- Disposal options that could be implemented as part of a Near-Term Remedial Action Alternative within this subarea include:
  - Constructing a CAD at the G-P Log Pond
  - Constructing a CAD over the southern portion of the Cornwall Avenue Landfill sediments
- The Near-Term Remedial Action Alternatives under consideration (represented by Alternatives 2A through 2E) include the following cleanup options:
  - Dredging all contaminated sediments within the Whatcom navigation channel and outside the navigation channel
  - Dredging all sediments (surface and subsurface) within the navigation channel; capping of areas outside the channel (i.e., Log Pond and Port Log Raft Area)
  - Dredging and capping sediments within the navigation channel such that access to the authorized channel depths is provided
  - Limited dredging of contaminated sediments in the Port Log Raft area to provide access to the Chemical Dock
  - Removal of sediments and upland waste material from the Cornwall Avenue Landfill
  - Capping of sediments and partial removal of upland wastes that occur within the shoreline
  - Capping sediments offshore from the Cornwall Avenue Landfill
  - Control disturbance to capped areas from temporary and permanent anchorage

SOUTH HILL SUBAREA

Subarea Description

This subarea (Figure A-7) extends from the south end of the Cornwall Avenue Landfill to just south of the Taylor Avenue Dock (Douglas Avenue right-of-way). The shoreline is predominately undeveloped in this subarea. The water/land interface from the south end of the Cornwall Avenue Landfill to the north end of Boulevard Park is gravel, cobble, and sand with rip-rap. Rip-rap extends along the shoreline of Boulevard Park. At the southern end of the subarea, the shoreline is cobble and gravel with rip-rap armoring at the landward edge of the rail road. No creeks drain into this subarea. Portions of the shoreline are surf smelt and sand lance spawning beaches and the entire shoreline is used by salmon as a nearshore migration corridor and for feeding. Part of the subarea is designated as Public, with Boulevard Park as an existing facility and the Taylor Avenue dock as a proposed public access park. The remaining part of the subarea (from the Bennett Street right-of-way to the BNSF trestle on the north side of the Padden Creek lagoon) is multi-use. Other characteristics within the subarea include:

- Harbor Area Designation
- Southern end of Cornwall Avenue Landfill
- Boulevard Park

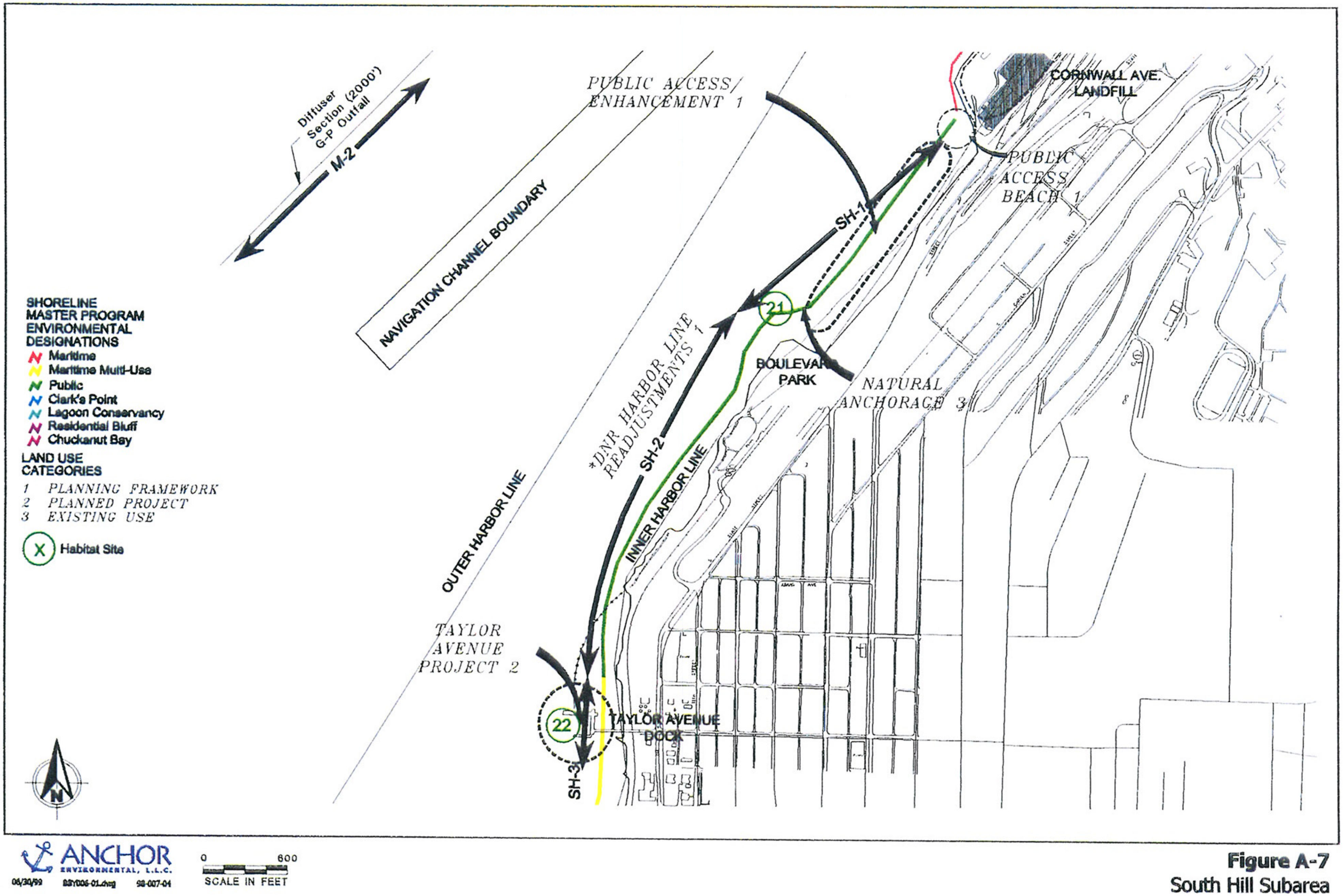

Figure A-7
South Hill Subarea

- Starr Rock sediment and disposal site
- BNSF Railroad

Recommended Strategy

Promote habitat protection and restoration opportunities, and use of the shoreline for public access and recreational purposes, and discourage commercial or industrial uses. If a Near-Term Remedial Action Alternative is implemented in this subarea, evaluate the option of constructing a CAD site that is large enough to contain all of the dredged contaminated sediment and improve habitat function to avoid creating multiple disposal sites throughout the bay. Design and locate a CAD site such that it can meet multiple objectives such as enhancing habitat, providing shoreline access, creating disposal capacity, and remediating contaminated sediments within the disposal site footprint.

Primary Uses

The primary uses in this subarea are habitat enhancement and protection, and public access.

Land Use

Land use activities/opportunities present in this subarea that are consistent with the recommended strategy include:

- Evaluate the option of moving the Inner and Outer Harbor Lines further offshore in some locations; and as appropriate remove the Harbor Area depending on whether or not a disposal site is located in a segment of the subarea (should be implemented as part of a Near-Term Remedial Action Alternative)
- Provide for public access enhancements where consistent with habitat enhancements and sediment remediation options
- Provide for public access and habitat enhancements at the Taylor Avenue Dock (should be implemented as a near-term action)

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Provide for no net loss and/or a net gain of marine aquatic habitat area/function consistent with the Pilot Project mitigation framework
- Restore habitat functions by removing/modifying existing structures or fills through redevelopment and voluntary projects
- Protect and restore eelgrass habitat
- Restore and protect natural processes that create/maintain habitat
- Protect existing smelt and sand lance spawning habitats
- Enhance habitat connectivity

Sediment Sites, Cleanup, Disposal and Source Control

Remediate the Starr Rock Site (should be implemented as part of a Near-Term Remedial Action Alternative)

- Further evaluate the Taylor Avenue Dock site (should be implemented as a near-term action)
- Evaluate and recommend treatment of stormwater discharges as appropriate (should be implemented as a near-term action)
- Control stormwater sources associated with existing and water-dependent uses through the use of BMPs for operations that require a discharge permit
- Control disturbance to capped sediments and/or CAD from temporary and permanent anchorage
- Disposal options evaluated as part of a Near-Term Remedial Action Alternative within this subarea include:
  - Constructing a CAD at the Starr Rock site, contiguous with a CAD/cap feature at the Cornwall Avenue Landfill site (i.e., the Starr Rock/Cornwall CAD)
- The Near-Term Remedial Action Alternatives under consideration (represented by Alternatives 2A through 2E) include the following cleanup options:
  - Removing sediments from Starr Rock and taking sediments to an upland disposal site
  - Capping sediments at the Starr Rock through the construction of the Starr Rock/Cornwall CAD at that location

FAIRHAVEN SUBAREA

Subarea Description

This subarea (Figure A-8) extends from south of the Taylor Avenue Dock (Douglas Avenue right-of-way) to the north boundary of Marine Park. The shoreline from south of the Taylor Avenue dock to the public boat launch ramp consists primarily of cobble, gravel, and sand with rip-rap armoring at the landward edge along the rail road. The lagoon embayment (Padden Creek lagoon) is an intertidal mudflat with rip-rap along the eastern shore and vegetated park along the western shore. South of the public boat launch ramp, the shoreline is artificial (e.g., bulkheads, piers, and rip-rap). Juvenile salmon use the creek, lagoon estuary, and fringe habitat for feeding, refuge, and as a migration corridor. The remaining shoreline is also used for feeding and as a migration corridor by salmon. The subarea is designated as Maritime Multi-Use and Maritime. The shoreline in this subarea includes the following characteristics:

- Harbor Area Designation
- Padden Creek Dock and public access
- BNSF Railroad
- Public boat launch
- Barge stub pier
- Bellingham Cruise Terminal
- Harris Avenue Shipyard

Recommended Strategy

Promote water-dependent commerce, navigation and maritime uses while protecting and enhancing habitat, particularly the Padden Creek estuary. Incorporate innovative designs into water dependent and maritime uses that protect habitat and implement habitat measures identified in the Habitat Documentation Report. Remediate sediments in a

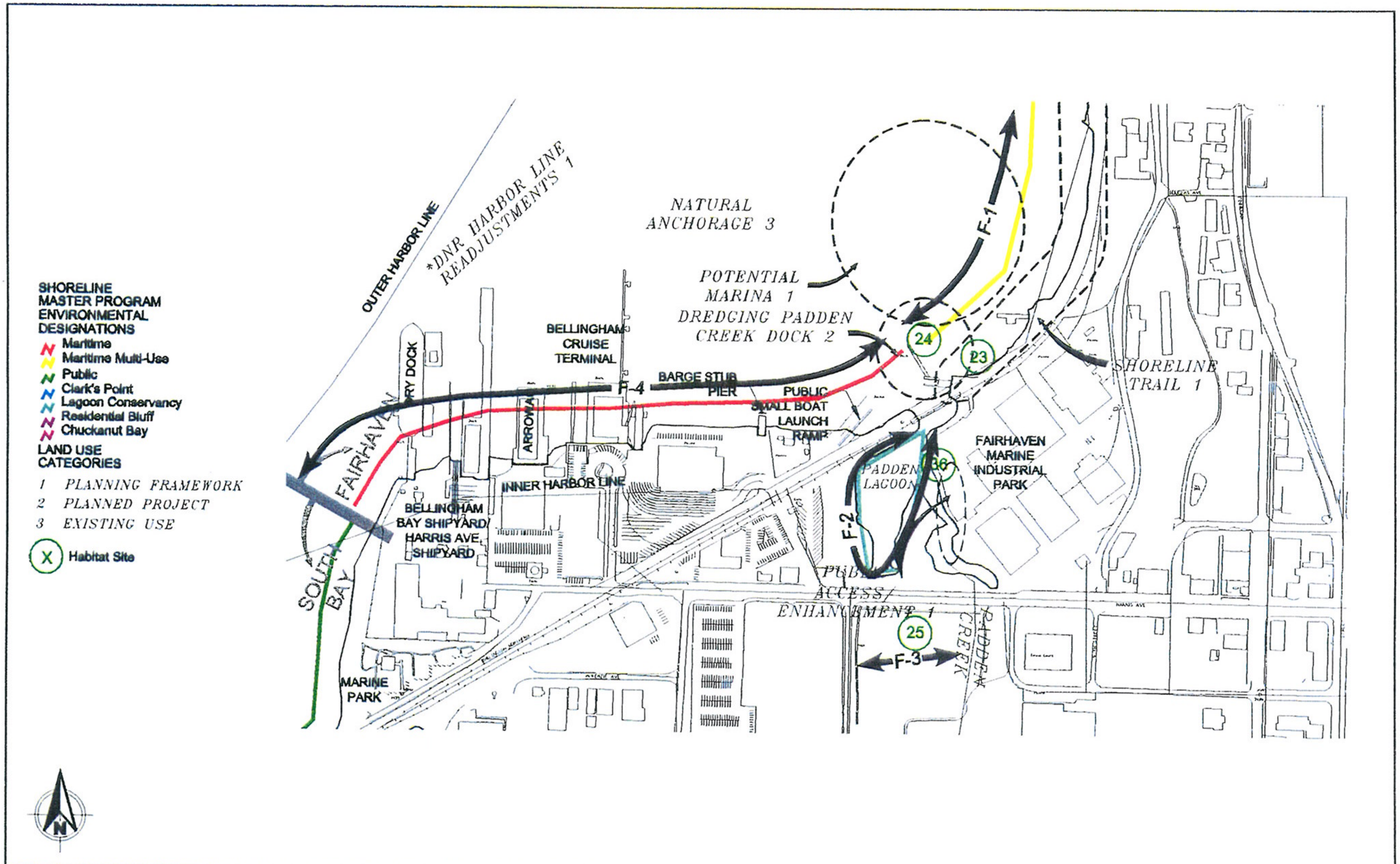

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Figure A-8
Fairhaven Subarea

manner that promotes maritime and habitat uses. Remediate the Harris Avenue Shipyard site.

Primary Uses

The primary uses in this subarea are directly related to water-dependent commerce and navigation, and natural resource production/habitat enhancement and protection.

Land Use

Land use activities/opportunities present in this subarea that are consistent with the recommended strategy include:

- Evaluate the option of adjusting the Harbor Area boundary
- Provide for potential future marina development that is consistent with habitat protection and enhancement measures and public access goals
- Provide for existing natural anchorage (fixed buoyed system moorage); recommend no expansion of this existing use that would impact habitat
- Recommend future railroad improvements/developments incorporate designs that avoid, or protect and enhance, the nearshore marine environment
- Recommend future shoreline work associated with Padden Creek incorporates designs that avoid impacts to the marine environment and that protect or enhance marine resources

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Protect and restore Padden Creek estuary habitat functions and area
- Protect and restore eelgrass habitat
- Restore and protect natural processes that create/maintain habitat
- Provide for no net loss and/or a net gain of marine aquatic habitat area/function consistent with the Pilot Project mitigation framework
- Protect existing smelt and sand lance spawning habitats
- Restore habitat functions by removing existing structures or fills through redevelopment or voluntary projects
- Enhance habitat connectivity

Sediment Sites, Cleanup, Disposal and Source Control

- Remediate the Harris Avenue Shipyard (should be implemented as part of a Near-Term Remedial Action Alternative)
- Ensure stormwater discharge from outfalls in the subarea do not contribute to sediment or water quality degradation
- Control stormwater sources associated with existing and water-dependent uses through the use of BMPs for operations that require a discharge permit
- Disposal options are not applicable for this subarea

SOUTH BAY SUBAREA

Subarea Description

This subarea (Figure A-9) extends from the north boundary of Marine Park to Governor's Point. The shoreline in this subarea is relatively undeveloped and is primarily used for public access and residential development. The water/land interface consists primarily of cobble, gravel, and sand with boulders and rip-rap. There are three pockets of mudflat lagoons, the largest being Chuckanut Creek lagoon. Chuckanut Creek enters into the Chuckanut Lagoon estuary and supports salmon. The creek, lagoons, and fringe habitat is used for feeding, refuge and as a migration corridor for salmon. The lagoons may also function as rearing areas for young salmon. The shoreline in this area is designated as Residential Bluff, Clarks' Point, Lagoon Conservancy, and Chuckanut Bay. Key land use features include:

- Marine Park
- City of Bellingham Post Point Waste Water Treatment Plant (WWTP)
- BNSF Railroad

Recommended Strategy

Protect and enhance habitat and natural resource production in this area; and maintain residential, conservation, and public access uses.

Primary Uses

The primary uses in this subarea are residential housing, conservancy of natural resources, public access, natural resource production, and habitat protection and enhancement.

Land Use

Land use activities/opportunities present in the subarea that are consistent with the recommended strategy include:

- Maintain the environmentally compatible WWTP operation
- Provide for environmentally compatible public access
- Provide for recreational opportunities consistent with habitat protection and enhancement measures
- Provide opportunities for commercial, tribal, and recreational fishing
- Evaluate the option of removing the Harbor Area designation to exclude this subarea (the harbor area designation should terminate immediately south of the WWTP; should be implemented as a near-term action)
- Future railroad developments need to acknowledge the importance of protecting and enhancing the nearshore marine habitats and incorporate elements into projects that enhance natural resources

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

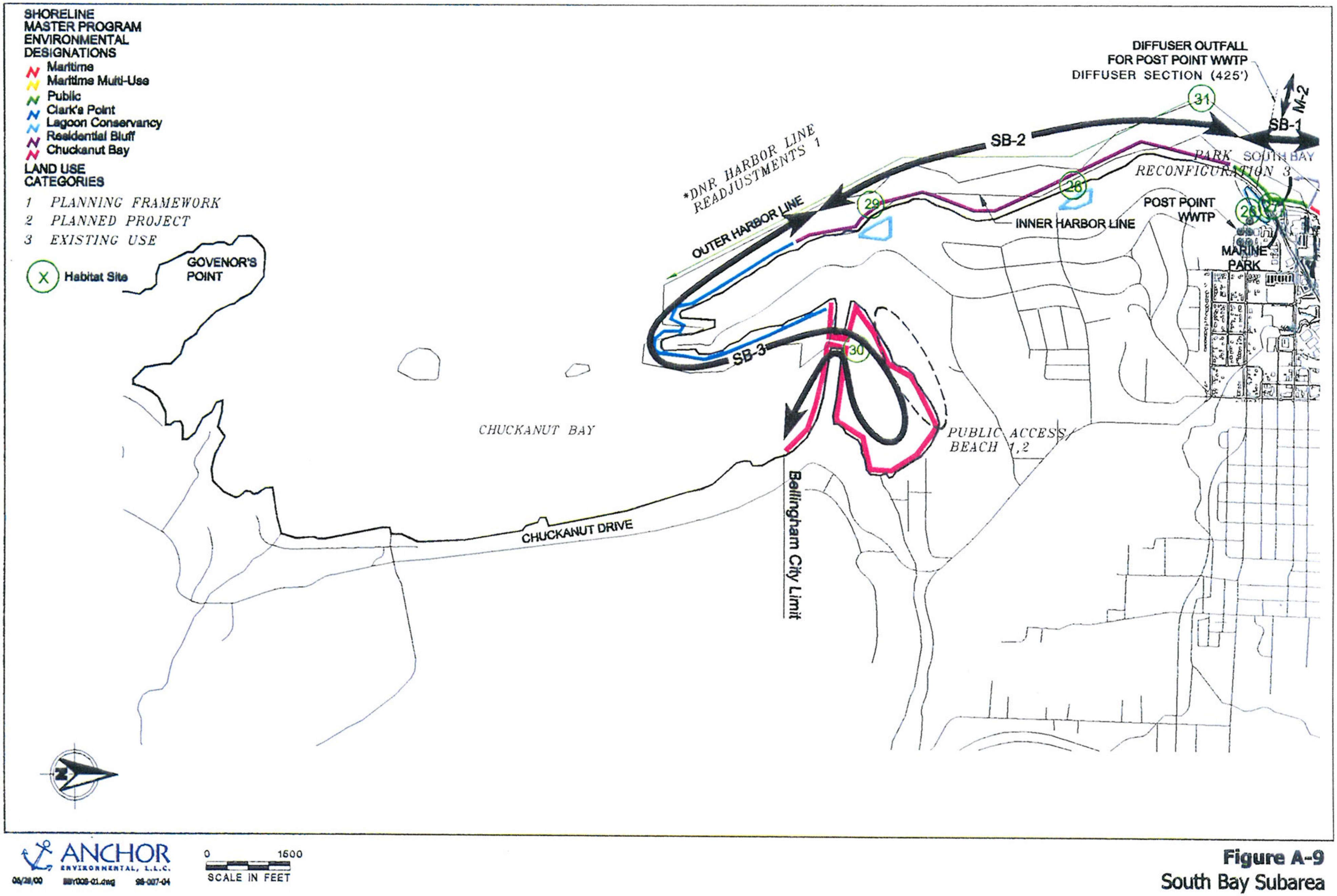

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Figure A-9
South Bay Subarea

- Create a habitat protection area in the vicinity of Post Point
- Enhance and increase the lagoon habitat at the Post Point WWTP in coordination with the City (should be implemented as a near-term action)
- Protect and restore eelgrass
- Protect Chuckanut Creek estuary habitat functions and area
- Restore and protect natural processes that create/maintain habitat
- Provide for no net loss and/or a net gain of marine aquatic habitat area/function consistent with the Pilot Project mitigation framework
- Restore habitat functions by removing/modifying existing structures or fills through redevelopment or voluntary projects

Sediment Sites, Cleanup, Disposal and Source Control

No sediment site issues for this area.

- Support the progress made by the WWTP in maintaining discharge performance in compliance its NPDES permit
- Upland watershed planning efforts in Chuckanut Creek should address non-point source contribution to water and sediment quality degradation. The *Sediment Site and Source Control Documentation Report* further addresses the linkage to other regional efforts/programs
- Encourage County Health Department to address potential septic source control issue at Chuckanut Village

There are no cleanup options or disposal sites in this subarea.

MARINE SUBAREA

Subarea Description

This subarea consists of the deeper subtidal waters of Bellingham Bay, encompassing the bay bottom in those areas below about - 40 feet MLLW. Key characteristics of this subarea (Figure A-10) include:

- G-P outfall
- Post Point WWTP Outfall
- PSDDA Disposal Site
- Commercial, tribal, and recreational fishing

Recommended Strategy

Protect and enhance habitat and natural resource production in this area; and minimize adjacent shoreline uses and discharges, both outfalls and ships' ballast water, from degrading water or sediment quality. Ensure discharges under G-P's new NPDES permit are controlled and in compliance with permit requirements.

Primary Uses

Natural resource production, habitat protection and enhancement, commercial and tribal fishing, commercial shipping, and recreational boating and fishing.

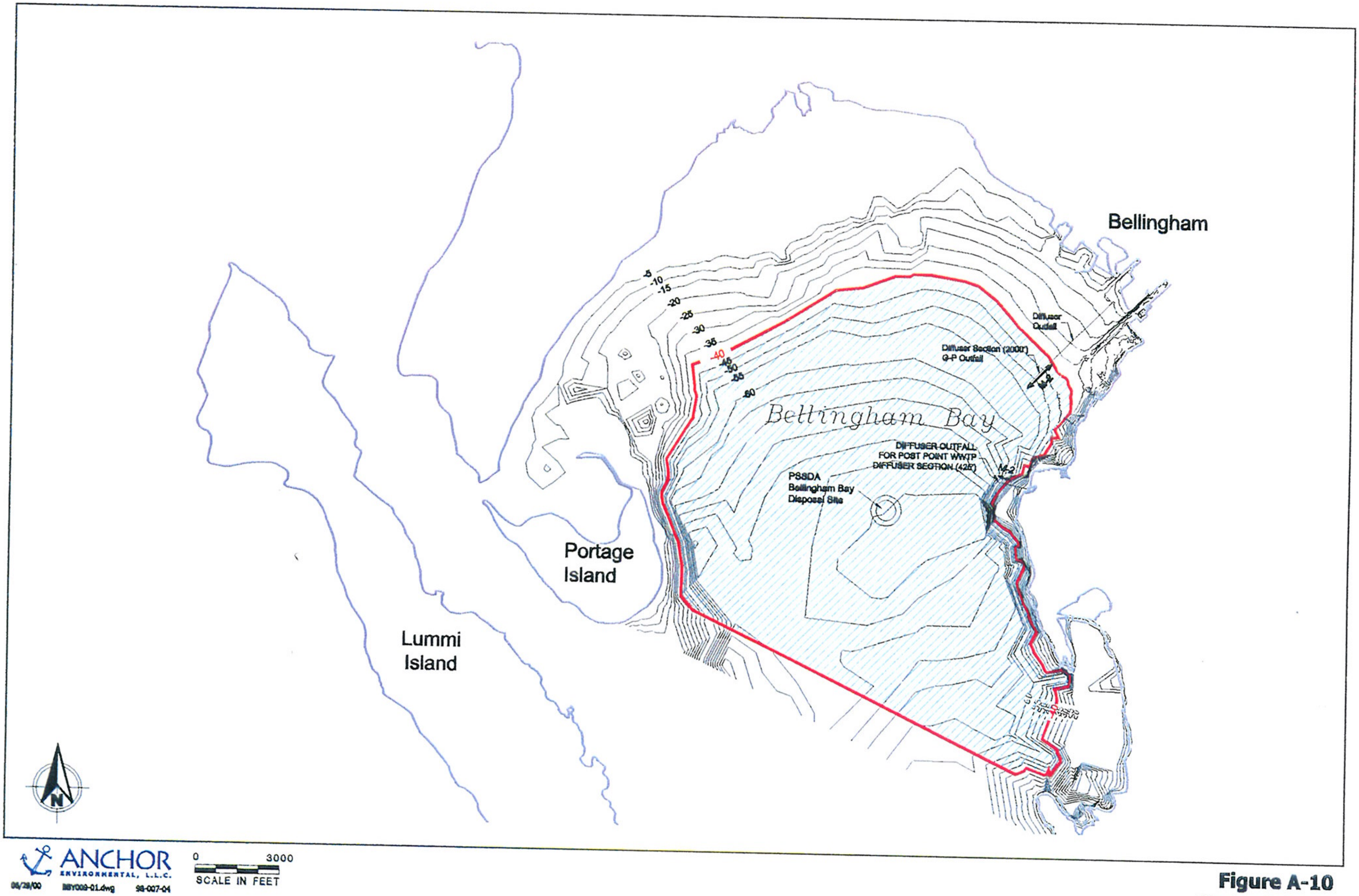


Figure A-10
Marine Subarea

Land Use

Land use activities/opportunities in the subarea that are compatible with the recommended strategy include:

- PSDDA dispersive disposal site location
- Post Point WWTP Outfall
- G-P outfall
- Provide opportunities for habitat enhancements that provide habitat functions and promote tribal, commercial, and recreational fishing

Habitat

Habitat restoration and protection opportunities present in the subarea include but are not limited to:

- Protect and enhance natural resources and habitat function

Sediment Sites, Cleanup, Disposal, and Source Control

- Based on the source control and natural recovery modeling performed as part of the Whatcom Waterway RI/FS, surface sediment mercury concentrations at the G-P outfall area are expected to decline to below station cluster criteria within the next several years. G-P's new NDPES permit will likely require sediment sampling to verify these model results (should be implemented as a near-term action).
- Work with USCG to control ships' ballast water discharge from occurring in the bay and establish a linkage with USCG protocol for ship discharge practices in inland waters
- Disposal and cleanup options do not occur within this subarea

Appendix B
Documentation Report Summaries

APPENDIX B

BELLINGHAM BAY COMPREHENSIVE STRATEGY

DOCUMENTATION REPORT SUMMARIES

INTRODUCTION

This appendix begins with the executive summaries of *the Comprehensive Strategy Documentation Report* and the *Final Data Compilation and Analysis Report.* Next, an overview of the documentation reports that were created for each of the four fundamental elements of the project is provided: (1) Sediment Sites and Source Control (2) Sediment Disposal Siting, (3) Habitat, and (4) Land Use.

COMPREHENSIVE STRATEGY DOCUMENTATION REPORT EXECUTIVE SUMMARY

The process used to develop the Comprehensive Strategy is designed as a template that can be applied to similar efforts to clean up urban bays of Puget Sound. This cooperative approach blends near-term cleanup actions at contaminated sites with long-term strategies for aquatic land use, habitat, sediment management and source control that will sustain a productive, healthy bay into the future. The process fosters teamwork between agencies, industry and tribal groups.

The Strategy was developed over a two-year period, beginning in 1997. After establishing the Pilot's Mission Statement, the Pilot Team developed specific objectives in four areas – environmental, process, partnering and policy. For example, "process" objectives included consideration of the proposed changes to the state's Sediment Management Standards. And "environmental" objectives included consideration the implications of the fish species that were listed or proposed for listing as threatened species under the Endangered Species Act. By using these objectives, the Pilot Team recognized a changing regulatory climate, as well as features unique to Bellingham Bay.

Early in the process, four fundamental project elements were defined:

- Source control and sediment cleanup
- Sediment disposal site identification
- Habitat restoration
- Aquatic land use

In order to expand opportunities for achieving multiple goals in Bellingham Bay, the Pilot Team envisioned that future strategic planning efforts and projects would encompass the four elements listed above. The Pilot Team also knew that actions presented in the Strategy would have to integrate the four project elements. In order to get to the point of integration, the issues and/or actions germane to each element had to be identified and, where appropriate, prioritized.

The Pilot Team established four subcommittees to focus on studying existing conditions and identifying/prioritizing issues under each of the project elements. The subcommittee process provided a forum to study issues in-depth and drew on the technical expertise of individual Pilot Team members. These subcommittees began with a data collection effort – available data was assembled, and in some cases new data was collected. As the data was analyzed, it quickly became apparent that the Pilot Team needed to have specific goals and evaluation criteria in order to evaluate the issues and make priorities under each project element. The seven, baywide pilot goals were born, representing bay-wide goals that reflected the collective interests and desired outcomes of Pilot actions. The goal descriptors were also designed to represent key regulatory and policy issues and concerns of individual Pilot members. Using these baywide goals, each subcommittee established their own criteria, specific to the element they were charged with, for evaluating issues and developing priorities.

Once the four elements had gone through separate processes for identifying key and/or priority issues, the Pilot Team needed to integrate the issues to form the Strategy. The Pilot Team arrived at a process that built upon the geographic separation and designation used in the land use subcommittee effort. The strategy development process started with broader geographic units (i.e., subareas), and then focused on more specific areas of the bay until ultimately the Integrated Near-Term Remedial Action Alternatives were developed – the most specific planning in the Strategy.

Nine subareas were defined as distinct geographic units in Bellingham Bay, and were consistent with designations called out in the City of Bellingham's Shoreline Management Program (see Appendix B). Three of these subareas, West Bay, South Bay, and Marine, are large uniform areas of relatively undeveloped shoreline. The other six areas have a wide range of shoreline uses. In these six subareas, it was necessary to further breakdown the areas into shoreline segments that reflected difference in uses along the shoreline within a subarea. The number of shoreline segments varied depending on the number of times shoreline uses and/or habitat features changed within a subarea. Because of this geographic diversity associated with the bay's tributaries and shoreline development, the shoreline segment definitions helped account for the bay's unique configuration.

Once the subareas were defined, each project element was inventoried within a subarea. For example, all of the habitat restoration opportunities within a geographic subarea were listed, as were all of the land use issues for that subarea, as well as sediment cleanup and disposal sites. Following the inventory, an analysis was made to determine whether or not there were overlapping issues within a subarea or shoreline segment. If an overlap occurred, an analysis was made to determine if the overlap represented a conflict between two or more competing uses, or if it represented an opportunity to combine two or more complementary uses.

An example of a conflicting use may be a habitat opportunity calling for more shallow-water intertidal habitat that conflicts with a land use opportunity calling for deep-water navigation depths and water-dependent commercial shoreline use. An example of a complementary use may be a confined aquatic disposal facility in an area where it would not impede navigation and commerce uses. Another example of a complementary use could be a confined aquatic disposal area on top of an existing contaminated sediment site, providing multiple cleanups within one disposal location, and enhancing habitat consistent with the restoration goals established by the Pilot Team.

The overlay matrix identified many areas of conflicting or competing uses. The Subarea Strategies were created to provide guidance and direction for how to resolve these conflicts. These strategies serve as a guide for how to resolve conflicts, help determine which project element(s) are the critical ones given a shoreline segment, and identify where a balance may need to occur within a subarea.

The key step in resolving the conflicts and/or taking advantage of the opportunities was a two-day workshop where the Pilot Team finalized the Subarea Strategies. The five Integrated Near-Term Remedial Action Alternatives were also defined during the workshop to address sediment cleanup at priority sites in a manner that was consistent with the Subarea Strategies.

The Integrated Near-Term Remedial Action Alternatives were developed by creating a matrix with the high priority cleanup areas listed vertically as the rows of the matrix. The columns of the matrix represented the proposed alternatives and extended horizontally across the matrix. The cells of the matrix were the method of how that specific sediment area would be cleaned up under the corresponding alternative. To define the methods that were built into the various alternatives, the Pilot Team agreed that the alternatives need to address:

- High priority sediment sites
- Incorporating cleanup methods (i.e., dredge or cap) and priority disposal sites in a manner consistent with the sediment sites, land use, and habitat issues identified in the Subarea Strategies
- Reflecting key land use concerns, including achieving both currently authorized navigation depths in Whatcom Waterway as well as potential future navigation depths that would not be encumbered with contaminated sediments
- Consistency with the habitat vision established for the bay, and incorporate habitat restoration opportunities where practical
- A mix of in-water disposal and upland disposal solutions blended into the alternatives
- At least one alternative designed for complete removal of all contaminated sediments occurring on state-owned aquatic lands

FINAL DATA COMPILATION AND ANALYSIS REPORT

The *"Final Data Compilation and Analysis"* report presents a compilation of historical and current data on physical, biological and aquatic land use characteristics of Bellingham Bay. The report is separated into three main components listed below. The report is primarily graphical in nature, using Geographical Information Systems (GIS) maps, and written summaries. In most cases, two maps are created for each category that was studied – one map focusing on the entire bay, and the second providing a close-up of the characteristics of the inner bay. The data compilation and analysis results presented in the report were conducted to build a comprehensive record of existing environmental and land use information to support planning and decision-making efforts in the bay.

Maps and written summaries are provided in the report for the following areas:

Physical and Built Environment

- Regional Geology
- Regional Hydrology
- Historic and Current Shoreline and Bathymetry
- Historic Dredge Material Disposal and Fill Sites
- Regional Oceanography
- Energy Classifications
- Intertidal Substrates

- Subtidal Sediment Grain Size
- City and County Zoning
- Shoreline Designations
- Property Ownership
- State-Owned Land and Lease areas
- Parks, Marinas, Open Spaces and Trails

Chemical Characteristics of Bellingham Bay

- Sediment Cleanup Sites
- Water Quality Assessment
- Contaminant Sources

Biological Characteristics of Bellingham Bay

- Intertidal and Shallow Subtidal Macrofauna, Kelp and Eelgrass
- Clams, Geoduck and Oysters
- Shellfish Harvest and Certification Areas
- Pandalid Shrimp
- Rock Crab
- Dungeness Crab
- Surf Smelt and Sand Lance Spawning Grounds
- Pacific Herring
- Salmon Fishing Areas
- Tribal Usual and Accustomed Fishing Areas
- Seabird Nesting
- Marine Mammals and Pinniped Haul-Out Sites

DOCUMENTATION REPORT SUMMARIES

Sediment Sites and Source Control

Existing sediment and water quality data from Bellingham Bay were evaluated to identify sediment cleanup sites and sources of pollution. The first step in the process was to perform an initial review of the considerable sediment and water quality data that have been collected in Bellingham Bay. This review identified nine study areas containing one or more surface sediment samples that exceeded protective chemical criteria. The eight areas of potential concern consisted of three known and five potential sediment cleanup and source control areas. Because of its relatively large size and diverse characteristics, the Whatcom Waterway Area was subdivided into five discrete "sites", resulting in a total of 12 sediment sites of potential concern within Bellingham Bay. Considering that all of the identified sediment cleanup sites are separated geographically, with little or no overlap between individual sites, known and potential contaminant sources were linked with specific sediment cleanup areas.

The second step in the process was to develop and apply evaluation criteria that would determine which of the 12 potential sediment cleanup and source control sites represent the highest priority for action under the Pilot. Using the seven goals of the Pilot project, evaluation criteria were developed to score and rank the 12 sediment cleanup/source control sites. The candidate sites and their ranking are summarized in the following table; more information on the ranking process follows.

Table B-1 Contaminated Sediment Sites

Sediment Cleanup and Source Control Site	Approximate Area in Acres	Rank
Whatcom Waterway Site		
Mid/Outer Whatcom Waterway: 30' Federal Channel	46	High
Head of Whatcom Waterway: 30' Federal Channel	7	Medium/High
Head of Whatcom Waterway: 18' Federal Channel	5	Low
I&J Waterway	0	Low
G-P Log Pond	8	High
G-P ASB	43	Medium/High
Port Log Rafting Area	24	Medium/High
Starr Rock	48	Medium/High
Cornwall Avenue Landfill	14	High
Harris Avenue Shipyard Site	4	Medium/High
G-P Outfall Site	0 [a/]	Low[a/]
Other Sediment Sites		
Olivine Nearshore Area	1	Medium
Squalicum Harbor Inner Boat Basin	3	Low
Weldcraft Steel and Marine	1	Low

[a/] 1999 Sampling data reveal that this site has recovered to below SQS cleanup criteria

Ranking Process

Consistent with the objectives of the Puget Sound Water Quality Management Plan and with SMS requirements, Ecology identifies and ranks contaminated sediment sites in Puget Sound through five sequential steps:

1. **Data Compilation:** Available sediment quality data in Puget Sound is compiled, validated, and entered into a geographical information system (GIS) database. Although Ecology focuses on surface sediment samples collected within the biologically active zone (i.e., 0 to 10 cm), the available subsurface sediment sampling data have also been compiled for the purposes of this Pilot Project.
2. **Station Cluster Identification:** Station clusters are defined as a group of sampling stations having spatial and chemical similarity. A station cluster is of potential concern when the average of the three highest concentrations for any chemical, biological effects (if determined), or other reserved criteria exceeds the SMS cleanup screening level (CSL), which is numerically equivalent to the minimum cleanup level (MCUL).
3. **Public Notice/Hazard Assessment:** The public is notified of Ecology's findings, and is asked to supply additional information if available.
4. **Site Identification:** If the original station clusters of potential concern are unchanged by any new information, these clusters are designated as sites. Ecology's site list contains sites composed solely of stations exceeding the CSL/MCUL.
5. **Site Ranking:** Using available sediment chemistry data and other information collected during the hazard assessment, Ecology has published a site-by-site ranking based solely on potential ecological effects. The most recent ranking was published by Ecology in 1996, including three sites in Bellingham Bay (the "known" sites discussed below). The human health ranking is still under development.

Sediment Data

The Pilot Team used a process similar to the SMS procedure to identify hazardous chemicals of potential concern and prospective sediment cleanup sites in Bellingham Bay. First, using the combined database described above, the frequencies of exceedance in surface (0 to 10 cm) samples of sediment quality standards (SQS), as well as CSL/MCUL criteria were compiled for each study area. Surface contaminants of potential concern identified from this analysis were (in descending order of prevalence in Bellingham Bay):

- **Mercury** - detected above SQS criteria in 45 percent of the surface sediment samples collected
- **Phenolic compounds** including phenol, 2-methylphenol, 4-methylphenol, 2,4-dimethylphenol, and an associated chemical – benzoic acid - detected above SQS criteria in 14 percent of the surface sediment samples collected
- **Solid waste and/or woody debris** - detected above SQS criteria in 7 percent of the surface sediment samples collected

- **Tributyltin (porewater ion)** - detected above SQS criteria in 6 percent of the surface sediment samples collected
- **Polychlorinated biphenyls (PCBs)** - detected above SQS criteria in 5 percent of the surface sediment samples collected
- **Plasticizer compounds** including bis(2-ethylhexyl)phthalate - detected above SQS criteria in 5 percent of the surface sediment samples collected
- **Metals including copper, lead, and zinc** - detected above SQS criteria in 4 percent of the surface sediment samples collected
- **Polynuclear aromatic hydrocarbons** (PAHs - detected above SQS criteria in 4 percent of the surface sediment samples collected

The subcommittee also reviewed the available information on subsurface sediment quality. Within the federally-authorized navigation channels, subsurface sediments typically contained higher concentrations of chemicals of concern, compared to levels within the surface biologically active zone. This vertical pattern of contamination reflects both the control of sediment contamination sources over time, and the continued deposition of cleaner sediments derived from sources such as the Nooksack River (see below and Anchor Environmental and Hart Crowser, 1999).

Sources of Contamination

The subcommittee also investigated potential sources of contamination that could affect sediment quality, including point sources (e.g., outfalls), surface water, groundwater, and other non-point sources. Detailed sampling and analysis of potential contaminant sources in inner Bellingham Bay shows that with the exception of low-level groundwater seepage into the G-P Log Pond, no ongoing, sources of mercury have been identified that have the potential to re-contaminate sediments (Anchor Environmental 1999). Although ongoing urban stormwater inputs of 4-methylphenol and phenol have been documented in the area, the available data suggest stormwater influences are highly localized. Further, sediment concentrations of these compounds are more closely associated with the degradation of historical woody debris deposits present in several nearshore areas of the inner bay.

In addition to sources that may affect sediment sites, localized water quality concerns have also been identified in Bellingham Bay. Based on sampling of a variety of discharges to the Whatcom Waterway study area and comparison of the sample data to ambient water quality criteria, the following discharges of potential water quality concern have been identified.

- Surface water runoff from City storm drains contains concentrations of dissolved copper that exceed the marine ambient water quality criteria. Similarly elevated copper concentrations in urban runoff have also been documented throughout Puget Sound, and appears to be the result of normal vehicle releases (i.e. due to tire wear).
- Higher concentrations of dissolved copper and other metals including arsenic, cadmium, silver, and zinc were detected in the Bornstein Seafoods drain that discharges into the I&J Waterway. However, the small flow from this source (0.1 to 5 gallons per minute) corresponds to a relatively low mass loading. Further investigations and source control efforts are underway at this site by Ecology.

Although these source areas represent a localized concern to water quality (typically within tens of feet of the outfall), they do not appear to represent important sources of metals to sediments in Bellingham Bay.

Ranking of Sites

The Pilot Team determined that the first four Pilot goals represented the primary elements of sediment cleanup and source control:

- Goal 1 – Human Health and Safety
- Goal 2 – Ecological Health
- Goal 3 – Protect and Restore Ecosystems
- Goal 4 – Social and Cultural Uses

These four goals thus formed the primary basis for site scoring to determine priority ranking. The Sediment Cleanup and Source Control Subcommittee developed and approved evaluation criteria and scoring guidelines that were used to prioritize sediment cleanup, water quality and associated source control sites.

The general guidelines for scoring for the sediment site and source control element are similar to guidelines developed by Ecology to identify and prioritize agency resources to address impaired and threatened water bodies (i.e., 303[d} listing and TMDL processes), and to implement the SMS. In the case of sediment cleanup, these general prioritization criteria were previously transformed by Ecology into a set of detailed scoring guidelines, which in turn were incorporated into a spreadsheet-based scoring model denoted the Sediment Ranking System (SEDRANK), January, 1990. The SEDRANK model integrates available information on toxicity potential, extent, natural recovery potential, habitat attributes, fisheries utilization, and other factors to derive a total score for each prospective sediment cleanup site. Use of the SEDRANK model has been incorporated into the SMS regulation (Chapter 173-204-540 WAC).

By combining information on the nature and extent of sediment contamination and source controls, along with data on the utilization and productivity of marine/estuarine habitats and fisheries utilization, the SEDRANK model reflects a range of the Pilot's baywide goals, particularly Goals 1 through 4. Because of the similarity in purpose and form, and to provide consistency with SMS policies and guidelines, the subcommittee decided to use the SEDRANK model to prioritize sediment cleanup and source control sites, with minor modifications.

Inputs to the model included the following:

- Maximum concentration of individual contaminants
- Area of contaminated sediments
- Historical versus ongoing sources
- Net sedimentation rate
- Water depth of contaminated sediments
- Habitat complexity

- Proximity to special marine habitats and wildlife refuges
- Proximity to tribal and other commercial fisheries
- Proximity to recreational fisheries and public access

Sediment Disposal Siting

To develop a short list of potential sites for the disposal of contaminated sediments generated by cleanup activities, several steps were taken by the Pilot Team. The first step was to develop and apply exclusion and avoidance criteria to the spectrum of potential sites with the objective of eliminating early in the process those areas which are technically unsuitable, legally precluded, or obviously less than optimal as potential contaminated sediment disposal sites. The development of these criteria followed a screening process similar to the ongoing Multi-User Disposal Site (MUDS) Study. Following the application of these criteria, 68 potential sites remained. Of these 68 sites, 36 were upland sites, 15 were nearshore fill sites, and 17 were confined aquatic disposal sites.

The next step was to develop and apply criteria that would determine which of the 68 potential sites were most desirable as disposal sites. Using the seven baywide goals, evaluation criteria were developed to score and rank the 68 sites. This ranking process identified seven viable disposal sites. These sites and their major characteristics are summarized in the next table, followed by more information on the process used to evaluate and rank the sites.

Table B-2 Viable Disposal Sites

Site	Site Type	Capacity (cubic yards)
Whatcom-Skagit Phyllite Quarry	Upland	200,000
Roosevelt Regional Landfill	Upland	1,000,000 +
Cornwall Ave. Landfill	Nearshore Fill	1,000,000
G-P Log Pond	Nearshore Fill	100,000
Starr Rock/Cornwall Ave. Landfill	Confined Aquatic Disposal	1,000,000
G-P Log Pond	Confined Aquatic Disposal	50,000
G-P ASB	Confined Aquatic Disposal	600,000

Initial Screening

The initial site screening focused on both exclusionary and avoidance criteria, with the objective of eliminating early in the process those areas which are technically unsuitable, legally precluded, or obviously less optimal as prospective contaminated sediment disposal sites. Factors considered in the initial screening were:

Threatened or Endangered Species: The presence of currently listed threatened or endangered species, protected under federal or state regulations, within a potential sediment disposal site has often been identified as a "fatal flaw" to site acceptability (Ecology, 1990). To the extent that information exists which identified critical habitats and breeding areas for threatened or endangered species within a given region, that site was excluded from further consideration in the initial site screening. Identified wildlife habitat for WDFW priority habitat species was used as a basis to initially define critical habitat areas.

Designated Parks, Sanctuaries, and Refuges: Potential sediment disposal sites were not considered in existing public parks, sanctuaries, preserves, or refuges.

Cultural Resource Areas: Known archaeological or historic sites identified on Whatcom and Skagit County databases were excluded from consideration as possible sediment disposal sites. However, additional cultural resource areas, including important tribal resources and uses, were considered further as part of the further evaluation of sites retained for more detailed evaluation.

Territory Not Under U.S. Government Control: Sites not under the control of the U.S. government were excluded from further consideration as a disposal location for Bellingham Bay dredged sediments.

Seismic Risk: High seismic hazard areas such as sites along major known fault lines were not considered as possible sediment disposal sites. Although the fill located along much of the Bellingham waterfront is susceptible to seismic shaking, past experience at other similar sites in Puget Sound (e.g., Elliott and Commencement Bays) indicates that this condition can often be relatively easily mitigated through appropriate design. Accordingly, the presence of uncompacted fill and clay did not necessarily constitute an unacceptable site condition.

Additional Exclusionary and Avoidance Criteria – Upland Disposal Sites

Slope: Both Whatcom County and the City of Bellingham have categorized upland slopes exceeding approximately 15 percent (7H:1V) as having a relatively high landslide potential. These areas were excluded as potential sediment disposal locations.

Floodplains: To ensure long-term stability, upland sites located within the 100-year Federal Emergency Management Act (FEMA) floodplain and floodway were excluded from further consideration as sediment disposal locations.

Volcanic Risks: Washington State has a history of volcano eruptions that can destroy structures in the blast impact areas and along the lava flow pathways. These areas, as determined by survey of historical impacts, were eliminated from consideration as a volcanic eruption could disperse the sediments.

Wetlands: Category 1 wetlands, as currently identified in City and County Sensitive Areas Ordinances, were excluded from the initial site screening evaluation, particularly as these areas overlapped with WDFW priority habitat species wetlands. In addition, the wetland definition was expanded to include stream corridors, lakes, and other fish habitat areas identified by the City and County.

Depth-to-Groundwater/Aquifer Areas: Several sensitive aquifers exist in Whatcom County and considerable efforts have been undertaken to date to protect these water supplies. Following the general recommendations contained in the "Nooksack Watershed Surficial Aquifer Characterization" report (Ecology, 1996), regional surficial aquifers (groundwater present within approximately 10 feet of the ground surface) represent highly sensitive areas and were not considered as possible sediment disposal sites.

Human Uses and Capacity: Sediment disposal would likely be incompatible with existing residential, commercial, institutional, and industrial buildings and associated use areas. Further, assuming a minimum sediment disposal volume of approximately 200,000 CY and a nominal disposal thickness of 10 feet (including 3 feet of cover), an area of at least 20 acres would be required for consideration as an upland disposal site. Only contiguous areas of greater than 20 acres without occupied buildings were considered in the initial site screening. Land use within prospective upland disposal areas was also considered in the development and aggregation of land areas into the long list of upland sites.

Additional Exclusionary and Avoidance Criteria – Nearshore Fill Disposal Sites

Navigation Channels: Consistent with existing legal requirements, federally-authorized navigation channels were not considered as possible nearshore fill disposal sites. However, berthing areas located immediately adjacent to the navigation channels can be preferred disposal locations, and thus were not excluded in the initial screening.

Sensitive or Critical Aquatic Habitats: Sensitive or critical aquatic habitats primarily include special aquatic sites such as native eelgrass meadows greater than 1/4-acre, mudflats, and salt marshes, in addition to fish spawning areas, primary Dungeness crab, rock crab, and shrimp aggregation areas. These areas were not considered as possible nearshore fill disposal sites.

Proximity to Tribal or Recreational Fishing Areas: Primary fishing areas currently used by the Lummi or Nooksack Tribes, including primary clam harvesting areas near Portage Island, were not considered as possible nearshore fill disposal sites. Primary recreational fishing and shellfishing sites were also excluded from consideration.

Surface Water or Preferential Groundwater Discharge Areas: The presence of surface water inflows along the shoreline can affect the ability to design a nearshore disposal site capable of ensuring long-term physical and chemical containment of sediment contaminants. Accordingly, primary surface water discharge areas, as identified based on available mapping, were used as avoidance criteria.

Human Uses and Capacity: Assuming a minimum sediment disposal volume of approximately 200,000 CY and a nominal disposal thickness of 10 feet (including 3 feet of cover), a total area of at least 20 acres would be required for sediment disposal site. Unless the Pilot Team identified a beneficial use for a nearshore fill (e.g., at the G-P Log Pond), only contiguous areas of greater than 20 acres were considered in the initial site screening for nearshore fills.

Additional Exclusionary and Avoidance Criteria - Confined Aquatic Disposal Sites

Slope: Existing mud line slopes of less than 6 percent (16H:1V) are typically recommended for CAD sites to ensure site stability both during and after construction (Ecology 1990, Palermo et al. 1998). Slopes exceeding 6 percent were excluded in the initial siting analysis.

Water Depth: The maximum depth limitation for in-water disposal sites was *not* used as an exclusionary and/or avoidance criterion, since recent work suggests that dredged material can be accurately placed and managed at relatively great depth (Palermo et al., 1998).

Wave and Current Energy: Strong waves or currents capable of achieving bottom velocities above approximately 50 cm/sec (the rough threshold for incipient motion of sand-sized materials) can affect the long-term stability of a CAD site as well as the ability to reliably place sediments in the CAD. The 50 cm/sec bottom velocity threshold was used for initial screening.

Sensitive or Critical Aquatic Habitats: Same as Nearshore Fill.

Proximity to Tribal Fishing Areas: Fishing areas currently used by the Lummi or Nooksack Tribes included the entire Bellingham Bay area. Accordingly, this criterion was evaluated further in subsequent steps addressing "preference criteria" and net environmental impacts of alternatives selected for detailed analysis. Tribal fishing concerns were considered further when evaluation criteria and scoring guidelines were applied to the long list.

Human Uses and Capacity: Assuming a minimum sediment disposal volume of approximately 200,000 cubic yards and a nominal disposal thickness of 10 feet (including 3 feet of cover), an area of at least 20 acres would be required for consideration as a CAD site. Only contiguous areas of greater than 20 acres were considered in the initial site screening.

Ranking the Long List

Using the disposal site evaluation criteria described above, the long list of 68 potential sediment disposal sites was identified. Next, these sites were scored to eliminate locations that were clearly less optimal as prospective contaminated sediment disposal sites. Only the first three Pilot goals (Human Health and Safety, Ecological Health, and Protect/Restore Ecosystems) were used in this assessment. The resultant criteria and guidelines are summarized below.

Goal 1 - Human Health and Safety

The following definitions were used to score disposal alternatives based on their impact on human health and safety:

High - A disposal site was scored high if:

- The movement and disposal of sediments requires limited handling
- Human exposure to or uptake of contamination can be avoided
- The site is known to pose an human health risk
- The disposal site would control sources of contamination to sediments
- The potential for reintroduction of contaminants is eliminated or occurs over a short time and is temporary
- The site allows for simultaneous cleanup of multiple sites

Medium - A disposal site was scored medium if:

- Moderate re-handling and movement is required
- Human exposure to or uptake of contamination is minimized
- The site is suspected to pose a human health risk
- A disposal site would control sources of contamination to the water
- Potential for reintroduction of contaminants occurs over a moderate period of time
- The site is located in an area that allows for simultaneous cleanup of contaminated sediments at that site.

Low - A disposal site was scored low if:

- Sediments need to be re-handled numerous times

- Human exposure to or uptake of contaminants is unavoidable or occurs over the long term
- The site is not located in an area that achieves multiple cleanups
- Uncontrolled sources to water or sediments are not controlled
- Reintroduction of contamination could occur over the long term

Goal 2 - Ecological Health

High – A disposal site was scored high if:

- The movement and disposal of sediments requires limited handling
- Ecological exposure to or uptake of contamination can be avoided
- The site is known to pose an ecological risk
- The disposal site would control sources of contamination to sediments
- The potential for reintroduction of contaminants is eliminated or occurs over a short time and is temporary
- The site allows for simultaneous cleanup of multiple sites

Medium – A disposal site was scored medium if:

- Moderate re-handling and movement is required
- Ecological exposure to or uptake of contamination is minimized
- The site is suspected to pose an ecological risk
- A disposal site would control sources of contamination to the water
- Potential for reintroduction of contaminants occurs over a moderate period of time
- The site is located in an area that allows for simultaneous cleanup of contaminated sediments at that site

Low – A disposal site was scored low if:

- Sediments need to be re-handled numerous times
- Ecological exposure to or uptake of contaminants is unavoidable or occurs over the long term
- The site is not located in an area that achieves multiple cleanups
- Uncontrolled sources to water or sediments are not controlled
- Reintroduction of contamination could occur over the long term

Goal 3 - Protect and Restore Ecosystems

High – A disposal site was scored high if:

- It is located to avoid or not permanently convert limited, sensitive, or high quality habitat to non-habitat uplands
- It occurs in a non-habitat upland area or significantly degraded habitat area
- Permanent protection of limited, sensitive, or high quality habitat occurs
- Restoration of aquatic/terrestrial systems occur over a short time frame
- It provides significant opportunity to improve ecosystem function and integrity through mitigation or preservation
- The site does not disrupt hydrologic transport and deposition processes

Medium – A disposal site was scored medium if:

- Limited, sensitive, or high quality habitat is converted to non-habitat upland and an equal area of non-habitat is available for conversion to habitat
- Temporary protection of habitat occurs
- Restoration of aquatic/terrestrial systems occur over a moderate time frame
- It provides limited opportunity to improve ecosystem function and integrity through mitigation or preservation

- The site will result in limited disruption of the hydrologic transport and deposition processes

Low – A disposal site was scored low if:

- Limited, sensitive, or high quality habitat is converted to non-habitat upland and an equal area of non-habitat is not available for conversion of non-habitat to habitat
- There is no opportunity for habitat protection
- Restoration of aquatic/terrestrial systems occur over a long term
- It occurs in an area where impacted habitats are difficult to replicate
- The site disrupts the hydrologic transport and deposition processes

Final Ranking and Recommendations

Similar scoring guidelines and assumptions were used in the further evaluation of the "shorter" list of 21 potential disposal sites, incorporating all seven baywide Pilot goals, are presented below, followed by a presentation of the results and sensitivity analysis of the scoring.

The results of this further evaluation of candidate disposal sites were initially reviewed by the Pilot Project Managers and consultants, and presented to the entire Pilot Team for review and comment. The most promising disposal sites were identified as those that met the following criteria:

- The site scored highest among all disposal sites evaluated within a given disposal environment (i.e., upland, nearshore fill, or CAD)
- The site owner confirmed that the site was available for disposal, subject to future negotiated agreements pertaining to cost, schedule, and other considerations
- The site had a minimum disposal capacity of 50,000 CY (possibly requiring the use of multiple disposal sites)

In addition, the highest scoring potentially available site within each disposal environment that had sufficient capacity for disposal of the reasonable maximum project sediment volume (approximately 1,000,000 CY) was also retained for further analysis. Based on these criteria, a total of seven sites were selected as candidate disposal sites that may be considered by the Pilot Team.

Habitat Restoration

The Habitat subcommittee had the task of identifying priority habitat restoration/protection opportunities in Bellingham Bay. After developing a habitat vision and objectives, the subcommittee began by using an aerial photograph of the study are to identify specific locations where the broad range of habitat objectives could be met. Site visits to some locations were also conducted by members of the subcommittee. In identifying specific locations, the Habitat Subcommittee did not consider whether the area was already being used for industrial purposes, commerce and navigation, etc. within the bay. In addition, the subcommittee acknowledged that some restoration opportunities might be implemented as a component of sediment remediation. The subcommittee decided that total abandonment of federally authorized navigation channels within the bay for the purposes of habitat may not be realistic, but habitat opportunities were not precluded from occurring within federally-authorized navigation channels.

The subcommittee identified 36 habitat opportunities within Bellingham Bay for consideration. The habitat restoration/preservation locations are listed in the following table, along with the overall ranking for the site. The process for developing site rankings is described following the table. It is important to recognize that these habitat restoration opportunities are suggested restoration concepts and not intended to be inclusive of all possibilities in the Bay.

Table B-3 Habitat Opportunity Descriptions

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description	Score
1	38,000 ft^2 (0.87)	Cement Co. Dock	The cement company dock is a relatively wooden structure near Little Squalicum Creek. It extends through intertidal and shallow subtidal water. The primary action would be removal of the treated wooden piles (probably cut below the mud line) to remove creosote from the aquatic environment and restore substrates.	39
2	30,000 ft^2 (0.68)	Mt. Baker Plywood West	The beach area west of Mt. Baker Plywood consists of large boulders and rocks. Opportunities at this site include either removing the large boulders and rocks to expose underlying sediments and supplement with finer mixed coarse gravel and sand, or placing finer mixed coarse gravel and sand over the large boulders and rocks to fill interstices.	40
3	30,000 ft^2 (0.68)	Mt. Baker Plywood Northwest	A portion of the shoreline appears to be fill. The fill could be removed and the area graded to support marine buffer, possibly salt marsh and sand/mud flat.	51
4	120,000 ft^2 (2.75)	Mt. Baker Plywood - South	The fill could be removed and the site graded to provide habitat suitable for sand/mudflat and salt marsh habitat with a marine buffer fringe.	53
5	20,000 ft^2 (0.45)	Squalicum Crk. Waterway - A	This action would involve the removal of treated wooden piles, a pier, log-rafting structures, and log rafts.	49
6	200,000 ft^2 (4.6)	Squalicum Crk. Waterway – B	The elevations in this portion of the creek estuary could be raised to provide intertidal and shallow water habitat such as eelgrass, kelp or salt marsh and associated functions. Shoreline buffer could also be established.	51
7	50,000 ft^2 (1.1)	Bellingham Cold Storage	The fill could be removed and the site graded to provide estuary habitat suitable for marine buffer, saltmarsh and/or intertidal mud/sandflat.	52
8	640,000 ft^2 (14.7)	Squalicum Harbor Breakwater	Elevations off portions of the breakwater could be raised from about -18 ft MLLW to provide gently sloping intertidal and shallow subtidal habitat and functions. Side slopes on the seaward edge of the breakwater could be modified to incorporate finer grained material to provide intertidal/shallow water functions.	46
9	70,000 ft^2 (1.6)	Squalicum Marina	The substrates along the marina margins could be modified to incorporate finer grained material to provide intertidal/shallow water functions.	42
10	160,000 ft^2 (3.6) (area available outside of existing eelgrass bed)	Port-Hilton Harbor	Shallow water habitat could be established by raising the elevation next to the ASB. Marine buffer fringe habitat could be established at high elevations and/or site elevations could me modified to meet the elevations of the existing eelgrass bed. Allow for natural eelgrass colonization or do limited eelgrass transplanting.	56
11	280,000 ft^2 (6.4)	G-P ASB – East	Shallow water habitat could be established by raising the elevation next to the ASB. Marine buffer fringe habitat could be established at high elevations and the site could support either marsh plants or eelgrass at lower elevations.	50

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description	Score
12	960,000 ft^2 (22)	G-P ASB – South	Elevations could be raised or modified to expand the existing eelgrass bed on the west side of the ASB. About 200, 000 CY would be required to create habitat at elevations suitable for eelgrass.	50
13	1,430,000 ft^2 (33)	GP – ASB	This action would consist of removing the ASB from the water and establishing intertidal and shallow subtidal habitat, and marine buffer and/or eelgrass.	43
14	30,000 ft^2 (0.68)	Sash & Door	This action would involve removing fill from the Sash and Door site and establishing estuarine riparian buffer, marsh, and mudflat banks.	52
16	<10,000 ft^2 (<0.23)	Lower Whatcom Creek	The action would involve removing wooden structures, derelict floats, etc. in the vicinity.	39
17	60,000 ft^2 (1.4)	Head of Whatcom Waterway	The concept would be to modify elevations and substrates in the head of the waterway to establish estuarine riparian buffer, mudflat benches, and marsh. Perhaps introduce rootwads or other structure to the head of the waterway.	54
18	270,000 ft^2 (6.2)	G-P Log Pond	The concept would be to modify the shoreline elevations to provide a gently sloping or terraced slope from the top of the bank to the pierhead line in the Whatcom Waterway. Remove and debris, treated wooded structures. Establish marine buffer fringe, mudflat banks and/or saltmarsh.	47
19	1,080,000 ft^2 (24.8)	Port Log Raft	Remove wood/bark debris, and sunken logs. Modify the shoreline edge and modify elevations to support intertidal and shallow subtidal habitat (sloped or terraced bench). The site may provide an opportunity to provide substrates suitable for macroalgae attachment establish and/or an eelgrass bed.	43
20	350,000 ft^2 (8)	Cornwall Avenue Landfill - Shoreline/Upland/in-water	Remove garbage from the in-water portion of the landfill. Cut back bank along shoreline and remove garbage. Re-grade upland to intercept an appropriate shallow water elevation. Establish intertidal habitat, marine buffer fringe, possibly a saltmarsh, and potentially expand the sparse eelgrass patches (0.25 acre) just offshore of the seaward extent of the garbage.	52
21	45,000 ft^2 (1.03) (1st action) 360,000 ft^2 (8.3) (2nd action)	Boulevard Park	Two actions could occur along the shoreline and offshore from about 600 to 800 ft north of Boulevard Park to the south end of the Park. The first action is shoreline substrate modification. Substrates consist of rip-rap and large rock and concrete debris. These substrates could possibly be removed and replaced with coarser grain sand and gravel to provide surf smelt and sand lance spawning areas. Alternatively, finer grained substrates could be placed in the interstices to provide some epibenthic habitat. The second action would occur offshore and consist of potentially restoring eelgrass or providing substrates to support kelp.	48
22	18,000 ft^2 (0.41)	Taylor Street Dock and Associated Structures	Remove the treated wooden structure and associated pilings and pier structures to remove creosote from the aquatic environment. Either allow eelgrass to naturally recolonize or conduct eelgrass transplant.	41
23	8,000 ft^2 (0.18)	Padden Creek - North Shoreline	Remove shoreline fill and create mudflat and/or saltmarsh.	57
24	1,500 ft^2 (0.03)	Padden Creek - North - In-Water	Remove treated wooden pier to remove creosote from the environment. This may provide an opportunity for existing eelgrass beds to expand. Remove a small filled area that protrudes waterward of the OHW line at the landward end of the pier structure.	46

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description	Score
25	120,000 ft^2 (2.75)	Padden Creek – Upland .	Remove fill and establish connection to Padden Creek. Excavate fill to create tidally influenced brackish marsh. Provide habitat buffer.	57
26	80,000 ft2 (1.8)	Post Point – Upland	Excavate upland next to a small open water embayment containing eelgrass. Grade excavated area to provide saltmarsh and mudflat bench.	57
27	900 ft2 (0.02)	Post Point – Shoreline	Modify existing structure under railroad crossing to open it up and replace existing concrete debris that has been used to armor the shoreline with rock.	39
28	900 ft2 (0.02)	Post Point – South	Modify existing structure under railroad crossing to open it up.	38
29	900 ft2 (0.02)	Chuckanut Spit	There is apparently a closed culvert under the rail trestle. The action would involve either opening the culvert or replacing the culvert with a new culvert that was bigger and more open.	40
30	7,500 ft2 (0.17)	Chuckanut Breach	There is one rail trestle allowing exchange between Bellingham Bay and the embayment in the north end of Chuckanut Bay. The action would consist of either installing a large open culvert under the rail line or building another trestle along the eastern end of the rail bed.	38
31	21,200,000 ft2 (486)	Post Point to Chuckanut Protection	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.	26
32	75,000,000 ft2 (1,722)	Portage Island Protection Area	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.	26
33	900,000 ft2 (20)	Lummi Peninsula	Portions of the shoreline along this area are armored with rip-rap and large boulders. The action that could be implemented here would consist of restoring upper intertidal substrates to coarse sand and gravel suitable to support surf smelt and sand lance spawning habitat. (the Lummi Nation, Corps, and County are proposing to armor the entire beach for road protection. Mitigation for maintaining surf smelt spawning habitat and functions lost from the revetment will be required by WDFW. This opportunity may not be a viable option for the Pilot).	38
34	140,000,000 ft^2 (3,214)	Nooksack Delta Protection Area	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.	26
35	170,000 ft^2 (3.9)	Nooksack Delta - East	Decaying wood deposits have apparently blanketed much of the higher intertidal area. The action would be to remove the wood deposits and if necessary import appropriately sized gravel to support surf smelt and sand lance spawning habitat.	43
36		East Shore Padden Creek	Remove fill, asphalt, and rock along the east shore and modify elevations to provide estuarine riparian buffer, mudflat benches, and marsh.	50

Ranking Habitat Opportunity Sites

The subcommittee decided that from an ecological perspective, the baywide Pilot Goal 3 – Protect and Restore Ecosystems was the more important goal for evaluating potential habitat restoration/protection opportunities in the bay. This goal was transformed into evaluation criteria as described below.

Goal 3: Protect and Restore Ecosystems

Goal Evaluation Description: Ecosystem and habitat issues associated with a habitat opportunity can be grouped into the following categories: physical considerations, ecosystem function, diversity, stability and productivity; mitigation sequencing; and ecosystem preservation and improvement.

High - A habitat opportunity was scored high if:

- It is located in a significantly degraded habitat area or non-habitat area
- The restoration timeline is relatively fast
- It provides significant opportunity to improve ecosystem function by providing several functions for a variety of species and/or results in a net increase of in-water habitat
- Permanent preservation of the site occurs
- The opportunity does not permanently disrupt or is supported by hydrologic transport and deposition processes
- It directly benefits threatened or endangered species
- The probability of success is high based on previously demonstrated restoration techniques
- The opportunity provides habitat connectivity to contiguous habitats
- The opportunity would restore/replace limited habitat
- The opportunity creates habitat functions that are sustained through natural process rather than ongoing manipulations
- The opportunity represents in-kind replacement of habitat types and functions affected through disposal siting
- The opportunity can be implemented in advance of any disposal site impacts

Medium - A habitat opportunity was scored medium if:

- It requires conversion of relatively moderate functioning habitat to a different habitat type or occurs in other estuarine/marine waters of Bellingham Bay
- Restoration occurs over a moderate time frame
- It provides a few functions but does not necessarily result in a net area increase of in-water habitat
- Limited protection of the site occurs
- The opportunity results in limited disruption of hydrologic transport and deposition processes
- It neither worsens nor improves threatened or endangered species
- The probability of success is moderate based on previously demonstrated mitigation techniques
- The opportunity provides some habitat connectivity

- The opportunity neither worsens nor improves limited habitat
- The opportunity creates habitat functions that require some ongoing manipulation
- The opportunity provides for some in-kind replacement
- The opportunity can be implemented concurrently with any disposal site impacts

Low - A habitat opportunity was scored low if:

- It requires conversion of relatively high functioning habitat that is difficult to replace to a different habitat type, or occurs outside of the estuary/marine waters of Bellingham Bay (e.g., non-tidally influenced freshwater areas in the drainage's to Bellingham Bay)
- The restoration time is relatively long
- It provides only one function for one species or does not result in a net increase of in-water habitat
- The site can not be permanently protected
- The opportunity does permanently disrupt hydrologic transport and deposition processes
- It does not benefit threatened or endangered species
- The probability of success is questionable based on previously demonstrated mitigation techniques
- The opportunity provides limited habitat connectivity
- The opportunity does not restore or replace limited habitat
- The opportunity requires ongoing manipulations
- The opportunity does not provide for in-kind replacement
- The opportunity can not be implemented in advance of or concurrent with any disposal site impacts

The evaluation scoring criteria guidelines were separated into 12 distinct criteria:

3a. Quality of existing habitat
3b. Restoration time-frame
3c. Opportunity to improve ecosystem function
3d. Site protection
3e. Sediment deposition/transport processes
3f. Threatened and endangered species
3g. Probability of success
3h. Habitat connectivity
3i. Restore/replace limited habitat
3j. Sustainability of habitat functions
3k. Type of habitat replacement
3l. Timing of implementation

Using these 12 criteria, a total numeric score for each opportunity was calculated using the following system:

- High = 5
- Medium/High = 4
- Medium = 3
- Medium/Low = 2
- Low = 1

The total score for each potential habitat opportunity was calculated as the arithmetic sum of the individual criterion scores.

Aquatic Land Use

The Aquatic Land Use Subcommittee included individuals representing the City of Bellingham, Port of Bellingham, Nooksack Tribe, Department of Natural Resources, and the Department of Ecology.

The Aquatic Land Use Subcommittee reviewed the baywide Pilot Goals and determined that Goal 4 (Social and Cultural Uses) and Goal 7 (Economic Vitality) of the Pilot relate to shoreline and aquatic land uses. To provide input to the development of Pilot Subarea strategies within the Comprehensive Strategy, the Aquatic Land Use Subcommittee produced the Aquatic Land Use Documentation Report to identify the context of shoreline land uses, navigation/commerce, other aquatic land uses and associated planning frameworks.

Because a Documentation Report related to habitat was prepared by a different subcommittee, the Aquatic Land Use Subcommittee did not include habitat in the Aquatic Land Use Documentation report. The Aquatic Land Use Subcommittee documented the local, state, federal, and tribal regulatory programs that create the land use-planning framework in the Pilot project area. State and local shoreline programs, comprehensive plans, aquatic management laws and tribal treaty rights and planning programs were described.

The Subcommittee then assisted the Pilot Team to define a set of nine primary geographic subareas in the bay based on an analysis of shoreline designations and land use context. These subareas were used by the Pilot Team as a project management tool to assist in developing recommendations for the Comprehensive Strategy for the Bay. Within each subarea, the Aquatic Land Use Subcommittee identified "land use activities" in three general categories: (1) existing uses; (2) planned projects; and (3) uses allowed in the planning framework.

The Aquatic Land Use Subcommittee assessed general categories of "land use activities" in each subarea relative to Pilot goals, federal, state, tribal and local land management responsibilities, to determine recommendations for development of subarea strategies in the Comprehensive Strategy. The Documentation Report does not have any regulatory authority, existing land use planning regulations govern decision-making.

Appendix C
Preliminary Draft Habitat Mitigation Framework Guidelines

APPENDIX C

PRELIMINARY DRAFT HABITAT MITIGATION FRAMEWORK

PRELIMINARY DRAFT HABITAT MITIGATION FRAMEWORK

Prepared by: The Pilot Habitat Subcommittee

INTRODUCTION

Aquatic habitat may be adversely impacted from implementation of sediment remedial actions, or development along the shoreline or in waters of Bellingham Bay. Sediment disposal and/or future development may convert one habitat type to another resulting in no net loss of area but a change in function, permanently alter, permanently remove or eliminate habitat and habitat function. These types of habitat alterations may affect habitat types, area, functional performance, and/or the physical processes that are needed to maintain habitat and resources that rely on certain types of habitat.

The Habitat Documentation Report (PI Engineering and Anchor Environmental 1999) identifies objectives for sustaining habitat and aquatic resources and increasing habitat area and function in Bellingham Bay. They include:

- Provide clean sediments to support functions and species.
- Restore the 200+ acres of historical native eelgrass bed that was formerly located in inner Bellingham Bay to the extent possible.
- Restore/enhance degraded estuaries of Whatcom, Squalicum, Padden, and Little Squalicum
- Creeks to support salmonids, salmonid prey, and functions such as refuge, feeding, and rearing.
- Restore/enhance/protect viable habitat that provides connective corridors between estuary and open water habitats and between other habitats in the open water environment.
- Restore, protect, and enhance natural processes that create and maintain habitat.
- Endeavor for net gain in aquatic area and function.
- Preserve existing viable habitat that tends to either concentrate sensitive life history stages and/or supports large numbers of species of concern.
- Maximize habitat restoration/protection opportunities (including marine buffer) with remediation and/or shoreline projects.
- Restore lost habitat attributes by removing shoreline fills, shoreline landfills, removing remnant structures, and removing/replacing treated timber structures.

In addition, the Habitat Documentation Report identifies over 30 opportunities at specific locations within Bellingham Bay where one or more of these objectives could be met at a given location. These objectives and specific opportunities have been integrated into the Bellingham Bay Comprehensive Strategy through a habitat evaluation in a baywide context for a sustainable aquatic ecosystem and improved habitat functions. It is important to realize that the habitat restoration opportunities identified in the Habitat Documentation Report are suggested restoration concepts and are not intended to be inclusive of all possibilities in the bay. They represent possibilities that were identified through the development of the Bellingham Bay Comprehensive Strategy.

The Bellingham Bay Comprehensive Strategy is designed to integrate a variety of environmental issues into one coordinated approach, creating a clear context for decisions within the bay. The environmental issues include sediment cleanup, control of contaminant sources, habitat restoration, and land use activities that address commerce, navigation, and shoreline use. The Bellingham Bay Comprehensive Strategy is made up of a series of strategies that range from broad strategies, covering the entire Bellingham Bay study area and encompassing a long-term planning horizon, to specific near-term actions that are focused on taking actions at specific locations.

PURPOSE OF MITIGATION FRAMEWORK

The overriding purpose of this mitigation framework is to provide an ecosystem context for mitigation actions within Bellingham Bay that may be required as a result of implementing remedial actions future projects in the bay. It provides more management and mitigation guidance and flexibility than would be possible through individual project consideration. This mitigation framework also provides guidance to project proponents that helps direct them towards implementing actions that achieve the habitat goals of the Comprehensive Strategy, and provides incentives and disincentives for undertaking certain actions.

Several outcomes are anticipated through utilization of this mitigation framework by the regulatory agencies and the regulated community.

1. A no net loss in area and ecosystem function in Bellingham Bay is anticipated.

2. Project proponents will focus on the baywide habitat objectives and actions identified to achieve the protection and restoration of estuaries, restoration of eelgrass, the restoration of habitat connective corridors, and the maintenance of processes needed to sustain marine ecosystems.

3. Project proponents will be directed away from impacting critical resources and towards habitat opportunities that help achieve the habitat objectives of the Bellingham Bay Comprehensive Strategy.

4. Regulatory agencies and the tribes will have flexibility to use this mitigation framework to provide incentives and disincentives to project proponents.

5. The mitigation framework can be applied to the preferred near-term remedial action alternative at the discretion of the relevant regulatory agencies.

MITIGATION SEQUENCING

This mitigation framework recognizes federal, state, tribal, and local laws and policies, concerning mitigation planning. It acknowledges that mitigation includes the following sequential elements:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.

2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking steps to reduce impacts.

3. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.

4. Repairing, rehabilitation, or restoring the affected environment, where possible.

5. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action.

6. Monitoring the impact and taking appropriate corrective actions.

Elements 1, 2, and 3 represent the desired sequence of steps in mitigation planning and are not unique to Bellingham Bay. Actions taken to repair, replace or offset losses to habitat or functions should occur only after impacts have been fully avoided or minimized. Elements 4, 5, and 6 typically occur after a permit is issued and is based on the assumption that a project proponent has taken steps to avoid and minimize impacts.

Many agencies recognize that strict sequencing is not always possible. The above elements identify the sequencing process; however, agencies have flexibility in how sequencing is applied to projects.

COMPENSATORY MITIGATION

The overall goal of compensatory mitigation is to ensure that shoreline and in water developments within Bellingham Bay proceed in a manner that compensate for identifiable, unavoidable impacts in manner that achieves a no net loss and net gain in area and ecosystem function.

Users of this framework should refer to the Bellingham Bay Comprehensive Strategy EIS and the Bellingham Bay Demonstration Pilot Habitat Restoration Documentation Report for information on the recommended strategy and habitat restoration and protection opportunities for a given area in Bellingham Bay. These documents identify areas where project development activities may conflict with or compliment habitat restoration, and identify locations for habitat restoration to achieve the habitat goals of the comprehensive strategy. Some of these locations may be appropriate to use for compensatory mitigation.

Compensatory mitigation should be based on existing current resource conditions, sensitivity, and identified functions within Bellingham Bay at the time a project is proposed. Information on the existing habitat and current resource conditions and habitat restoration opportunities identified in the EIS, Data Compilation Report (PIE and Anchor 1999), sub-area strategies, and Habitat Documentation Report should be used as an overlay onto a given development scenario to identify adverse impacts. Depending on the project site, additional site specific information may be required. Elements of a development scenario such as dredging and shoreline fills or overwater structures, each of which can have specific types of impacts on resources, habitats, and physical processes, can be evaluated relative to known conditions and desired future habitat restoration outcomes. From this overlay, a project proponent can determine:

1. Adverse impacts from the project;

2. Whether the proposed project is consistent with habitat goals of the Comprehensive Strategy;
3. Reevaluate the proposed project to determine if there are ways to avoid and minimize impacts,
4. Incorporate a habitat mitigation action into the project; and
5. Locate and plan to achieve the habitat objectives as identified in the Comprehensive Strategy as a part of a proposed project.

In assessing adverse impacts to marine resources, functions, and physical process, a number of habitats, functions, and specific areas within Bellingham Bay receive priority consideration including:

- Target Species: salmonids, Dungeness crab, hardshell clams, surf smelt and sand lance, Pacific herring, flatfish, Ling cod, pandalid shrimp
- Threatened and Endangered Species (including species such as Chinook salmon)
- Species protected under the Marine Mammal Protection Act (MMPA) such as harbor seals
- Habitats or physical processes difficult to replace (i.e., eelgrass, sediment or gravel deposition, estuaries)
- Reproductive and rearing habitat (e.g., intertidal and shallow subtidal areas (+11 to –10 ft MLLW), spawning beaches, eelgrass)
- Habitats that provide multiple functions for a variety of species (e.g., areas that concentrate sensitive life history stages such as eelgrass beds)
- Estuaries within Bellingham Bay that support juvenile salmon during their transition from freshwater to marine waters

Assuming that all steps have been taken to avoid and minimize the impacts from a proposed project through the application of the mitigation sequencing steps described above, a project proponent would consider the following types of mitigation actions:

Creation: The establishment of marine habitat area and function in an area where they do not exist (e.g., convert upland to in-water habitat).

Restoration: The establishment of marine habitat area and/or function in areas where they historically existed, or where they currently exist in a disturbed condition (e.g., Squalicum Creek estuary, and eelgrass beds between Squalicum and Whatcom creeks).

Enhancement: To modify physical attributes of the aquatic environment that provides additional function (e.g., placement of suitable sized substrate for macroalgae or kelp attachment over a sandy bottom).

Preservation: To acquire habitat areas for the purpose of permanent protection. This form of compensatory mitigation is typically used in conjunction with creation, restoration, or enhancement.

Marine mitigation banking is an acceptable mitigation practice within Bellingham Bay, and is one mechanism that could be used to achieve habitat objectives in the bay. Mitigation banking is the creation, restoration, and enhancement, and may include the preservation of habitat undertaken by a project proponent to act as a bank of credits to compensate for habitat impacts from future development projects. Credits and debits are based on area or scientifically valid measures of habitat function acceptable to the mitigation banking review team that would be formed for the purposes of establishing a bank. The use of credits from a mitigation bank as a form of compensation can occur after the standard sequencing of mitigation (i.e., avoidance, minimization, etc.) has occurred. Habitat units may be traded or sold.

The Comprehensive Strategy and EIS provide a landscape context within which to plan and establish a mitigation bank. A bank can be established by public and/or private parties for the purposes of providing compensatory mitigation for development related impacts within Bellingham Bay. A mitigation bank instrument such as a Memorandum of Agreement would need to be developed and approved by federal, state, and local-regulatory agencies, the Tribes, and land owner. (Note: Several federal agencies have already issued guidance on the establishment and use of mitigation banks and Washington Department of Ecology is currently developing rules to establish and approve mitigation banks, including banks in marine waters).

COMPENSATORY MITIGATION REQUIREMENTS

Compensatory mitigation requirements for identifiable, unavoidable impacts take into account several elements including impact location, mitigation location, mitigation action, and mitigation timing all of which can influence the type and extent of mitigation that will be required.

In the absence of an agreed to functional equivalency model that can define the value "currency" of a particular habitat type, this framework starts with an assumption that the resource regulatory agencies reviewing a project site and mitigation action will value a habitat the same. The Habitat Subcommittee recognizes the following in developing this mitigation framework:

1. Efforts by NMFS and other trustee agencies to develop a Habitat Equivalency Model (HEM) for Commencement Bay that would be used to determine the type and how much mitigation may or may not be required in Bellingham Bay for development actions.

2. Another model or method may be developed in the future as a tool to help regulators and the regulated communities define mitigation requirements in Bellingham Bay.

Given the above information and in the absence of a functional equivalency model for Bellingham Bay, the Habitat Subcommittee used existing information, scientific knowledge, and best professional judgement to develop the following modifiers to use when determining the extent and type of compensatory mitigation required for a proposed development project. These modifiers address many of the elements that have been developed for the HEM including habitat type, timing of mitigation, the time necessary for a mitigation action to achieve function, and risk associated with the mitigation action. The Habitat Subcommittee could not come to an overall consensus on how to incorporate a modifier specifically targeted at net gain; however, this framework attempts to use the concept of net gain that would result in aggregate (i.e., within a sub area or the inner bay habitat gains) net gain over project by project net habitat gains.

MODIFIERS

In-Kind and Out-of-Kind Habitat Replacement (assumes sequencing has occurred)

In-kind habitat replacement is defined as providing the same functions as those that are impacted (e.g., estuary habitat for estuary habitat, spawning habitat for spawning habitat, eelgrass habitat for eelgrass habitat). Out of kind is defined as providing a different function within the same sub-area.

On-Site and Off-Site Habitat Replacement (assumes sequencing has occurred)

On-site is defined as providing habitat replacement within the same sub-area as where the impact occurs (e.g., surf smelt spawning habitat replacement within a sub-area where a project impacts surf smelt spawning habitat). Off-site habitat replacement is defined as replacing habitat functions in other sub-areas than where the impact occurs.

Off-site mitigation may occur outside of a sub-area in which the impact occurs but within Bellingham Bay based on the following limitations:

1. Project related impacts to documented herring spawning habitat will be mitigated in the same sub-area where impacts to herring spawning habitat occurs and within or adjacent to documented herring spawning habitat.

2. Project impacts to documented surf smelt spawning beaches will be mitigated in the same sub-area where impacts to surf smelt spawning habitat occurs and within or adjacent to documented surf smelt spawning habitat.

3. Project impacts to documented sand lance spawning beaches will be mitigated in the same sub-area where sand lance spawning habitat occurs and within or adjacent to documented surf smelt spawning habitat.

4. Project related impacts to creek estuaries will be mitigated within the same sub-area creek where the estuary occurs.

5. Nearshore (e.g., -10 ft MLLW shoreward) project related impacts that do not include documented herring, smelt, or sand lance spawning habitats, or creek estuaries may be mitigated in any sub-area with the exception of the West Bay or South Bay subareas unless the impact occurs in the adjacent sub-area, and with the exception of the Marine sub-area.

Mitigation Timing

This mitigation framework encourages reducing the risk of temporal losses of marine habitats and resources through implementation of mitigation in advance of project implementation. Mitigation requirements for actions that can be implemented in advance of a project impact and is agreed to in advance by the regulatory agencies will be less stringent then mitigation requirements for actions that are implemented concurrent with or after project impacts.

Mitigation Feasibility

Some types of habitat mitigation have a higher risk for achieving functional success than other habitat replacement actions. For example, in Washington State it appears to be more difficult to replace large eelgrass beds greater than 0.25 acre in size than smaller eelgrass beds and to replace herring spawning habitats. Habitat replacement actions that target other types of functions have less risk of failure. For example, modifying beach elevations and substrates in intertidal elevations for epibenthic and benthic production has been successfully demonstrated in several areas in Puget Sound over the past 10 years.

Mitigation Type

This modifier refers to whether the mitigation action creates, restores, enhances or preserves habitat (see description above).

Habitat Incentives and Disincentives

This modifier refers to whether an impact or action does or does not provide for the protection and restoration of estuaries, the restoration of eelgrass, the restoration of habitat connective corridors, or the overall health of the aquatic environment. Thus, for an action that involves sediment clean up and isolation or containment of contaminated sediments from the aquatic food chain, this mitigation framework provides the flexibility of applying a discount factor for sediment clean up when assessing the overall mitigation requirements for an action.

Net Gain

Application of this mitigation framework results in no net loss of aquatic habitat; however, the Habitat Subcommittee endeavored to incorporate the concept of net gain into the framework. Issues of what net gain means, agreement on what would constitute net gain, and how net gain should be applied (e.g., on a project by project basis or on a bay-wide basis) are unresolved. As a result, the Habitat Subcommittee has reserved a placeholder in this mitigation framework for future incorporation of net gain.

Mitigation Ratios

Ratios are typically used to determine how much additional mitigation area is required to compensate for lost area, function, and temporal losses, and takes into account potential risk from implementing a mitigation action. Ratios are essentially multipliers applied to the habitat area impacted and for Bellingham Bay are subject to the modifiers defined above. The ratios assigned to the modifiers below are intended to get to a goal of no net loss.

Modifier	Suggested Ratio
In kind	1:1
Out of kind	1.25:1
On site	1:1
Off site	1.25:1
Mitigation Timing	
In advance	
Vegetated	
Macroalgae	1:1
Eelgrass (<0.25 acre)	1:1
Eelgrass (>0.25 acre)	1.25:1
Unvegetated	
Intertidal/Shallow Subtidal	1:1
Subtidal	1:1
Concurrent	
Vegetated	
Macroalgae	1.25:1
Eelgrass (<0.25 acre)	1.25:1
Eelgrass (>0.25 acre)	1.5:1
Unvegetated	
Intertidal/Shallow Subtidal	1.25:1
Subtidal	1.25:1
Post-Project Impact	
Vegetated	
Macroalgae	1.5:1
Eelgrass (<0.25 acre)	1.5:1
Eelgrass (>0.25 acre)	1.75:1
Unvegetated	
Intertidal/Shallow Subtidal	1.5:1
Subtidal	1.5:1
Feasibility	
Demonstrated	1:1
Not demonstrated	1:1 (if done in advance) 1.5:1 (if can not be done in advance)
Mitigation Type	
Restore	1:1
Create	1:1
Enhance	1.5:1
Protect	Used in conjunction w/ other mitigation type
Habitat Incentives/Disincentives	
Incentive – mitigation type and location in priority habitat area.	Discount 0.25
Incentive – impact area avoids a priority habitat	Discount 0.25
Disincentive – impact type and location in priority habitat	Increase 0.5
Incentive – Benefit of sediment clean up	Discount 0.5

Special Note

USFWS comments indicate ratios for concurrent and post-project seem low. Supports higher ratio for eelgrass (>0.25 acre) above others in each group; does not support discounting for when impact area avoids a priority habitat (requires clarification); and thinks discount for incentive of cleaning up contaminated sediments is high. No other Pilot Team member provided alternative mitigation ratios for consideration.

APPLICATION OF MITIGATION RATIOS – THEORETICAL EXAMPLES

Theoretical Example 1: A development project impacts 0.20 acre of eelgrass. Mitigation proposed is in-kind, on-site, is conducted in advance of project impacts, has been successfully demonstrated, is creation, and the impact is in an area identified as being a priority for habitat.

Modifier	Suggested Ratio
In kind	1:1
On site	1:1
Mitigation Timing	
In advance	
Vegetated	
Eelgrass (<0.25 acre)	1:1
Feasibility	
Demonstrated	1:1
Mitigation Type	
Create	1:1
Habitat Incentives/Disincentives	
Incentive – mitigation type and location in priority habitat area.	Discount 0.25
Disincentive – impact type and location in priority habitat	Increase 0.5
Mitigation Required	1:25:1

Under this scenario, 0.25 acre of eelgrass mitigation would be required.

Theoretical Example 2: A development proposal will dredge 0.5 acre of intertidal habitat, 0.5 acre of eelgrass, and will clean up 5 acres of contaminated sediment. Mitigation proposed is in-kind, off-site, is not considered to be demonstrated (for eelgrass), and would occur in advance. The impact is considered a priority habitat area and the mitigation site is in a location identified as a priority habitat area.

Modifier	Suggested Ratio
In kind	1:1
Off site	1.25:1
Mitigation Timing	
In advance	
Vegetated	
Eelgrass (>0.25 acre)	1.25:1
Unvegetated	
Intertidal/Shallow Subtidal	1:1
Feasibility	
Demonstrated	1:1
Not demonstrated	1:1 (if done in advance)
Mitigation Type	
Restore	1:1
Habitat Incentives/Disincentives	
Incentive – mitigation type and location in priority habitat area.	Discount 0.25
Disincentive – impact type and location in priority habitat	Increase 0.5
Incentive – Benefit of sediment clean up	Discount 0.5
Mitigation Required	1.25 to 1

Under this scenario, 0.63 acre of eelgrass and 0.63 acre of mudflat would be replaced.

MITIGATION MONITORING

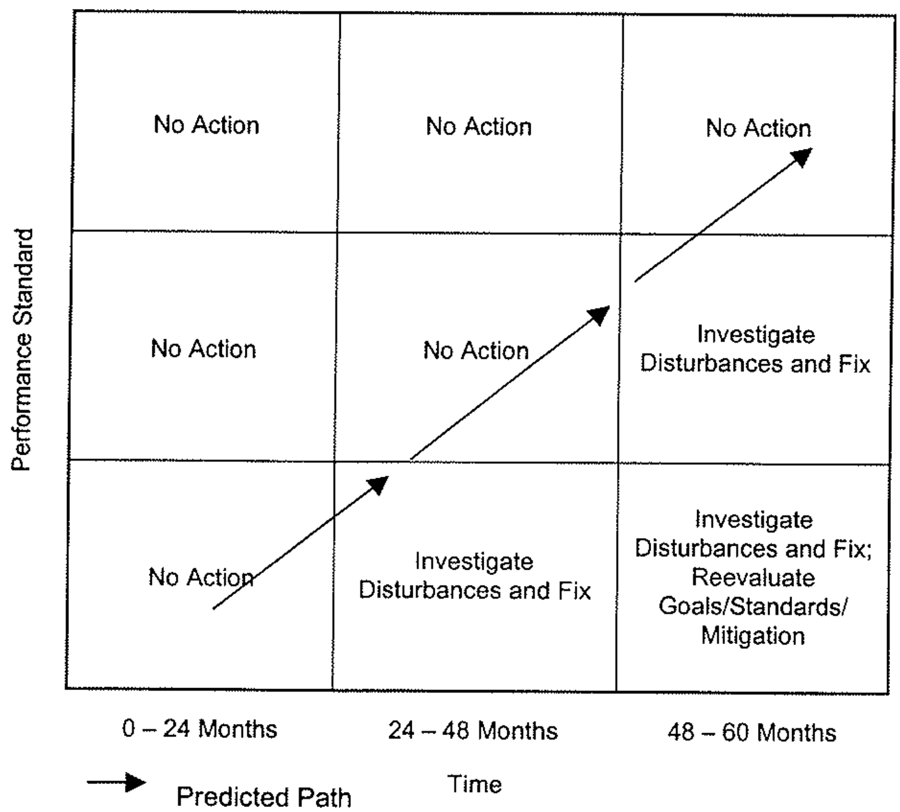
Monitoring of a mitigation action will typically be for a period of three to five years or until the performance criteria for the compensatory action have been met. Monitoring of an appropriate control site may also be necessary to account for natural variations or changes in habitat of habitat functions.

Attributes that will need to be monitored to determine the success of mitigation action will depend on the habitat type and functions for which the compensatory action has been required. Examples of attributes that may need to be monitored are identified below. Other attributes may also need to be monitored and will be specific to the mitigation action. Some habitat attributes (epibenthic invertebrate production) may be determined to be successful based on monitoring and study documentation from mitigation projects with similar habitat characteristics.

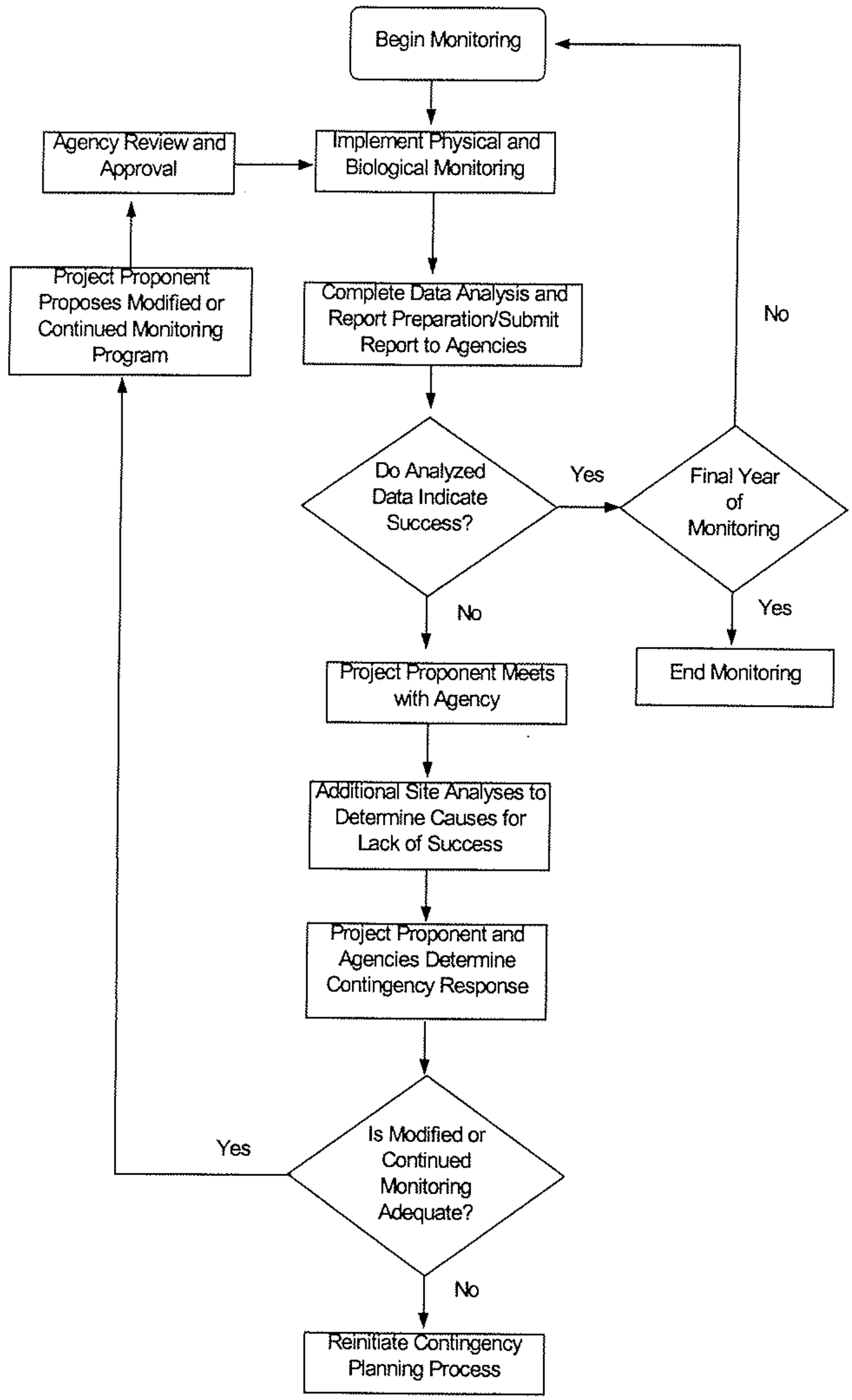
Surf smelt/sand lance spawning habitat:	Substrate composition/evidence of eggs/tidal elevation.
Juvenile salmonids	Epibenthos/presence of fish
Eelgrass	Area/density
Macroalgae	Area/percent cover/density
Mudflat/sandflat	Area/tidal elevation/substrate composition
Hardshell clams	Elevation/substrate type/clam density/species composition
Herring spawn	Herring spawn
Dungeness crab	Presence/density/seasonal utilization
Epibenthos	Elevation/substrate type/density
Benthos	Elevation/density
Waterfowl	Habitat use/species/counts

MITIGATION ADAPTIVE MANAGEMENT AND CONTINGENCIES

With many mitigation projects, all contingencies cannot be anticipated. An adaptive management and contingency plan that is flexible enough so that modifications can be made if portions of the mitigation design to do not produce the desired results will need to be developed. The following figures are examples of an adaptive management matrix and contingency planning process that could be adapted for mitigation projects.



Generic Adaptive Management Model



Contingency Planning Process

MITIGATION PLAN CONTENT

Mitigation plans will need to include the following elements:

- Statement of Impacts and Mitigation Need
- Mitigation Goals and Objectives
- Mitigation Evaluation Performance Standards
- Mitigation Design and Schedule
- Mitigation Monitoring Plan and Schedule
- Mitigation Maintenance Plan
- Adaptive Management and Contingency Plan

Special Note

It should be noted that although the Tribes have helped develop this framework and agree to its application for habitat impacts, the Tribes may require additional mitigation or agreements with developers for other issues such as Treaty Rights.

WAC 332-30-107 (5) provides an opportunity for DNR (for lands not covered under Port Management Agreements [PMAs]) to supplement the SMP planning process with management plans to meet the responsibilities for state-owned aquatic lands. Plans developed and implemented will involve aquatic lands, resources, and activities requiring intensive management, special protection, or conflict resolution and will be developed when these needs are not provided for in the SMP. WAC 332-30-107 (6) indicates that the SMP and additional planning processes described in subsection (5) are the preferred means for identifying and mitigating adverse impacts on resources and uses of state-wide value. In the absence of such planning directed at these values and uses, DNR (for aquatic lands not covered under PMAs) will mitigate unacceptable adverse impacts on a case-by-case basis by the following methods:

- Avoidance
- Look at alternatives that result in insignificant adverse impacts
- Replace, preferably on-site, impacted resources and uses
- Payment of loss value

REFERENCES

PIE and Anchor. 1999. Bellingham Bay Demonstration Pilot Project – Final Compilation and Analysis. Prepared for the Bellingham Bay Demonstration Pilot Work Group by Pacific International Engineering and Anchor Environmental. March 17, 1999.

APPENDIX D
RELATIONSHIP TO OTHER PLANS, POLICIES, AND PROGRAMS

APPENDIX D

BELLINGHAM BAY COMPREHENSIVE STRATEGY

RELATIONSHIP TO OTHER PLANS, POLICIES, AND PROGRAMS

RELATIONSHIP TO OTHER PLANS, POLICIES, AND PROGRAMS

RELATIONSHIP TO EXISTING PLANS, POLICIES, AND CONTROLS

The first section of Appendix D describes the major laws and policies that apply to the Bellingham Bay Comprehensive Strategy. Table D-1 at the conclusion of this section summarizes the relationship of the Comprehensive Strategy to these laws and guidelines

Federal Laws/Policies

Federal Clean Water Acts (CWA), Washington Water Pollution Control Act (WPCA)

33 USC 1251 *et seq.*; 40 CFR 116-117, 122-123, 230-233, plus 33 CFR 320

RCW 90.48 *et seq.*

The federal and state clean water acts generally regulate pollution in navigable waters and waters of the state. These regulations include a prohibition of any un-permitted discharges of hazardous substances, including oil, into water. The acts also establish regulations for permitting point source and non-point source discharges. Section 404 of the Clean Water Act requires permits from the Corps of Engineers for discharges of dredged or fill material into waters of the United States, including wetlands. Section 404(b)(1) requires a comprehensive evaluation to determine a project's compliance with the guidelines. These guidelines require a rigorous alternatives analysis and do not permit discharge of dredged or fill material if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem, so long as that alternative does not have other significant adverse environmental impacts. The 404 permit program is co-administered by the Corps and EPA. Ecology has the authority, through Section 401 of the Clean Water Act, to issue a water quality certification that a proposed discharge will comply with the applicable provisions of state and federal water quality laws. If a Section 404 permit precedes State 401 Certification, the 404 permit is provisioned so that a proponent cannot proceed until receiving Certification. When the State denies Certification, the Corps must deny the corresponding Section 404 permit.

Coastal Zone Management Act (CZM)

16 USC 1451 *et seq.*; 15 CFR 923

Under the Coastal Zone Management Act, any applicant for a federal permit for activity in a state's coastal zone must certify that the proposed activity will comply with the state's coastal zone management program, administered by Ecology.

National Environmental Policy Act

42 WSC 4321 *et seq.*; 40 CFR 1500 *et seq.*

The National Environmental Policy Act (NEPA) is intended to help the federal lead agency in making decisions based on an understanding of the environmental consequences of their actions, and to help the federal government take actions that protect, restore, and enhance the environment. Any federal project, or a private or state project requiring a permit from a federal agency, must meet the NEPA requirements. If a proposal is determined by a federal lead agency to have a "probable significant adverse impact," the agency must prepare an environmental impact statement (EIS). The EIS is a public disclosure document that analyzes alternative means of attaining the applicant's goal for the proposal, and analyzes the environmental consequences of each alternative and the potential options for mitigating the impacts.

National Pollution Discharge Elimination System (NPDES), State Waste Discharge Program

33 USC 1432; 40 CFR 21-125; RCW 90.48.260; WAC 173-216

The NPDES and State Waste Discharge programs implement permit systems applicable to industrial and commercial operations that discharge to groundwater, surface water, or municipal sewerage systems. In Washington, EPA has delegated the responsibility of administering the NPDES program to Ecology.

Rivers and Harbors Act

33 USC 403; 33 CFR 322

The Rivers and Harbors Act prohibits the creation of any obstruction to navigation in any waters of the United States. Section 10 of the Rivers and Harbors Act requires a permit from the Corps for any structures or work in navigable waters of the United States.

Endangered Species Act (ESA)

16 USC 1531 *et seq.*; 50 CFR 17; RCW 77.12 *et seq.*

ESA provides a process for determining whether a species should be "listed" as threatened or endangered, and it prohibits the "taking" of designated species unless the take is considered "incidental." The Act also imposes a requirement for agencies to consult with federal resource agencies regarding actions that may adversely affect listed species and a duty to ensure that federal action is not likely to jeopardize a listed species or adversely modify critical habitat. NMFS and USFWS are the primary responsible agencies.

Fish and Wildlife Coordination Act

16 USC 661 *et seq.*

The Fish and Wildlife Coordination Act requires federal agencies to consult with fish and wildlife agencies on activities that could affect fish and wildlife.

Federal and State Clean Air Acts

42 USC 7401 *et seq.*; 40 CFR 50; RCW 70.94; WAC 173-400, 403

The Clean Air Act regulates emissions of hazardous pollutants to the air; controls for emissions are implemented through federal, state and local programs. The Clean Air Act is implemented in the state of Washington through the Washington Clean Air Act (RCW 70.94). The regional air pollution contract authorities, activated under the Washington Clean Air Act, have jurisdiction over regulation and control of the emission of air contaminants and the requirements of state and federal Clean Air Acts in their districts. In 1993, EPA issued a rule that requires federal agencies to demonstrate that projects they are involved with are in compliance with federally-approved Clean Air Act state implementation plans.

Federal and State Wetlands Protection Executive Orders

E.O. 11990; E.O. 90-04

Executive Order 11990 and the state Executive Order (90-04) requires that agencies minimize the destruction or loss of wetlands, avoid undertaking or providing assistance for construction in wetlands unless no practicable alternative exists, and achieve no net loss of function or acreage. The federal agencies implement these considerations through existing federal requirements, such as the NEPA and SEPA and Section 404 and 401 permits.

Environmental Justice

E.O. 12989

Environmental justice concerns arise from environmental impacts on minority populations, low-income populations, and Indian Tribes. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", requires that each federal agency research, collect data and analyze the environmental effects (which may be cumulative and multiple) of federal actions on low-income populations, minority populations, and Indian Tribes. Environmental and human health impacts must be evaluated to ensure that any federal actions do not have disproportionately high or adverse effects on the populations of concern.

Environmental justice issues are addressed during the NEPA process. Agencies are required to work to ensure effective public participation, community and Tribal representation, and information access. EIS preparation must consider both impacts on the natural or physical environment and interrelated social, cultural, and economic impacts on low-income and minority populations or Indian Tribes. Mitigation measures may include steps to avoid, reduce, or eliminate impacts.

National Historic Preservation Act

36 CFR 800

When proponents seek a federal approval, the responsible federal agency must consult with the State Historic Preservation Officer and the federal Advisory Council on Historic Preservation to determine if the project would affect cultural or historic sites on or eligible for the National Register of Historic Places.

Floodplain Management Executive Order

E.O. 11988

Federal agencies are required by this Executive Order to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, and avoid adverse effect and incompatible development in floodplains.

Indian Treaty Rights

Treaty of Point Elliott (12 Stat. 927), Treaty of Medicine Creek (10 Stat. 1132)

In 1854 and 1855, Native American Tribes, in what is now the state of Washington, signed treaties with the United States government conveying their right, title, and interest in and to the lands occupied by them. These treaties and subsequent court decisions protect Indian tribes' property and water rights, including their rights to fish and co-manage fishery resources in Puget Sound.

State Laws/Policies

State Environmental Policy Act (SEPA)

RCW 43.21C; WAC. 197-11

The State Environmental Policy Act is intended to ensure that state and local government officials consider environmental values when making decisions. The SEPA process begins when someone submits a permit application to an agency, or an agency proposes to take some official action such as implementing a plan or policy. Prior to taking any action on a proposal, agencies must follow specific procedures to ensure that appropriate consideration has been given to the environment. The severity of potential environmental impacts associated with a project will determine whether an EIS is required. Like NEPA, the EIS is a public disclosure document that analyzes alternative means of attaining the applicant's goal for the proposal, and analyzes the environmental consequences of each alternative and the potential options for mitigating the impacts.

Shorelines Management Act (SMA)

RCW 90.58; WAC 173-14

The Shoreline Management Act (SMA) establishes a comprehensive land and water use planning and regulatory program for the management of state waters and their adjacent shorelines and wetlands. Any person proposing to build a substantial development in the state's shorelines must obtain a Substantial Development Permit under the Shoreline Management Act. Ecology and local governments divide responsibility for the implementation of this program. Local governments are primarily responsible for the day-to-day management, and Ecology is responsible for oversight and technical support. The SMA establishes a framework for local governments to develop local shoreline master programs that contain their specific regulations and permit requirements. With some exceptions (e.g. single family home), a Substantial Development Permit must be obtained for any proposed project valued over $2,500 within 200 feet of the shoreline, or any project that interferes with public use of the water. This permit may impose restrictions to protect the shoreline and aquatic habitat.

Growth Management Act (GMA)

RCW 36.70A; RCW 36.70.A.150; RCW. 36.70.A.200

The Growth Management Act requires counties and cities to classify and designate natural resource lands and critical areas (which include "waters of the state"). Additionally, the state's fastest growing cities and counties must adopt comprehensive plans and development regulations regarding land use within their jurisdiction. In particular, each plan must identify land within the jurisdiction that is useful for public purposes, and include a process for siting essential public facilities, including solid waste handling facilities.

State Aquatic Lands Management Laws

Washington State Constitution Articles XV, XVII, XXVII

RCW 79.90 through 79.96; WAC 332-30

The management of state-owned aquatic lands is intended to provide a balance between:

- Encouraging direct public use and access
- Fostering water-dependent uses
- Ensuring environmental protection
- Utilizing renewable resources

DNR has the authority to lease state-owned aquatic lands. It has the responsibility to consider the natural values of the land before it leases it and the authority to withhold land from leasing if it determines it has significant natural values.

Puget Sound Water Quality Management Plan (Puget Sound Plan)

RCW 90.70

The Puget Sound Water Quality Management Plan is a state plan first developed in 1987 which state and local agencies follow to protect water quality and habitat in Puget Sound. In March 1988, the Administrator of EPA formally designated Puget Sound as an estuary of national significance under Section 320 of the Clean Water Act. Section 320 requires developing a comprehensive conservation and management plan for any designated estuary, and the Puget Sound Plan was the first federally approved plan for such an estuary. Federal agencies must act consistently with the Puget Sound Plan. The Puget Sound Plan identifies specific goals related to many state agency programs such as stormwater, contaminated sediment, fish and wildlife, and wetlands.

Washington Water Quality Standards

WAC 173-200; 173-201A; 173-220 to -255

Ecology has promulgated state-wide water quality standards under the Washington Water Pollution Control Act. Under these standards, all surface waters of the state were first divided into classes (AA, A, B, C, and Lake) based on the beneficial uses of that water body. Then water quality criteria were defined for different types of pollutants and the characteristic uses for each class of surface water.

Dredged Material Management Program Guidelines

RCW 79.90; WAC 332-30

The Dredged Material Management Program (DMMP), formerly Puget Sound Dredged Disposal Analysis (PSDDA) is a federal/state program that classifies and governs what dredged material can be put back into open water. The collaborative program provides a consistent and predictable approach to disposing of dredged sediments in unconfined open water areas and monitoring the condition of the open water disposal sites. DNR approval is required for material disposal on state-owned aquatic lands.

State Sediment Standards (SMS)

WAC 173-204; WAC 173-204-120

The Sediment Management Standards were established by Ecology to help reduce and ultimately eliminate both the adverse effects on biological resources and significant health threats to humans that could result from surface sediment contamination. The regulations accomplish this by establishing standards for the quality of surface sediments, applying these standards as the basis for management and reduction of pollutant discharges, and providing a management and decision process for the cleanup of contaminated sediments. The SMS derives its authority from MTCA and the CWA.

Model Toxics Control Act (MTCA)

RCW 70.105D; WAC 173-340

MTCA is the Washington state equivalent of the federal Superfund law. The MTCA regulations establish administrative processes and standards to identify, investigate, and clean up facilities where hazardous substances are located. These regulations are intended to provide a workable process to accomplish effective and expeditious cleanups in a manner that protects human health and the environment.

State Solid Waste Management Act

RCW 70.95; WAC 173-304; WAC 173-351

The Washington State Solid Waste Management Act and its regulations, among them the Minimum Functional Standards (WAC 173-304), establish minimum state-wide standards for solid waste handling facilities, including municipal landfills (WAC 173-351). These regulations include location, collection and transportation, and landfilling standards, and general facility requirements and closure/post-closure requirements.

State Hydraulics Act

RCW 75.20; WAC 220-110

The Hydraulics Act establishes regulations for the construction of any hydraulic project or the performance of any work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh water of the state. The Hydraulics Act also creates a program requiring permits for any activities that could adversely affect fisheries and water resources. The Act is administered by WDFW.

Table D-1. Compliance with Major Laws and Policies

Laws/Policies/Guidelines	Basis of Compliance
Federal	
Clean Water Act	Implementation of any of the Near-Term Alternatives would require an approval under Section 404 of the CWA.
CZM	As part of the Section 404 approval, compliance with CZM would also be required.
NEPA	The Corps would be responsible for NEPA compliance as part of its review under Section 404 of the CWA.
NPDES	Applies to the Comprehensive Strategy in two ways. First, it is an important regulatory component of source control. Second, any upland construction activities of 5 acres or more would be required to obtain an approval.
Rivers and Harbors	Approval under Section 10 would be required for implementation of any of the Near-Term Remedial Action Alternatives, since each involves work in navigable waters.
ESA	A draft Biological Assessment analyzing the Near-Term Remedial Action Alternative that is ultimately selected will be prepared in the future as part of permitting.
Fish and Wildlife Coordination	Fish and wildlife agencies are members of the Pilot Team that developed the Comprehensive Strategy. The requirements of this act have been met.
Clean Air Act	Construction activities that expose contaminated sediments to the air would require testing for potential volatility and approval from the Northwest Air Pollution Authority under NWAPA regulation 530.1.
Executive Order 11990 – Protection of Wetlands	The CWA (Section 404) and local critical area ordinances would regulate wetlands that would be affected by any of the upland disposal locations.
Environmental Justice	None of the proposed alternatives would disproportionately adversely affect minority populations, or low-income populations. Alternatives 2A,2C, and the Preferred Remedial Action Altremative would limit accessibility to Usual and Accustomed Fishing Areas for the Lummi Nation and the Nooksack Tribe.
National Historic Preservation	As part of the Section 404 review, the Corps would consult with the appropriate agencies for Section 106 consultation.

Table D-1. Compliance with Major Laws and Policies (continued)

Executive Order 11988 – Floodplain Management	The CWA (Section 404) and local critical area ordinances would regulate floodplains that would be affected by any of the upland disposal locations.
Indian Treaty Rights	
	Rights of Native Americans have been considered in the decision-making process in a number of ways. First and most importantly, representatives of the Lummi Nation and Nooksack Tribe have been active Pilot Team members. Second, the tribes Usual and Accustomed Fishing Areas have been included in all discussions of fish and shellfish use (see Section 3.2). Last, spiritual and cultural uses of the bay have been accounted for (see Section 3.2 and 3.6). However, it is recognized that discussions will need to continue with the tribes to determine potential mitigation requirements for tribal U&A impacts resulting from implementation of the selected Near-Term Remedial Action Alternative.
State	
SEPA	This document is an environmental impact statement prepared under the SEPA guidelines. It is the SEPA compliance document for both the Bellingham Bay Comprehensive Strategy and the cleanup of the Whatcom Waterway and Cornwall Avenue Landfill sites. It can also serve as a "base" upon which SEPA review for future actions in the bay can be conducted.
SMA	The development of the Comprehensive Strategy has been closely coordinated with the City's update of the Shoreline Master Plan. Implementation of any Near-Term Alternative would require a Shoreline Substantial Development Permit.
GMA	Any use of public facilities would have to comply with the local jurisdictions comprehensive plan prepared under GMA.
Aquatic Lands Management	DNR will evaluate any proposed use of state-owned aquatic land to determine compliance. The Near-Term Remedial Action Alternatives have been developed to provide a balance among competing uses of aquatic lands.
Puget Sound Plan	The Comprehensive Strategy complies with the Puget Sound Management Plan, particularly Strategy 1, 2, 3, 4 and Elements S-1, S-4, S-7, and S-8. The Demonstration Pilot is called out specifically in the 1997-99 Puget Sound Water Quality Work Plan as a Key Action.
Water Quality Standards	Compliance with water quality standards would be regulated under Section 401 approval by Ecology.
DMMP	Use of a DMMP disposal site for sediment would require the approval of the DMMP agencies. This need is not currently envisioned.
SMS	The Near-Term Remedial Action Alternatives have been designed to meet the sediment quality standards outlined in the SMS.
MTCA	The Whatcom Waterway cleanup study is being performed under an Agreed Order between Ecology and G-P under MTCA. The Cornwall Avenue Landfill, Harris Avenue Shipyard and several smaller sites are also being investigated under MTCA as part of Ecology's Voluntary Cleanup Program.
Solid Waste	Upland disposal locations that receive sediments that may pose a threat to human health or the environment would need to meet state Minimum Functional Standards.
Hydraulic Code	Sediment capping, dredging, and disposal actions typically require a HPA under this state regulation.

CUMULATIVE IMPACTS WITH PROJECTS AND PROGRAMS

In terms of its relationship with other projects and programs, the Comprehensive Strategy can be assessed at two levels – its relationship with other state-wide initiatives to address similar issues, and its relationship to other specific proposed actions in Bellingham Bay.

Other State-Wide Initiatives

Puget Sound Confined Disposal Site Study

Like the Pilot, the Puget Sound Confined Disposal Site Study is an outcome of work done by the CSMP. The goal of the study is to find environmentally sound solutions to the lack of confined disposal capacity for contaminated sediments in Puget Sound. A draft programmatic NEPA/SEPA EIS has been issued by the Corps, Ecology and DNR (1999) that evaluates the environmental impacts of developing one or more multi-user disposal sites (MUDS) in Puget Sound. At a programmatic level, this EIS evaluates the potential impacts of different disposal alternatives (such as nearshore confined, confined aquatic, and upland landfill). If developing a MUDS site in Puget Sound is determined to be feasible, a specific embayment in Puget Sound will be chosen for a site-specific EIS. This site-specific EIS will then evaluate the potential impacts of a specific disposal alternative at a specific site. The current schedule has work on a site-specific EIS beginning in late 2000.

Similar to the MUDS site-specific EIS, one of the purposes of the Comprehensive Strategy is to evaluate how to deal with all contaminated sediments in Bellingham Bay. The potential affect of the Puget Sound Confined Disposal Site Study in relation to the this project is that upon completion of the Comprehensive Strategy, there would not be a need to undertake any further evaluation of Bellingham Bay as a potential site for a MUDS facility since comprehensive decisions regarding disposal of contaminated sediments would already have taken place. However, it is likely that the study would use the work done by the Pilot for comparison purposes.

In response to public comments on the Draft MUDS EIS, the scope of the Puget Sound Confined Disposal Study was expanded to include a study of the feasibility and practicability of developing a multi-user treatment program or facility to help manage contaminated sediments in Puget Sound. The treatment feasibility study was initiated in spring, 2000. The results, of the study, expected in draft form in late 2000 or early 2001, may recommend one of three possible courses of action:

1. Pursue a public or private management option to construct and implement the most promising treatment technology(ies);
2. Issue a Request for Proposals for a private/public partnership to construct and implement the most promising treatment technology(ies); or
3. Implement a pilot study of the most promising treatment technology(ies), and use that information to determine the feasibility of a future public management or private/public partnership option.

Depending on the outcome of the CSMP study and subsequent implementation steps, there may develop an opportunity to treat some of the sediments removed from Bellingham Bay, perhaps as early as within the next 3 years. Subject to timely demonstrations of the practicability of treatment and issuance of the necessary permits for such off-site actions, treatment could be included as a part of the Near-Term Remedial Action Alternative ultimately selected.

Specific Plans, Programs and Proposed Actions in Bellingham Bay

While this document does not constitute the SEPA review of the following projects, they have been included in the Bellingham Bay Demonstration Pilot Land Use Documentation Report and the land use impact analysis presented in Section 4 of the draft EIS.

- Squalicum Master Plan
- Thomas Glenn Spit development
- Central Waterfront Redevelopment Project
- Whatcom Creek Waterfront Action Program
- Bellingham Shipping Terminal Master Plan
- Padden Creek dredging
- Wastewater Treatment Plant expansion

COORDINATION

Coordination has been the hallmark of the development of the Comprehensive Strategy by the Pilot Team. Rather than the typical site-by-site approach to environmental issues, the appropriate agencies, government entities, tribes, and businesses have been working cooperatively for several years to develop a baywide plan.

The Pilot Team has typically met twice a month for 4 hours. Meeting locations alternate between Bellingham and Everett (to accommodate those traveling from Olympia and Seattle). The meetings are facilitated by a consultant and are working sessions where ideas are discussed and views exchanged. Subcommittees of the Pilot Team form as needed to research specific issues (e.g., the Habitat Subcommittee). The subcommittees present findings and make recommendations to the Pilot Team. The Pilot Team seeks to find consensus recommendations.

Individual Pilot Team members are responsible for keeping their respective entities briefed. The State agencies have periodically conducted joint briefings of their directors.

APPENDIX E
SUPPORTING HABITAT EVALUATION DATA

APPENDIX E

SUPPORTING HABITAT EVALUATION DATA

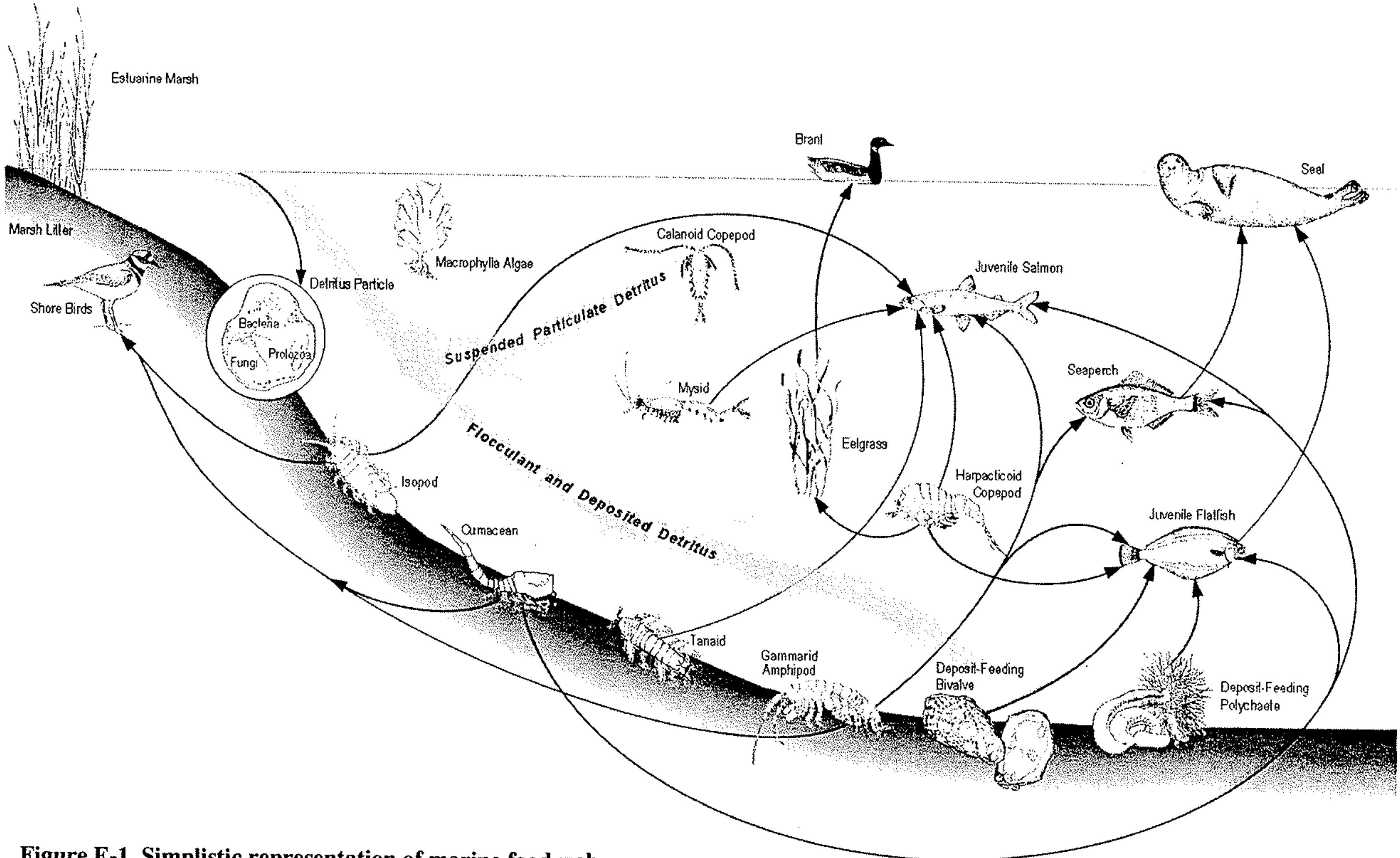


Figure E-1. Simplistic representation of marine food web.

Table E-1. Alternative 2A: Summary of Habitat Modifications

Contaminated Sediment Cleanup Areas	Site Unit #	Alternative 2A Actions (including CAD Disposal)	Existing Habitat in Remedial Area in acres within depth strata (datum = feet MLLW)						Net Change in Habitat Area in acres within depth strata (datum = feet MLLW)					
			+11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10	+11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10
Mid/Outer Whatcom Waterway: 30' Federal Channel	1	Dredge & Cap to Auth. Nav. Depths (Dredge volume = 210,000 CY)	0.0	0.4	0.5	1.2	2.1	20	0.0	0.0	0.5	0.0	-1.2	0.7
Head of Whatcom Waterway: 30' Federal Channel	2	Dredge & Cap with CAD Disposal (Dredge volume = 80,000 CY)	0.0	0.0	0.0	0.0	0.1	7.0	0.0	0.0	0.0	0.0	0.1	-0.1
Head of Whatcom Waterway: 18' Federal Channel	3	Partial Dredge Near New West Fisheries (Dredge volume = 20,000 CY)	0.0	0.0	0.0	0.0	0.5	2.8	0.0	0.0	0.0	0.0	0.0	0.0
G-P Log Pond	4	CAD (Disposal site restores mudflat areas)	0.2	0.3	0.6	0.8	2.7	3.4	0.0	0.0	0.0	4.4	-2.2	-2.2
G-P Aerated Stabilization Basin	5	Cap (w/ armor/habitat layers) (Dredge volume = 10,000 CY)	0.0	0.4	1.0	2.4	11	31	0.0	0.0	0.7	2.4	3.4	-6.5
Port Log Rafting Area	6	Partial Dredge for Chem Dock / Cap (Dredge volume = 40,000 CY)	0.0	0.2	0.6	2.1	2.8	19	0.0	0.22740	0.68384	0.23712	-0.8	-0.4
Starr Rock	7	Cap and CAD (Disposal site restores eelgrass meadows)	0.0	0.0	0.0	4.0	5.2	83	0.0	0.0	0.0	29.3	-4.3	-25
I & J Waterway	8	No Action (pending PSDDA analysis)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cornwall Avenue Landfill	9	Cap and CAD (part of Starr Rock CAD)	0.0	1.0	1.4	1.4	2.4	7.4	0.0	0.7	-0.2	2.9	-0.6	-2.7
Harris Avenue Shipyard	10	Partial Dredge with CAD Disposal & Cap (Dredge volume = 20,000 CY)	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CLEANUP AREAS*			**0**	**3**	**4**	**12**	**28**	**181**	**0**	**1**	**2**	**39**	**-6**	**-36**

*All values in this table have been rounded to one significant figure. Totals are based on non-rounded values. When summing values across an elevation range corresponding to a tidal zone (I.e. summing the values from all of the intertidal ranges: -11 to +8, +8 to +4, +4 to 0, and 0 to -4) the total for that zone is based on two decimal points (eg. to the hundredths of an acre). As a result the total for an elevation presented in the summary tables in the text of the EIS may be ± 0.1 acre of the summed values.

Table E-2. Alternative 2B: Summary of Habitat Modifications

Contaminated Sediment Cleanup Areas	Site Unit #	Alternative 2B In-Water Actions	Existing Habitat in Remedial Area in acres within depth strata (datum = feet MLLW) +11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10	Net Change in Habitat Area in acres within depth strata (datum = feet MLLW) +11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10
Mid/Outer Whatcom Waterway: 30' Federal Channel	1	Dredge & Cap to Auth. Nav. Depths (Dredge volume = 210,000 CY)	0.0	0.4	0.5	1.2	2.1	20	0.0	0.0	0.5	0.0	-1.2	0.7
Head of Whatcom Waterway: 30' Federal Channel	2	Dredge & Cap with Upland Disposal (Dredge volume = 80,000 CY)	0.0	0.0	0.0	0.0	0.1	7.0	0.0	0.0	0.0	0.0	0.1	-0.1
Head of Whatcom Waterway: 18' Federal Channel	3	Partial Dredge Near New West Fisheries (Dredge volume = 20,000 CY)	0.0	0.0	0.0	0.0	0.5	2.8	0.0	0.0	0.0	0.0	0.0	0.0
G-P Log Pond	4	Cap (w/ armor/habitat layers) (Cap partially restores mudflats)	0.2	0.3	0.6	0.8	2.7	3.4	0.2	0.1	0.2	0.4	1.3	-2.2
G-P Aerated Stabilization Basin	5	Cap (w/ armor/habitat layers) (Dredge volume = 10,000 CY)	0.0	0.4	1.0	2.4	11	31	0.0	0.0	0.7	2.4	3.4	-6.5
Port Log Rafting Area	6	Partial Dredge for Chem Dock / Cap (Dredge volume = 40,000 CY)	0.0	0.2	0.6	2.1	2.8	19	0.0	0.2	0.7	0.2	-0.8	-0.4
Starr Rock	7	1 to 3-foot Cap	0.0	0.0	0.0	0.0	2.9	42	0.0	0.0	0.0	0.0	0.2	-0.2
I & J Waterway	8	No Action (pending PSDDA analysis)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cornwall Avenue Landfill	9	1 to 3-foot Cap	0.0	1.2	1.4	1.4	2.4	7.4	0.2	0.4	0.0	0.0	0.4	-1.1
Harris Avenue Shipyard	10	Partial Dredge with Upland Disposal & Cap (Dredge volume = 20,000 CY)	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CLEANUP AREAS*			**0**	**3**	**4**	**8**	**26**	**140**	**0**	**1**	**2**	**3**	**3**	**-10**

*All values in this table have been rounded to one significant figure. Totals are based on non-rounded values. When summing values across an elevation range corresponding to a tidal zone (I.e. summing the values from all of the intertidal ranges: -11 to +8, +8 to +4, +4 to 0, and 0 to -4) the total for that zone is based on two decimal points (eg. to the hundredths of an acre). As a result the total for an elevation presented in the summary tables in the text of the EIS may be ± 0.1 acre of the summed values.

Table E-3. Alternative 2C: Summary of Habitat Modifications

Contaminated Sediment Cleanup Areas	Site Unit #	Alternative 2C In-Water Actions (including CAD Disposal)	Existing Habitat in Remedial Area in acres within depth strata (datum = feet MLLW) +11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10	Net Change in Habitat Area in acres within depth strata (datum = feet MLLW) +11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10
Mid/Outer Whatcom Waterway: 30' Federal Channel	1	Dredge with CAD Disposal (Dredge volume = 570,000 CY)	0.0	0.0	0.0	0.1	1.3	44	0.0	0.0	0.0	0.0	-1.0	0.9
Head of Whatcom Waterway: 30' Federal Channel	2	Dredge & Cap with CAD Disposal (Dredge volume = 80,000 CY)	0.0	0.0	0.0	0.0	0.1	6.9	0.0	0.0	0.0	0.0	0.1	-0.1
Head of Whatcom Waterway: 18' Federal Channel	3	Dredge Existing Channel (excl. Citizens Dock) (Dredge volume = 40,000 CY)	0.0	0.0	0.0	0.0	0.5	2.9	0.0	0.0	0.0	0.0	-0.2	0.2
G-P Log Pond	4	CAD (Diposal site restores mudflat areas)	0.2	0.3	0.6	0.8	2.7	3.4	0.0	0.0	0.0	4.4	-2.2	-2.2
G-P Aerated Stabilization Basin	5	Cap (w/ armor/habitat layers) (Dredge volume = 10,000 CY)	0.0	0.4	1.0	2.4	11	31	0.0	0.0	0.7	2.4	3.4	-6.4
Port Log Rafting Area	6	Partial Dredge for Chem Dock / Cap (Dredge volume = 60,000 CY)	0.0	0.2	0.6	2.1	2.8	19	0.0	0.2	0.3	0.7	-0.8	-0.3
Starr Rock	7	Cap and CAD (Diposal site restores eelgrass meadows)	0.0	0.0	0.0	4.0	5.3	84	0.0	0.0	0.0	50.2	-4.4	-45.7
I & J Waterway	8	No Action (pending PSDDA analysis)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cornwall Avenue Landfill	9	Cap and CAD (part of Starr Rock CAD)	0.0	1.2	1.4	1.4	2.4	7.4	0.0	0.7	-0.2	3.1	-0.6	-2.9
Harris Avenue Shipyard	10	(Dredge volume = 20,000 CY)	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CLEANUP AREAS*			**0**	**2**	**4**	**11**	**27**	**206**	**0**	**1**	**1**	**61**	**-6**	**-57**

251

*All values in this table have been rounded to one significant figure. Totals are based on non-rounded values. When summing values across an elevation range corresponding to a tidal zone (I.e. summing the values from all of the intertidal ranges: -11 to +8, +8 to +4, +4 to 0, and 0 to -4) the total for that zone is based on two decimal points (eg. to the hundredths of an acre). As a result the total for an elevation presented in the summary tables in the text of the EIS may be ± 0.1 acre of the summed values.

Table E-4. Alternative 2D: Summary of Habitat Modifications

Contaminated Sediment Cleanup Areas	Site Unit #	Alternative 2D In-Water Actions	Existing Habitat in Remedial Area in acres within depth strata (datum = feet MLLW)						Net Change in Habitat Area in acres within depth strata (datum = feet MLLW)					
			+11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10	+11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10
Mid/Outer Whatcom Waterway: 30' Federal Channel	1	Dredge with Upland Disposal (Dredge volume = 570,000 CY)	0.0	0.0	0.0	0.1	1.3	44	0.0	0.0	0.0	0.0	-1.0	1.0
Head of Whatcom Waterway: 30' Federal Channel	2	Dredge & Cap with Upland Disposal (Dredge volume = 80,000 CY)	0.0	0.0	0.0	0.0	0.1	6.9	0.0	0.0	0.0	0.0	0.1	-0.1
Head of Whatcom Waterway: 18' Federal Channel	3	Dredge Existing Channel (excl. Citizens Dock) (Dredge volume = 40,000 CY)	0.0	0.0	0.0	0.0	0.5	2.9	0.0	0.0	0.0	0.0	-0.2	0.2
G-P Log Pond	4	Cap (w/ armor/habitat layers) (Cap partially restores mudflats)	0.2	0.3	0.6	0.8	2.7	3.4	0.2	0.1	0.2	0.4	1.3	-2.2
G-P Aerated Stabilization Basin	5	Partial Dredge of Mercury BSL Areas & Cap (Dredge volume = 200,000 CY)	0.0	0.4	1.0	2.4	11	31	0.0	0.0	0.0	-0.7	-9.0	9.7
Port Log Rafting Area	6	Partial Dredge for Chem Dock / Cap (Dredge volume = 60,000 CY)	0.0	0.2	0.6	2.1	2.8	19	0.0	0.2	0.3	0.7	-0.8	-0.4
Starr Rock	7	Partial Dredge of Mercury BSL Areas & Cap (Dredge volume = 130,000 CY)	0.0	0.0	0.0	0.0	2.9	42	0.0	0.0	0.0	0.0	0.2	-0.2
I & J Waterway	8	No Action (pending PSDDA analysis)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cornwall Avenue Landfill	9	1 to 3-foot Cap	0.0	1.2	1.4	1.4	2.4	7.4	0.2	0.4	0.0	0.0	0.4	-1.1
Harris Avenue Shipyard	10	Partial Dredge with Upland Disposal & Cap (Dredge volume = 20,000 CY)	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CLEANUP AREAS*			**0**	**2**	**4**	**7**	**25**	**163**	**0**	**1**	**0**	**0**	**-9**	**7**
								202						

*All values in this table have been rounded to one significant figure. Totals are based on non-rounded values. When summing values across an elevation range corresponding to a tidal zone (I.e. summing the values from all of the intertidal ranges: -11 to +8, +8 to +4, +4 to 0, and 0 to -4) the total for that zone is based on two decimal points (eg. to the hundredths of an acre). As a result the total for an elevation presented in the summary tables in the text of the EIS may be ± 0.1 acre of the summed values.

Table E-5. Alternative 2E: Summary of Habitat Modifications

Contaminated Sediment Cleanup Areas	Site Unit #	Alternative 2E In-Water Actions	Existing Habitat in Remedial Area in acres within depth strata (datum = feet MLLW)						Net Change in Habitat Area in acres within depth strata (datum = feet MLLW)					
			+11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10	+11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10
Mid/Outer Whatcom Waterway: 30' Federal Channel	1	Dredge with Upland Disposal (Dredge volume = 570,000 CY)	0.0	0.0	0.0	0.0	0.0	38	0.0	0.0	0.0	0.0	-1.0	1.0
Head of Whatcom Waterway: 30' Federal Channel	2	Dredge & Cap with Upland Disposal (Dredge volume = 80,000 CY)	0.0	0.0	0.0	0.0	0.1	6.9	0.0	0.0	0.0	0.0	-0.1	0.1
Head of Whatcom Waterway: 18' Federal Channel	3	Dredge Entire Channel (incl. Citizens Dock) (Dredge volume = 90,000 CY)	0.0	0.0	0.1	0.7	1.3	3.5	0.0	0.0	-0.1	-0.5	-0.7	1.3
G-P Log Pond	4	Cap (w/ armor/habitat layers) (Cap partially restores mudflats)	0.2	0.3	0.6	0.8	2.7	3.4	0.2	0.1	0.2	0.4	1.3	-2.2
G-P Aerated Stabilization Basin	5	Dredge with Upland Disposal (Dredge volume = 470,000 CY)	0.0	0.4	1.0	2.4	12	34	0.0	-0.4	-1.0	-0.9	-8.7	11
Port Log Rafting Area	6	Dredge with Upland Disposal (Dredge volume = 230,000 CY)	0.0	0.1	0.4	2.0	2.7	25	0.0	-0.1	-0.4	-1.3	0.4	1.4
Starr Rock	7	Dredge with Upland Disposal (Dredge volume = 530,000 CY)	0.0	0.0	0.0	0.0	2.9	42	0.0	0.0	0.0	0.0	-0.8	0.8
I & J Waterway	8	No Action	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cornwall Avenue Landfill	9	Dredge with Upland Disposal (Dredge volume = 400,000 CY)	0.0	1.2	1.4	1.4	2.4	7.4	0.7	0.9	0.9	0.9	1.4	2.3
Harris Avenue Shipyard	10	Dredge with Upland Disposal (Dredge volume = 50,000 CY)	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CLEANUP AREAS*			**0**	**2**	**4**	**7**	**25**	**168**	**1**	**1**	**0**	**-1**	**-8**	**16**

*All values in this table have been rounded to one significant figure. Totals are based on non-rounded values. When summing values across an elevation range corresponding to a tidal zone (I.e. summing the values from all of the intertidal ranges: -11 to +8, +8 to +4, +4 to 0, and 0 to -4) the total for that zone is based on two decimal points (eg. to the hundredths of an acre). As a result the total for an elevation presented in the summary tables in the text of the EIS may be ± 0.1 acre of the summed values.

…dial Area in acres …um = feet MLLW)			Net Change in Habitat Area in acres within depth strata (datum = feet MLLW)					
…-4	-4 to -10	Below -10	+11 to +8	+8 to +4	+4 to 0	0 to -4	-4 to -10	Below -10
.1	1.3	44	0.0	0.0	0.0	0.0	-1.0	0.9
.0	0.1	6.9	0.0	0.0	0.0	0.0	0.1	-0.1
.0	0.5	3.8	0.0	0.0	0.0	0.0	-0.2	0.2
.8	2.7	3.4	0.0	1.0	1.0	2.0	-2.5	-1.5
.4	11	31	0.0	0.1	0.8	2.8	3.6	-7.3
.1	2.8	19	0.0	0.6	1.0	1.6	1.2	-4.4
0.0	2.9	42	0.0	0.0	0.0	0.0	0.2	-0.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.4	2.4	23	1.0	6.7	8.3	8.9	4.2	-29
0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
7	**25**	**180**	**1**	**8**	**11**	**15**	**6**	**-41**

219

…alues across an elevation range corresponding to a tidal zone (i.e. summing the …oints (eg. to the hundredths of an acre). As a result the total for an elevation

Table E-7 Bellingham Bay General Ecology of Sand/Mud/Gravel/Rock Substrata Relative to Tidal Elevation Strata

Sand/Mud/Gravel	+13 to +11 ft MLLW (Intertidal)	+11 to +8 ft MLLW (Intertidal)	+8 to +4 ft MLLW (Intertidal)	+4 to 0 ft MLLW (Intertidal)	0 to −4 ft MLLW (Intertidal)	−4 to −10 ft MLLW (Shallow Subtidal)	−10 to −20 ft MLLW (Subtidal)	Below −20 ft MLLW (Subtidal)
Marine Vegetation								
Supralittoral fringe (marine buffer such as rooted trees, shrubs, and grasses)	Can be abundant in this tidal range, depending upon shoreline land uses. When present, rooted vegetation provides buffer functions such as primary production, source of detritus, source of downed woody debris, filters stormwater runoff, insect production as prey for fish, habitat for terrestrial species such as birds and small mammals.	Generally sparse in this tidal range – may occur at upper end of tidal range. When present, rooted vegetation provides buffer functions such as primary production, source of detritus, source of downed woody debris, filters stormwater runoff, insect production as prey for fish, habitat for terrestrial species such as birds and small mammals.	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.
Rooted Saltmarsh species (rushes, sedges, etc.)	Absent in this tidal range.	Abundant in this tidal range. Provides primary production, source of detritus, produce prey species for juvenile fish, water quality benefits	Generally sparse in this tidal range.	Typically absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.
Macroalgae (seaweeds and kelps)	Absent in this tidal range.	Sparse in this tidal range due to desiccation. Species composition limited by appropriate attachment sites. Predominately green algae such as *Ulva*. Kelps are absent. Provide primary production, source of detritus, source of epiphyte attachment and limited prey production for juvenile fish.	Low abundance in this tidal range due to desiccation. Species composition limited by appropriate attachment sites. Predominately green algae such as *Ulva*. Kelps are absent. Provide primary production, source of detritus, source of epiphyte attachment and moderate prey production for juvenile fish.	Moderately abundant in this tidal range. Species composition limited by appropriate attachment sites. Predominately green and red algae. Kelps are absent. Provide primary production, source of detritus, source of epiphyte attachment and abundant prey production for juvenile fish.	Abundant in this tidal range. Predominately green and red algae. Kelps occur at lower elevations. Species composition limited by appropriate attachment sites. Provide primary production, source of detritus, source of epiphyte attachment and abundant prey production for juvenile fish.	Abundant in this tidal range. Predominately green, red, and brown algae. Kelps are abundant. Species composition is limited by appropriate attachment sites. Provide primary production, source of detritus, source of epiphyte attachment and moderate prey production for juvenile fish.	Abundant in this tidal range to where they become light limited (about −20 ft MLLW). Species composition limited by appropriate attachment sites. Provide primary production, source of detritus, source of epiphyte attachment and limited prey production for juvenile fish.	Sparse to absent in this tidal range. −20 ft MLLW is about the lowest elevation for macroalgaes and kelp.
Eelgrass (*Zostera marina*)	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	May be present starting at about 0 ft. MLLW. Provides primary production; source of detritus; surface area for epiphyte attachment and source of abundant prey for juvenile fish, particularly salmon; provides refuge for juvenile Dungeness crab, salmonids, and other fish species; provides wave surge protection.	Can be abundant in this tidal range. Provides primary production; source of detritus; surface area for epiphyte attachment and source of abundant prey for juvenile fish, particularly salmon; provides refuge for juvenile Dungeness crab, salmonids, and other fish species; provides wave surge protection.	Can be abundant in this tidal range. Provides primary production; source of detritus; surface area for epiphyte attachment and source of moderate prey for juvenile fish, particularly salmon; provides refuge for juvenile Dungeness crab, salmonids, and other fish species; provides wave surge protection.	Can be abundant in this tidal range but does not typically occur deeper than about −20 ft MLLW in Puget Sound and about −16 ft MLLW in Bellingham Bay. Provides primary production; source of detritus; surface area for epiphyte attachment and source of limited prey for juvenile fish, particularly salmon; provides refuge for juvenile Dungeness crab, salmonids, and other fish species; provides wave surge protection.	Sparse to absent in this tidal range. −20 ft MLLW is about the deepest depth in which eelgrass occurs in Puget Sound.
Epiphyte Community (microalgaes and diatoms)	Absent in this tidal range.	Epiphyte community sparse in this tidal range due to desiccation. Provides primary production, source of detritus, sparse food base for epibenthic invertebrate community, which is primary prey source for juvenile marine fish.	Epiphyte community moderate in this tidal range. Somewhat limited due to desiccation. Provides primary production, source of detritus, moderate food base for epibenthic invertebrate community, which is primary prey source for juvenile marine fish.	Epiphyte community abundant in this tidal range. Less limited due to desiccation. Provides primary production, source of detritus, abundant food base for epibenthic invertebrate community, which is primary prey source for juvenile marine fish.	Epiphyte community abundant in this tidal range. Provides primary production, source of detritus, abundant food base for epibenthic invertebrate community, which is primary prey source for juvenile marine fish.	Epiphyte community moderate in this tidal range. Provides primary production, source of detritus, moderate food base for epibenthic invertebrate community, which is primary prey source for juvenile marine fish.	Epiphyte community sparse in this tidal range. Closely associated with the seaward limit of eelgrass and macroalgae. Provides primary production, source of detritus, limited food base for epibenthic invertebrate community, which is primary prey source for juvenile marine fish.	Sparse to absent in this tidal range. Closely associated with the seaward limit of eelgrass and macroalgae.
Epibenthic Organisms (isopods, copepods, amphipods)	Absent in this tidal range.	Sparse in this tidal range due to lack of epiphyte community. These organisms are the primary prey food for juvenile marine fish.	Moderate in this tidal range due to lack of epiphyte community. These organisms are the primary prey food for juvenile marine fish.	Abundant in this tidal range. More abundant starting at about +2 ft MLLW. These organisms are the primary prey food for juvenile marine fish.	Abundant in this tidal range. These organisms are the primary prey food for juvenile marine fish.	Moderate in this tidal range. These organisms are the primary prey food for juvenile marine fish.	Sparse in this tidal range due to lack of epiphyte community. These organisms are the primary prey food for juvenile marine fish.	Sparse to absent in this tidal range due to lack of epiphyte community.

Table E-7. Bellingham Bay General Ecology of Sand/Mud/Gravel/Rock Substrata Relative to Tidal Elevation Strata (Continued)

	+13 to +11 ft MLLW (Intertidal)	+11 to +8 ft MLLW (Intertidal)	+8 to +4 ft MLLW (Intertidal)	+4 to 0 ft MLLW (Intertidal)	0 to -4 ft MLLW (Intertidal)	-4 to -10 ft MLLW (Shallow Subtidal)	-10 to -20 ft MLLW (Subtidal)	Below -20 ft MLLW (Subtidal)
Benthic Organisms								
Polychaete worms	Absent in this tidal range.	Absent in this tidal range.	Sparse in this tidal range. These organisms are a food resource to flat fish.	Moderately abundant in this tidal range. These organisms are a food resource to flat fish.	Abundant in this tidal range. These organisms are a food resource to flat fish.	Abundant in this tidal range. These organisms are a food resource to flat fish.	Abundant in this tidal range. These organisms are a food resource to flat fish.	Abundant in this tidal range.
Recreationally and commercially important clam species (manila, butter, native little neck, geoduck, horse)	Absent in this tidal range.	Absent in this tidal range.	Limited manila clam species present in this tidal range (upper distribution to about +7 ft MLLW). Other species generally absent in this tidal range. Siphons are food resource for fish species, and clams provide food for mollusks and sea stars.	Moderate to abundant in this tidal range for native littleneck, manila, butter clam, and cockle. Horse clam and geoduck are found at an upper range of about +1 ft MLLW but are relatively sparse. Siphons are food resource for fish species, and clams provide food for crabs and sea stars.	Abundant in this tidal range. Geoduck, horse clam, butter clam are abundant. Cockles and littleneck clams are moderate. Siphons are food resource for fish species, and clams provide food for crabs and sea stars.	Abundant in this tidal range. Geoduck and horse clams are abundant. Cockles and butter clams are moderate. Siphons are food resource for fish species, and clams provide food for crabs and sea stars.	Abundant in this tidal range. Geoduck and horse clams are abundant. Other clam species are moderate to sparse. Siphons are food resource for fish species, and clams provide food for crabs and sea stars.	Geoduck and horse clams are abundant in this tidal range. Other clams are generally absent in this tidal range.
Pandalid Shrimp								
Juvenile shrimp	Absent in this tidal range.	Absent in this tidal range	Generally sparse in this tidal range except when it is inundated. Shrimp are a food resource for marine fish depending on preference and behavior of predators.	Moderate in this tidal range. Shrimp are a food resource for marine fish depending on preference and behavior of predators.	Abundant in this tidal range. Shrimp are a food resource for marine fish depending on preference and behavior of predators.	Abundant in this tidal range. Shrimp are a food resource for marine fish depending on preference and behavior of predators.	Less abundant in the deeper subtidal waters below about -20 ft MLLW. Shrimp are a food resource for marine fish depending on preference and behavior of predators.	Sparse to absent below about -20 ft MLLW.
Adult shrimp	Absent in this tidal range.	Absent in this tidal range	Generally absent in this tidal range accept when it is inundated. Shrimp are a food resource for marine fish, and may be harvested recreationally or commercially.	Sparse in this tidal range. Shrimp are a food resource for marine fish, and may be harvested recreationally or commercially.	Moderate to abundant in this tidal range. Shrimp are a food resource for marine fish, and may be harvested recreationally or commercially.	Abundant in this tidal range. Shrimp are a food resource for marine fish, and may be harvested recreationally or commercially.	Abundant in this tidal range. Shrimp are a food resource for marine fish, and may be harvested recreationally or commercially.	Abundant in this tidal range to about -60 to -70 ft MLLW.
Dungeness crab								
Juvenile crab	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	Sparse in this tidal range. Juveniles are a source of food for marine fish.	Moderate to abundant in this tidal range. Juveniles are a source of food for marine fish. Juveniles use vegetated shallows for refuge and rearing.	Abundant in this tidal range. Juveniles are a source of food for marine fish. Juveniles use vegetated shallows for refuge and rearing.	Less abundant in deeper subtidal range (about -20 ft MLLW). Juveniles are a source of food for marine fish. Juveniles use vegetated shallows for refuge and rearing.	Sparse to absent below about -20 ft MLLW.
Adult crab	Absent in this tidal range.	Absent in this tidal range.	Absent in this tidal range.	Sparse in this tidal range. Adults feed on clams and other organisms and are a food source for larger marine fish. Adults use this tidal range for mating and to brood eggs. Adults use vegetated areas for reproduction and refuge. Adults also use unconsolidated sands to burrow during reproduction and egg incubation.	Moderate to abundant in this tidal range. Adults feed on clams and other organisms and are a food source for larger marine fish. Adults use this tidal range for mating and to brood eggs. Adults use vegetated areas for reproduction and refuge. Adults also use unconsolidated sands to burrow during reproduction and egg incubation.	Abundant in this tidal range. Adults feed on clams and other organisms and are a food source for larger marine fish. Adults use this tidal range for mating and to brood eggs. Adults use vegetated areas for reproduction and refuge. Adults also use unconsolidated sands to burrow during reproduction and egg incubation.	Abundant in this tidal range. Adults feed on clams and other organisms and are a food source for larger marine fish. Adults use this tidal range for mating and to brood eggs. Adults use vegetated areas for reproduction and refuge. Adults also use unconsolidated sands to burrow during reproduction and egg incubation.	Can be abundant below -20 ft MLLW.

Table E-7. Bellingham Bay General Ecology of Sand/Mud/Gravel/Rock Substrata Relative to Tidal Elevation Strata (Continued)

	+13 to +11 ft MLLW (Intertidal)	+11 to +8 ft MLLW (Intertidal)	+8 to +4 ft MLLW (Intertidal)	+4 to 0 ft MLLW (Intertidal)	0 to –4 ft MLLW (Intertidal)	–4 to –10 ft MLLW (Shallow Subtidal)	–10 to –20 ft MLLW (Subtidal)	Below –20 ft MLLW (Subtidal)
Salmonids								
Juvenile salmonids (Chinook, Coho, Chum, Sockeye, Cutthroat Trout, Dolly Varden)	Absent in this tidal range.	Low abundance expected when this range is inundated. Juveniles are food resource for other marine fish. This tidal range is used for some refuge, feeding, and migration when inundated.	Abundant when inundated. Juveniles are food resource for other marine fish. This tidal range is used for rearing, feeding, migration and refuge when inundated.	Abundant in this tidal range. Juveniles are food resource for other marine fish. This tidal range is used for rearing, feeding, migration, and refuge.	Abundant in this tidal range. Juveniles are food resource for other marine fish. This tidal range is used for rearing, feeding, migration, and refuge.	Abundant in this tidal range. Juveniles are food resource for other marine fish. This tidal range is used for rearing, feeding, migration, and refuge.	Fry are sparse; larger smolts and sub-adults abundant in this tidal range. Juveniles are food resource for other marine fish. This tidal range is less important to smaller salmonids for rearing, feeding, and migration. Larger sized smolts and sub-adults use this tidal range for feeding, rearing, and migration. Sub-adults use deeper water as well for feeding and migration.	Fry are generally absent in this tidal range. Larger smolts and subadults moderate to abundant in this tidal range. Larger sized smolts and sub-adults use this tidal range for feeding, rearing, and migration. Sub-adults use deeper water as well for feeding and migration.
Adult salmonids (Chinook, Coho, Chum, Sockeye, Cutthroat Trout, Dolly Varden)	Absent in this tidal range.	Low abundance expected when this range is inundated. Adults are food resource to larger marine fish.	Low abundance expected when this range is inundated. Adults are food resource to larger marine fish.	Moderately abundant. Adults are food resource to larger marine fish. Adults use this tidal range for rearing and migration.	Abundant in this tidal range. Adults are food resource to larger marine fish. Adults use this tidal range for rearing and migration.	Abundant in this tidal range. Adults are food resource to larger marine fish. Adults use this tidal range for rearing and migration.	Abundant in this tidal range. Adults are food resource to larger marine fish. Adults use this tidal range for rearing and migration.	Abundant in this tidal range.
Marine Fish Species								
Juvenile marine fish (Flat Fish, Rock Fish, Ling Cod, Sandlance, Surf Smelt, Herring, Pollock)	Absent in this tidal range.	Sparse in this tidal range. Surf smelt and sandlance eggs abundant during egg development.	Abundant when inundated. Surf smelt and sandlance eggs moderate during egg development. Flat fish and ling cod use this tidal range for rearing.	Abundant in this tidal range. Herring eggs are abundant in certain areas where there is marine vegetation for spawning. Flat fish, ling cod, and rock fish use this tidal range for rearing.	Abundant in this tidal range. Herring eggs are abundant in certain areas where there is marine vegetation for spawning. Flat fish, ling cod, and rock fish use this tidal range for rearing.	Abundant in this tidal range. Herring eggs are abundant in certain areas where there is marine vegetation for spawning. Flat fish, ling cod, and rock fish use this tidal range for rearing.	Less abundant in deeper subtidal range (below about –20 ft MLLW). Herring eggs are abundant in certain areas where there is marine vegetation for spawning. This tidal range is less important to juvenile flat fish, ling cod, and rock fish for rearing.	Generally sparse to absent in this tidal range.
Adult marine fish (Flat Fish, Rock Fish, Ling Cod, Sandlance, Surf Smelt, Herring, Pollock)	Absent in this tidal range.	Sparse in this tidal range. Sandlance and surf smelt abundant in this tidal range during spawning.	Low abundance in this tidal range. Surf smelt and sandlance abundant in this tidal range during spawning.	Moderate in this tidal range. Ling cod use this tidal range for laying eggs.	Abundant in this tidal range. Ling cod use this tidal range for laying eggs. Herring use this elevation zone for reproduction.	Abundant in this tidal range. Flat fish, ling cod, rock fish and herring use this tidal range for reproduction and spawning.	Abundant in this tidal range. Flat fish, ling cod, rock fish and herring use this tidal range for reproduction and spawning.	Abundant in this tidal range.

Table E-7. Bellingham Bay General Ecology of Sand/Mud/Gravel/Rock Substrata Relative to Tidal Elevation Strata (Continued)

Rocky Shoreline	+13 to +11 ft MLLW (Intertidal)	+11 to +8 ft MLLW (Intertidal)	+8 to +4 ft MLLW (Intertidal)	+4 to 0 ft MLLW (Intertidal)	0 to –4 ft MLLW (Intertidal)	–4 to –10 ft MLLW (Shallow Subtidal)	–10 to –20 ft MLLW (Subtidal)	Below –20 ft MLLW (Subtidal)
	Differences in the ecology for a rocky shoreline in this tidal range are: • Marine buffer vegetation is typically less abundant or may be absent.	Differences in the ecology for a rocky shoreline in this tidal range are: • Rooted vegetation is generally absent. • Brown algae such as *Fucus* are common because it can avoid desiccation. • Juvenile crab and shrimp may occur in crevices that remain wetted at lower tides. • Surf smelt and sand lance do not use rocky shores for spawning because of the larger sized substrate.	Differences in the ecology for a rocky shoreline in this tidal range are: • Rooted vegetation is generally absent. • Brown algae such as *Fucus* are common because it can avoid desiccation. • Tend to see more barnacles and mussels attached to rock substrate. • Benthic organisms are less abundant. • Surf smelt and sand lance do not use rocky shores for spawning because of the larger sized substrate. • Juvenile crab and shrimp may occur in crevices that remain wetted at lower tides. • Attached kelp and other vegetation provides rearing for ling cod and rock fish.	Differences in the ecology for a rocky shoreline in this tidal range are: • More macroalgae is present because the substrate provides an appropriate attachment site. • Eelgrass is generally absent. • Epibenthic organisms are generally less abundant. • Benthic organisms are less abundant. • Juvenile crab and shrimp may occur in crevices that remain wetted at lower tides. • Attached kelp and other vegetation provides rearing for ling cod and rock fish. • Species such as ling cod and rock fish would be relatively moderately abundant.	Differences in the ecology for a rocky shoreline in this tidal range are: • More macroalgae is present because the substrate provides an appropriate attachment site. • Eelgrass is generally absent. • Epibenthic organisms are generally less abundant. • Benthic organisms are less abundant. • Crustacea and fish use rocky substrate as reef community. • Attached kelp and other vegetation provides rearing for ling cod and rock fish, and spawning for herring. • Species such as ling cod and rock fish are more abundant.	Differences in the ecology for a rocky shoreline in this tidal range are: • More macroalgae is present because the substrate provides an appropriate attachment site. Kelps are abundant. • Eelgrass is generally absent. • Epibenthic organisms are generally less abundant. • Benthic organisms are less abundant. • Crustacea and fish use rocky substrate as reef community. • Attached kelp and other vegetation provides rearing for ling cod and rock fish, and spawning for herring. Rock fish would likely be more abundant and use this tidal range for spawning. • Species such as ling cod and rock fish are more abundant.	Differences in the ecology for a rocky shoreline in this tidal range are: • More macroalgae is present because the substrate provides an appropriate attachment site. Kelps are abundant. • Eelgrass is generally absent. • Benthic organisms are less abundant. • Crustacea and fish use rocky substrate as reef community. • Attached kelp and other vegetation provides rearing for ling cod and rock fish, and spawning for herring. Adult rock fish would be more abundant in this tidal range and would use rocky areas for spawning. • Species such as ling cod and rock fish are more abundant.	Differences in the ecology for a rocky shoreline in this tidal range are: • Macroalgaes and kelp are light limited. • Eelgrass is generally absent. • Benthic organisms are less abundant. • Crustacea and fish use rocky substrate as reef community. • Attached kelp less abundant, and where it occurs, it provides rearing for ling cod and rock fish. Adult ling cod and rock fish are more abundant.

Sources:

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Simenstad, C.A., C. Tanner, R. Thom and L.L Conquest. 1991. Estuarine Habitat Assessment Protocol. EPA 910/9-91-037, U.S. Environmental Protection Agency, Seattle, Washington.

Washington Department of Fisheries, 1992. Salmon, Marine Fish, and Shellfish Resources and Associated Fisheries in Washington's Coastal and Inland Marine Waters. Technical Report 79. Olympia, Washington.

Wenger, B. 1999. Washington Department of Ecology. Personal Communication. August 11, 1999 e-mail.

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Table E-8. Habitat Strategy Objectives	2A	2B	2C	2D	2E	Preferred Remedial Action Alternative	Modifiers
Provide Clean Sediments (Area of contaminated sediments cleaned up by a given remedy)	24 acres - complete removal 117 acres – engineered cap 29 acres – capped with a CAD 37 acres - retained natural cap	24 acres - complete removal 146 acres – engineered cap 37 acres - retained natural cap	59 acres - complete removal 108 acres – engineered cap 30 acres – capped with a CAD 10 acres - retained natural cap	97 acres - complete removal 100 acres – engineered cap 10 acres - retained natural cap	183 acres – complete removal 15 acres – engineered cap 9 acres - retained natural cap	60 acres – complete removal 108-119 acres – engineered cap 0-11 acres – capped with a CAD 9 acres – retained natural cap	MTCA assigns similar long-term effectiveness/permanence to all complete removal alternatives (i.e. upland disposal is same as CAD). However, complete removal alternatives are more permanent than engineered caps, which in turn are more permanent than retained natural caps. Monitoring and corrective action commitments are required for all alternatives.
Restore/Enhance Whatcom, Squalicum and Padden Creek Estuaries	About 8 acres	About 6 acres	About 6 acres	About 7 acres	About 4 acres	About 6 acres	Whatcom Creek estuary, assuming no impact from gasoline spill and source control is effective.
Restore/Enhance/Protect Intertidal and Shallow Subtidal Connective Corridors	35.5 acres (through conversion of subtidal to intertidal/shallow subtidal)	9.4 acres (through conversion of subtidal to intertidal/shallow subtidal)	57 acres (through conversion of subtidal to intertidal/shallow subtidal)	–7 acres of intertidal/shallow subtidal to subtidal 1.4 acres (through conversion of subtidal to intertidal/shallow subtidal)	5 acres of new intertidal/shallow subtidal in-water habitat; –5 acres of intertidal/shallow subtidal converted to subtidal 1.5 acres (through conversion of subtidal to intertidal/shallow subtidal)	41 acres (through conversion of subtidal to intertidal/shallow subtidal)	
Restore/Enhance/Protect Natural Processes Creating and Maintaining Habitat	Location where wave energy reaches the existing shore is further seaward. Final design would need to assess coastal process effects on habitat.	High natural sedimentation rate in the bay may result in progradation in intertidal/shallow subtidal habitat.	Location where wave energy reaches the existing shore is further seaward. Final design would need to assess coastal process effects on habitat.	High natural sedimentation rate in the bay may result in progradation in intertidal/shallow subtidal habitat.	Tidal indundation restored. High natural sedimentation rate in the bay may result in progradation in intertidal/shallow subtidal habitat.	Location where wave energy reaches the existing shore is further seaward. Final design would need to assess coastal process effects on habitat.	Natural processes include sedimentation, sediment transport, currents, tidal elevations and such that are important in sustaining certain habitat types.
Net Gain in Aquatic Area and/or Function	No net gain in area. About 35.5 acre net gain in intertidal/shallow subtidal function.	No net gain in area. 9.4 acre net gain in intertidal/shallow subtidal function.	No net gain in area. 57 acre net gain in intertidal/shallow subtidal function.	No net gain in area. About 5.6 acre net loss in intertidal/shallow subtidal function.	7 acre net gain in area. Additional area could be realized if a riparian zone were added to the final design. About 3.5 acre net loss in intertidal/shallow subtidal function.	No net gain in area. 41 acre net gain in intertidal/ shallow subtidal function.	Net gain in function is related to intertidal and shallow subtidal habitat. The assumption is that any area converted to intertidal/shallow subtidal will be protected in perpetuity.
Protect and Preserve Existing Habitat That Supports Sensitive Life Stages or Concentrations of Species of Concern	2.1 acres in head of Whatcom Waterway, assuming no impacts from the gasoline spill and source control is effective.	2.1 acres in head of Whatcom Waterway assuming no impacts from the gasoline spill and source control is effective.	2.0 acres in head of Whatcom Waterway assuming no impacts from the gasoline spill and source control is effective.	2.0 acres in head of Whatcom Waterway assuming no impacts from the gasoline spill and source control is effective.	0.9 acre in head of Whatcom Waterway assuming no impacts from the gasoline spill and source control is effective.	2.0 acres in head of Whatcom Waterway assuming no impacts from the gasoline spill and source control is effective.	This objective is primarily applicable to Portage Island area, Nooksack River delta, and Governor's Point area.
Remove Existing Fills and Structures	0 acres	0 acres	0 acres	0 acres	7 acres	0 acres	7 acres of an upland landfill are removed in Alt. 2E.
Maximize Habitat Opportunities/Benefits in Bellingham Bay	**High** Provides most protection of estuarine delta mudflat at head of Whatcom Waterway. Restores about 4.4 acres of intertidal connectivity at G-P log pond. Enhances about 35 acres of nearshore migratory corridor through conversion at CAD facility. Potential for 30 acres of eelgrass on CAD surface.	**Low/Medium** Provides same protection of estuarine delta mudflat at head of Whatcom Waterway. Restores about 0.9 acre of intertidal connectivity at G-P log pond. Enhances about 9.4 acres of nearshore migratory corridor through conversion by capping. Potential for 2 acres of eelgrass on cap surface.	**High** Provides slightly less (0.1 acre less protection of estuarine delta mudflat at head of Whatcom Waterway. Restores about 4.4 acres of intertidal connectivity at G-P log pond. Enhances about 57 acres of nearshore migratory corridor through conversion at CAD facility. Potential for 50 acres of eelgrass on CAD surface.	**Low/Medium** Provides slightly less (0.1 acre less protection of estuarine delta mudflat at head of Whatcom Waterway. Restores about 0.9 acre of intertidal connectivity at G-P log pond. Enhances 1.4 acres of nearshore migratory corridor through conversion by capping. Potential for 2 acres of eelgrass on cap surface.	**Medium** Provides least protection of estuarine delta mudflat at head of WhatcomWaterway. Restores about 0.9 acre of intertidal connectivity at G-P log pond. Creates 5 acres of nearshore migratory corridor by excavating upland and enhances about 1.5 acres through conversion. Potential for 4 acres of eelgrass on cap surface.	**Highest** Most enhanced migratory corridor including protection of estuarine delta mudflat at head of Whatcom Waterway. Restores about 4 acres of intertidal connectivity at G-P log pond. Enhances about 41 acres of nearshore migratory corridor through conversion at CAD facility. Potential for 25 acres of eelgrass on CAD surface.	

Appendix F
Cost Estimates
Near-Term Remedial Alternatives

APPENDIX F

COST ESTIMATES

NEAR-TERM REMEDIAL ALTERNATIVES

This appendix summarizes the preliminary engineering cost estimate completed for the near-term remedial alternatives. Below each of the assumed unit costs are discussed. Tables F-1 through F-6 present the estimated total costs for each alternative. Table F-7 presents the breakdown of unit costs.

Unit costs for dredging, transport, and disposal were based on recent similar construction projects, including the 1994 Sitcum Waterway Remediation Project construction bids (with assumed inflation) as well as other recently completed feasibility study cost estimates completed for sediment cleanup projects in Puget Sound (e.g., City of Tacoma; Hylebos Cleanup Committee).

Dredge volumes were estimated assuming the neat line volume plus two feet of overdredge. Cap volumes were estimated assuming 1 foot of additional material above the required thickness (e.g., 4 feet of material placed for a 3-foot-thick cap).

Mobilization and demobilization costs cover expenses incurred by the contractor as they start and close out a project. EPA (1994) recommends a range of 5 to 20 percent of capital costs for this item. Based on the anticipated construction equipment and manpower requirements for this project, and considering recent Puget Sound bids for similar projects, a 2 percent mobilization/demobilization cost was assumed.

Engineering design costs include preparing a final design package for the selected remedial action. This may include additional sampling and analysis, along with engineering, permitting, construction contract document preparation and contractor procurement. EPA (1994) recommends a range of 7 to 15 percent of capital costs for engineering expenses. Based on recent Puget Sound experience on similar projects, engineering design was assumed to be 10 percent.

Construction management and water/sediment monitoring during the implementation of remedial actions was estimated at 5 percent of capital costs. This estimate is based on recent Puget Sound experience and similar feasibility study/remedial design estimates within Commencement Bay and Elliott Bay. Construction management includes working with the contractor on design interpretation, contracting, and pay issues. Water quality monitoring during construction would normally be performed during capping, dredging, and disposal operations, and would include both routine and "intensive" monitoring elements appropriate for various phases of construction. Sediment monitoring during construction would include bathymetric surveys of dredge cuts and cap placement, along with post-dredge sampling and analysis to verify that contaminated sediments have been removed.

Habitat design and initial development costs pertain to eelgrass mitigation due to losses associated with cap construction at the Cornwall Avenue Landfill, and the mudflat development at the Cornwall site following landfill excavation (Alternative 2E only). Two different unit costs were developed and applied in the cost estimates, one for eelgrass mitigation and one for mudflat development. The eelgrass unit price includes planting. Only 0.5 acres are identified for replacement, consistent with the quantity impacted at the Cornwall Avenue Landfill site. No costs are presented for planting the CAD surface in any of the alternatives, as the text of the EIS qualifies the eelgrass opportunity on the CAD surface as a potential opportunity, but does not take credit for that benefit.

Long-term monitoring was assumed to be necessary to verify the performance of natural recovery, capping, CAD, confined disposal, and habitat enhancement elements. Based on recent Puget Sound experience and similar feasibility study/remedial design estimates within Puget Sound, the present worth estimates summarized in Table F-7 were developed.

Contingency costs cover unanticipated conditions such as increased dredge or cap volumes, slower production rates, construction market effects on costs, on other items. EPA (1994) recommends a range of 25 to 30 percent of capital costs for screening level feasibility studies. Contingency was assumed to be 30 percent with the exception of the treatment line item in Table F-6, which is a fixed cost not subject to contingency markups.

Table F-1 - Preliminary Cost Estimate for Remedial Action Alternative 2A
Removal and Capping to Achieve Authorized Channel Depths w/ Starr Rock CAD

Item	Unit	Unit Cost	Bellingham Bay Priority Sites No. of Units	Bellingham Bay Priority Sites Estimated Cost (a)
Mobilization/Demobilization	PERCENT	2%	$12,273,000	$245,000
Outer/Mid Whatcom Waterway - SSU 1				
- Mechanical Dredge and Transport to CAD	CY	$4.0	213,000	$852,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	30,000	$240,000
Head of Whatcom Waterway (30' Channel) - SSU 2				
- Mechanical Dredge and Transport to CAD	CY	$4.0	78,000	$312,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	35,000	$280,000
Head of Whatcom Waterway (18' Channel) - SSU 3				
- Mechanical Dredge and Transport to CAD	CY	$4.0	19,000	$76,000
G-P Log Pond - SSU 4				
- CAD	-	-	-	see below
G-P ASB - SSU 5				
- Mechanical Dredge and Transport to CAD	CY	$5.0	12,000	$60,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	136,000	$1,088,000
Port Log Rafting Area - SSU 6				
- Mechanical Dredge and Transport to CAD	CY	$5.0	88,000	$440,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	49,000	$392,000
Starr Rock - SSU 7				
- Cap (Squalicum Dredge Materials or equivalent)	CY	$4.0	110,000	$440,000
Other Remedial Areas (Cornwall, Harris Ave & others)				
- Mechanical Dredge and Transport to CAD	CY	$5.0	60,000	$300,000
- Cap (upland quarry source)	CY	$15.0	58,000	$870,000
Disposal - Log Pond and Starr Rock CADs				
- Land Encumbrance/Easement Fees and Other Soft Costs			costs not calculated	
- Construct rip rap training dikes (upland quarry source)	CY	$40.5	26,800	$1,085,000
- Construct containment berm (upland quarry source)	CY	$15.0	134,000	$2,010,000
- Place CAD cap bedding layer (Snohomish Dredge Materials)	CY	$8.0	140,000	$1,120,000
- Place CAD armor layer (upland quarry source)	CY	$15.0	72,000	$1,080,000
- Place CAD habitat layer (upland quarry source)	CY	$15.0	48,000	$720,000
- Bottom dump barge placement (below -5' MLLW)	CY	$1.5	470,000	$705,000
- Construct rip rap reef (upland quarry source)	CY	$40.5	5,000	$203,000
Engineering Design	PERCENT	10%	$12,518,000	$1,252,000
Construction Monitoring/Management	PERCENT	5%	$12,518,000	$626,000
Habitat Design and Initial Development				
- Eelgrass planting and Initial Monitoring	ACRE	$200,000	0.5	$100,000
Long-term Monitoring	LS	$1,100,000	1	$1,100,000
Contingency	PERCENT	30%	$15,596,000	$4,679,000
TOTAL ESTIMATED COST (rounded; excluding soft costs)				**$20,300,000**

NOTES:
(a) Cost estimates from Whatcom Waterway and Cornwall Avenue Landfill RI/FS documents, with minor modifications by the Pilot Team.

Table F-2 - Preliminary Cost Estimate for Remedial Action Alternative 2B

Removal and Capping to Achieve Authorized Channel Depths w/ Upland Disposal

Item	Unit	Unit Cost	Bellingham Bay Priority Sites No. of Units	Bellingham Bay Priority Sites Estimated Cost (a)
Mobilization/Demobilization	PERCENT	2%	$27,460,000	$549,000
Outer/Mid Whatcom Waterway - SSU 1				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	213,000	$852,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	30,000	$240,000
Head of Whatcom Waterway (30' Channel) - SSU 2				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	78,000	$312,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	35,000	$280,000
Head of Whatcom Waterway (18' Channel) - SSU 3				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	19,000	$76,000
G-P Log Pond - SSU 4				
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	100,000	$800,000
G-P ASB - SSU 5				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	12,000	$60,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	136,000	$1,088,000
Port Log Rafting Area - SSU 6				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	88,000	$440,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	49,000	$392,000
Starr Rock - SSU 7				
- Cap (Squalicum Dredge Materials or equivalent)	CY	$4.0	150,000	$600,000
Other Remedial Areas (Cornwall, Harris Ave & others)				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	60,000	$300,000
- Cap (upland quarry source)	CY	$15.0	58,000	$870,000
Disposal - Roosevelt Landfill or Equivalent				
- Offload and dewater	CY	$5.0	470,000	$2,350,000
- Haul and Dispose at Roosevelt Regional Landfill	CY	$40.0	470,000	$18,800,000
Engineering Design (b)	PERCENT	7%	$9,209,000	$645,000
Construction Monitoring/Management (b)	PERCENT	5%	$9,209,000	$460,000
Habitat Design and Initial Development				
- Eelgrass planting and Initial Monitoring	ACRE	$200,000	0.5	$100,000
Long-term Monitoring	LS	$600,000	1	$600,000
Contingency	PERCENT	30%	$29,814,000	$8,944,000
TOTAL ESTIMATED COST (rounded; excluding soft costs)				**$38,800,000**

NOTES:

(a) Cost estimates from Whatcom Waterway and Cornwall Avenue Landfill RI/FS documents, with minor modifications by the Pilot Team.

(b) Assumes no engineering design or construction monitoring/mananement associated with haul and dispose to landfill.

Table F-3 - Preliminary Cost Estimate for Remedial Action Alternative 2C
Full Removal from Navigation Areas w/ Starr Rock CAD

Item	Unit	Unit Cost	Bellingham Bay Priority Sites No. of Units	Bellingham Bay Priority Sites Estimated Cost (a)
Mobilization/Demobilization	PERCENT	2%	$16,172,000	$323,000
Outer/Mid Whatcom Waterway - SSU 1				
- Mechanical Dredge and Transport to CAD	CY	$4.0	570,000	$2,280,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	11,000	$88,000
Head of Whatcom Waterway (30' Channel) - SSU 2				
- Mechanical Dredge and Transport to CAD	CY	$4.0	78,000	$312,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	35,000	$280,000
Head of Whatcom Waterway (18' Channel) - SSU 3				
- Mechanical Dredge and Transport to CAD	CY	$4.0	41,000	$164,000
G-P Log Pond - SSU 4				
- CAD	-	-	-	see below
G-P ASB - SSU 5				
- Mechanical Dredge and Transport to CAD	CY	$5.0	12,000	$60,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	136,000	$1,088,000
Port Log Rafting Area - SSU 6				
- Mechanical Dredge and Transport to CAD	CY	$5.0	88,000	$440,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	49,000	$392,000
Starr Rock - SSU 7				
- Cap (Squalicum Dredge Materials or equivalent)	CY	$4.0	100,000	$400,000
Other Remedial Areas (Cornwall, Harris Ave & others)				
- Mechanical Dredge and Transport to CAD	CY	$5.0	60,000	$300,000
- Cap (upland quarry source)	CY	$15.0	58,000	$870,000
Disposal - Log Pond and Starr Rock CADs				
- Land Encumbrance/Easement Fees and Other Soft Costs			costs not calculated	
- Construct rip rap training dikes (upland quarry source)	CY	$40.5	46,240	$1,873,000
- Construct containment berm (upland quarry source)	CY	$15.0	231,200	$3,468,000
- Place CAD cap bedding layer (Snohomish Dredge Materials)	CY	$8.0	230,000	$1,840,000
- Place CAD armor layer (upland quarry source)	CY	$15.0	125,000	$1,875,000
- Place CAD habitat layer (upland quarry source)	CY	$15.0	83,000	$1,245,000
- Bottom dump barge placement (below -5' MLLW)	CY	$1.5	849,000	$1,274,000
- Construct rip rap reef	CY	$40.5	5,000	$203,000
Engineering Design	PERCENT	10%	$18,775,000	$1,878,000
Construction Monitoring/Management	PERCENT	5%	$18,775,000	$939,000
Habitat Design, Planting and Initial Development				
- Eelgrass planting and Initial Monitoring	ACRE	$200,000	0.5	$100,000
Long-term Monitoring	LS	$1,100,000	1	$1,100,000
Contingency	PERCENT	30%	$22,792,000	$6,838,000
TOTAL ESTIMATED COST (rounded; excluding soft costs)				**$29,600,000**

NOTES:
(a) Cost estimates from Whatcom Waterway and Cornwall Avenue Landfill RI/FS documents, with minor modifications by the Pilot Team.

Table F-4 - Preliminary Cost Estimate for Remedial Action Alternative 2D

Full Removal from Navigation Areas w/ Upland Disposal

Item	Unit	Unit Cost	Bellingham Bay Priority Sites No. of Units	Bellingham Bay Priority Sites Estimated Cost (a)
Mobilization/Demobilization	PERCENT	2%	$61,155,000	$1,223,000
Outer/Mid Whatcom Waterway - SSU 1				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	570,000	$2,280,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	11,000	$88,000
Head of Whatcom Waterway (30' Channel) - SSU 2				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	78,000	$312,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	35,000	$280,000
Head of Whatcom Waterway (18' Channel) - SSU 3				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	41,000	$164,000
G-P Log Pond - SSU 4				
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	100,000	$800,000
G-P ASB - SSU 5				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	200,000	$1,000,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	78,000	$624,000
Port Log Rafting Area - SSU 6				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	88,000	$440,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	49,000	$392,000
Starr Rock - SSU 7				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	130,000	$650,000
- Cap (Squalicum Dredge Materials or equivalent)	CY	$4.0	110,000	$440,000
Other Remedial Areas (Cornwall, Harris Ave & others)				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	60,000	$300,000
- Cap (upland quarry source)	CY	$15.0	58,000	$870,000
Disposal - Roosevelt Landfill or Equivalent				
- Offload and dewater	CY	$5.0	1,167,000	$5,835,000
- Haul and Dispose at Roosevelt Regional Landfill	CY	$40.0	1,167,000	$46,680,000
Engineering Design (b)	PERCENT	7%	$15,698,000	$1,099,000
Construction Monitoring/Management (b)	PERCENT	5%	$15,698,000	$785,000
Habitat Design and Initial Development				
- Eelgrass planting and Initial Monitoring	ACRE	$200,000	0.5	$100,000
Long-term Monitoring	LS	$600,000	1	$600,000
Contingency	PERCENT	30%	$64,962,000	$19,489,000
TOTAL ESTIMATED COST (rounded; excluding soft costs)				**$84,500,000**

NOTES:

(a) Cost estimates from Whatcom Waterway and Cornwall Avenue Landfill RI/FS documents, with minor modifications by the Pilot Team.

(b) Assumes no engineering design or construction monitoring/mananement associated with haul and dispose to landfill.

Table F-5 - Preliminary Cost Estimate for Remedial Action Alternative 2E

Full Removal from Harbor Areas w/ Upland Disposal

Item	Unit	Unit Cost	Bellingham Bay Priority Sites: No. of Units	Bellingham Bay Priority Sites: Estimated Cost (a)
Mobilization/Demobilization	PERCENT	2%	$118,742,000	$2,375,000
Outer/Mid Whatcom Waterway - SSU 1				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	570,000	$2,280,000
Head of Whatcom Waterway (30' Channel) - SSU 2				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	78,000	$312,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	35,000	$280,000
Head of Whatcom Waterway (18' Channel) - SSU 3				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$4.0	90,000	$360,000
G-P Log Pond - SSU 4				
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	100,000	$800,000
G-P ASB - SSU 5				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	470,000	$2,350,000
Port Log Rafting Area - SSU 6				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	220,000	$1,100,000
Starr Rock - SSU 7				
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	480,000	$2,400,000
Dredge and Transport - Other Remedial Areas				
- Excavate Landfill and Transport to Upland Offload Facility	CY	$5.0	370,000	$1,850,000
- Mechanical Dredge and Transport to Upland Offload Facility	CY	$5.0	90,000	$450,000
Disposal - Roosevelt Landfill or Equivalent				
- Offload and dewater	CY	$5.0	2,368,000	$11,840,000
- Haul and Dispose at Roosevelt Regional Landfill	CY	$40.0	2,368,000	$94,720,000
Engineering Design (b)	PERCENT	7%	$26,397,000	$1,848,000
Construction Monitoring/Management (b)	PERCENT	5%	$26,397,000	$1,320,000
Habitat Design and Initial Development				
- Mudflat Development and Initial Monitoring	ACRE	$50,000	3	$150,000
- Eelgrass planting and Initial Monitoring	ACRE	$200,000	0.5	$100,000
Long-term Monitoring	LS	$100,000	1	$100,000
Contingency	PERCENT	30%	$124,635,000	$37,391,000
TOTAL ESTIMATED COST (rounded; excluding soft costs)				**$162,000,000**

NOTES:

(a) Cost estimates from Whatcom Waterway and Cornwall Avenue Landfill RI/FS documents, with minor modifications by the Pilot Team.

(b) Assumes no engineering design or construction monitoring/mananement associated with haul and dispose to landfill.

Table F-6 - Preliminary Cost Estimate for the Preferred Remedial Action Alternative
Full Removal from Navigation Areas w/ Cornwall CAD and Provisional Treatment

Item	Unit	Unit Cost	Bellingham Bay Priority Sites: No. of Units	Bellingham Bay Priority Sites: Estimated Cost (a)
Mobilization/Demobilization	PERCENT	2%	$13,312,000	$266,000
Outer/Mid Whatcom Waterway - SSU 1				
- Mechanical Dredge and Transport to Treatment (base case) (b,c)	CY	$75	100,000 (c)	$7,500,000 (c)
- Mechanical Dredge and Transport to CAD	CY	$4.0	470,000	$1,880,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	11,000	$88,000
Head of Whatcom Waterway (30' Channel) - SSU 2				
- Mechanical Dredge and Transport to CAD	CY	$4.0	78,000	$312,000
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	35,000	$280,000
Head of Whatcom Waterway (18' Channel) - SSU 3				
- Mechanical Dredge and Transport to CAD	CY	$4.0	46,000	$184,000
G-P Log Pond - SSU 4				
- Cap (Snohomish Dredge Materials or equivalent)	CY	$8.0	63,000	$504,000
G-P ASB - SSU 5				
- Mechanical Dredge and Transport to CAD	CY	$5.0	12,000	$60,000
- Cap (reused CAD pit materials; bottom dump barge placement)	CY	$1.5	160,000	$240,000
Port Log Rafting Area - SSU 6				
- Mechanical Dredge and Transport to CAD	CY	$5.0	88,000	$440,000
- Cap (reused CAD pit materials; bottom dump barge placement)	CY	$1.5	111,000	$167,000
Starr Rock - SSU 7				
- Cap (Squalicum Dredge Materials or equivalent)	CY	$4.0	150,000	$600,000
Other Remedial Areas (Cornwall, Harris Ave & others)				
- Mechanical Dredge and Transport to CAD	CY	$5.0	60,000	$300,000
- Cap (upland quarry source)	CY	$15.0	58,000	$870,000
Disposal - Cornwall CAD				
- Land Encumbrance/Easement Fees and Other Soft Costs			costs not calculated	
- Construct containment berm (upland quarry source)	CY	$15.0	87,000	$1,305,000
- Mechanical dredge subsurface pit (bottom dump beneficial reuse)	CY	$6.5	350,000	$2,275,000
- Place CAD cap bedding layer (Snohomish Dredge Materials)	CY	$8.0	222,000	$1,776,000
- Place CAD armor layer (upland quarry source)	CY	$15.0	36,000	$540,000
- Place CAD habitat layer (upland quarry source)	CY	$15.0	24,000	$360,000
- Bottom dump barge placement (below -5' MLLW)(base case)	CY	$1.5	754,000	$1,131,000
Engineering Design	PERCENT	10%	$13,578,000	$1,358,000
Construction Monitoring/Management	PERCENT	5%	$13,578,000	$679,000
Habitat Design and Initial Development				
- Eelgrass planting and Initial Monitoring	ACRE	$200,000	0.5	$100,000
Long-term Monitoring	LS	$1,100,000	1	$1,100,000
Contingency	PERCENT	30%	$16,815,000	$5,045,000
TOTAL ESTIMATED COST (rounded; excluding soft costs)				**$29,400,000**

NOTES:
(a) Cost estimates from Whatcom Waterway and Cornwall Avenue Landfill RI/FS documents, with minor modifications by the Pilot Team.
(b) The $7.5 million cost includes mobilization/demobilization, engineering design, construction monitoring/management, and contingency. Therefore, mobilization/demobilization, engineering design, construction monitoring/management, and contingency costs in Table F-6 do not include treatment costs.
(c) The $7.5 million represents the amount G-P would contribute to the cost of treatment, and the 100,000 CY represents the minimum quantity of sediments that would be treated.

Table F-7 - Assumed Unit Costs

Bellingham Bay Demonstration Pilot Project

Task Item	Unit	Assumed Unit Cost			Notes
Removal - Contaminated Sediment					
Mechanical Dredge and Transport - Private Bid	CY	$5.0			Based on regional bid records and design estimates
Mechanical Dredge and Transport - Corps Bid	CY	$4.0			Seattle District Corps estimate based on payment records (the Corps typically recieves lower bids than others)
In Situ Capping					
Upland quarry source	CY	$15.0			Purchase, haul and place 1'-3' cap (assume 2' for est.)
Maintenance Dredge Material Sources (cycle year)	**Dredge Volume per Cycle (CY)**	**Material Type**	**Transport Distance (miles)**	**Estimated Additional Haul/Place Cost (/CY)**	(Estimated cost increment over and above normal PSDDA disposal)
Squalicum Waterway (2000; 2003)	120,000	Silt	1	$4.0	Assuming 50% bottom-dump; 50% clamshell placement
Swinomish Waterway (2001; 2002?; 2003)	40,000	Sand	20	$2.0	Based on haul estimates and Corps payment records (30 miles)
Snohomish Waterway (2001 [Jetty Is?]; 2003)	250,000	Silty sand	80	$8.0	Based on extrapolation of haul estimates and Corps payment records
CAD Construction					
Rip rap training dikes	CY	$40.5			Purchase, haul, and place rip rap.
Berm construction	CY	$15.0			Purchase, haul, and place select fill.
CDF cap (armor and habitat layers - upland source)	CY	$15.0			Purchase, haul, and place select fill.
Rip rap reef	CY	$40.5			Purchase, haul, and place rip rap.
Upland Disposal					
Offload, Haul, and Dispose at Roosevelt Regional Landfill	CY	$45.0			Ffrom Whatcom Waterway RI/FS
Offload, Haul, and Place at Phyllite Pit (incl. Misc. const.)	CY	$41.5			From Pilot Team cost estimate
Contaminated Sediment Placement in CAD					
Bottom dump barge placement (below -5' MLLW)	CY	$1.5			Based on Corps payment records
Clamshell off of barge placement (above -5' MLLW)	CY	$12.5			Double handling off of barge into CDF.
Aquatic Habitat Enhancement					
Mudflat Development and Initial Monitoring	ACRE	$50,000			From Pilot Team cost estimate
Eelgrass Planting and Initial Monitoring	ACRE	$200,000			From Pilot Team cost estimate and EPA guidance
Mobilization/Demobilization	PERCENT	2.0%			
Engineering Design					
Including Disposal Site Design	PERCENT	10%			
Disposal at an Existing Facility	PERCENT	7%			
Construction Monitoring/Management	PERCENT	5%			Includes Env. Monitoring and project management.
Long-term Monitoring (Present Worth)					
Capped Sediments - 100 acres or more (e.g., Whatcom Waterway Site)		$300,000			
Capped Sediments - 10 acres or less		$100,000			
Cornwall Avenue Uplands		$100,000			
CAD Site (excl. habitat restoration areas)		$300,000			
Habitat Restoration Areas		$200,000			
Contingency	PERCENT	30%			From EPA guidance

APPENDIX G
BELLINGHAM BAY COMPREHENSIVE STRATEGY CONCEPTUAL IMPLEMENTATION FRAMEWORK

APPENDIX G:

BELLINGHAM BAY COMPREHENSIVE STRATEGY-
CONCEPTUAL IMPLEMENTATION FRAMEWORK

APPENDIX G:

BELLINGHAM BAY COMPREHENSIVE STRATEGY-CONCEPTUAL IMPLEMENTATION FRAMEWORK

This final EIS provides an environmental impact analysis and is not a decision document. Rather, the environmental evaluation provided herein will be used by various members of the Pilot Team to inform future regulatory decisions. The information in this appendix conveys concepts regarding implementation of the Comprehensive Strategy, including the preferred near-term remedial action alternative if selected by Ecology. The conceptual actions described below will undergo further review and refinement and may significantly change through the regulatory processes that will follow. Public involvement is a key element of the regulatory processes that will be undertaken in the future.

BELLINGHAM BAY COMPREHENSIVE STRATEGY – THE PREFERRED ALTERNATIVE

The Bellingham Bay Comprehensive Strategy (Comprehensive Strategy) does not modify or replace existing regulatory processes and there would be no new regulatory mechanism established to ensure that the Comprehensive Strategy would be implemented. Rather, the Comprehensive Strategy would be implemented through future regulatory processes or through future agreements between Pilot Team members.

The Comprehensive Strategy embraces a bay-wide approach to conducting sediment cleanup, controlling sources of pollution, habitat restoration, and accompanying land use decision-making throughout the bay. As a result, while certain actions at a specific location in the bay may be acceptable (i.e., dredging, capping, or a temporary CAD), that acceptability may be predicated, in part, on the intent that other actions occur in other parts of the bay. Also, these actions may vary temporally in terms of when they occur (e.g., near-term cleanup versus long-term habitat restoration and targeted development). The consideration of these individual actions is important in order to ensure that the balance being sought through the Comprehensive Strategy is ultimately achieved.

The Pilot Team is made up of various entities that play different roles in land use and regulatory authority within Bellingham Bay and along the shoreline. Based on these differing roles and authorities, the members of the Pilot Team will focus their attention on different aspects of the Comprehensive Strategy. The following preliminary list describes actions relevant to the Comprehensive Strategy. (The primary agencies/entities potentially responsible for a particular action are provided in parenthesis):

Sediment Cleanup and Source Control

- Establish a total maximum daily loading (TMDL) for Bellingham Bay to ensure compliance with water and sediment quality standards (Ecology);

- Select cleanup remedies and conduct sediment cleanups in accordance with MTCA, including encouraging the development of sediment treatment alternatives; and preventing recontamination through comprehensive source control (G-P, Ecology, DNR, Port, City);
- Within the MTCA process, identify materials suitable for treatment and work cooperatively with other Pilot Team members to facilitate treatment (DNR, G-P, Port, City, Ecology);
- If the remedial action selected under MTCA results in hazardous substances remaining at the site, re-evaluate remedial actions at least every 5 years as required under MTCA (Ecology);
- Create a Port Commissioners' resolution adopting the Preferred Near-term Remedial Action Alternative, including the land use modifications and habitat restoration actions that go along with the cleanup components (Port); and
- Obtain and ensure compliance with all permits and necessary use authorizations (Ecology, City, WDFW, Corps, and DNR).

Habitat Restoration and Land Use

- Establish reserves to ensure resource/habitat protection, restoration, and production in critical areas throughout the bay (DNR, Lummi Nation, County, City, Port);
- Seek out opportunities for land acquisitions/exchanges to promote habitat restoration in key areas of the bay (DNR and Port);
- Perform a comprehensive harbor area analysis and cooperate with other Pilot Team members to complete actions found necessary as a result of this analysis (e.g., relocation of harbor lines; changes in authorized uses; etc.) (DNR, Port, City, County);
- Make use authorization decisions consistent with any requirements for institutional controls imposed under the MTCA process and condition those authorizations consistent with the Comprehensive Strategy (DNR, Lummi Nation, Port, County, City);
- Audit/monitor existing agreements to ensure uses/actions are consistent with the Comprehensive Strategy (DNR, Port and others);
- Adopt objectives of the Comprehensive Strategy within the Port's District Master Plans when updated (Port);
- Propose for incorporation the objectives and specific relevant elements of Comprehensive Strategy into the City's and County's Shoreline Master Programs when updated (City, County);
- Make land management and permitting decisions consistent with the habitat goals of the Comprehensive Strategy, especially in the small deltas (Port, WDFW, DNR, City, County); and
- Prioritize and accomplish (including funding) habitat restoration projects consistent with the Comprehensive Strategy, especially in the small deltas (Corps, Port, WDFW, DNR, City, and County).

The timing of these various activities are described in general terms in Figure G-1. While there are several critical milestones identified, the timeline for the " Implementation Framework for Non-MTCA Activities" represents an effort that would include identification of priority actions and primary organizations, and the development of agreements and detailed implementation schedules.

Some actions, as described in detail by the near-term remedial action alternatives evaluated in this EIS (including the preferred remedial action alternative), may occur in the near future to address priority sediment cleanup/source control sites - Whatcom Waterway, Cornwall Avenue Landfill and Harris Avenue Shipyard. In addition, remediation of the G-P Log Pond, a sub-unit of the Whatcom Waterway Site which has already undergone a remedial investigation and feasibility study (RI/FS) under MTCA, is planned to be expedited under applicable regulatory authorities to take advantage of clean dredge materials from regional dredging projects that are available this summer and fall. The preferred remedial action alternative is discussed below.

PREFERRED NEAR-TERM REMEDIAL ACTION ALTERNATIVE

A conceptual implementation framework for completing the preferred near-term remedial action alternative, should it ultimately be selected as a remedy by Ecology, has been developed and includes the following components:

1. Appropriate stakeholders would work to comprehensively address Natural Resource Damages as defined in MTCA and CERCLA (Superfund) laws, tribal Treaty Rights, habitat mitigation and other key requirements as early as possible.

2. Based on treatment technology viability and the outcome of the MTCA cleanup action decision making and design process, at least 400,000 cubic yards of sediments would be removed from the bay for treatment. These sediments would either be processed directly for treatment or stored upland if upland storage is made available and it is determined that treatment would be available within a reasonable period of time.

3. A larger CAD facility may be constructed and used if it is determined through the MTCA process that removal of dredged sediments for treatment is not viable at the time of dredging.

4. Identification and permitting of a treatment process for sediments removed from the aquatic environment would be pursued, consistent with the MTCA process, by the state under DNR's lead in collaboration with the other Pilot Team Members and the Dredged Material Management Program agencies. A facility constructed and/or permitted by another party could be used if appropriate. If a State Environmental Policy Act evaluation is required for storage, transportation and/or treatment of the sediments, this evaluation would be a separate process from the Pilot Project EIS presented herein.

5. Dredging would occur on a schedule determined through the MTCA process. However, given current information it is estimated that dredging and treatment could begin as early as 2003. CAD construction would begin approximately one year earlier.

6. DNR would assure that any state owned aquatic land associated with CAD and caps are available indefinitely for appropriate in-water use to the Local Parties at no additional cost based on the overall project commitments. DNR would make these lands available based on commitments from other liable parties to the concepts of treatment and funding of an annuity to an agreed-to level for future CAD removal. The cost of removing materials placed on state owned aquatic lands in the CAD would be funded in part or in whole by an annuity established for this purpose.

7. The cost of using state-owned aquatic lands has been factored into the overall scope of the action described in this document, based on the value to the state from this overall proposed action.

Based upon this conceptual implementation framework, the following draft work item list has been developed. The list is not exhaustive but does provide an indication of the major tasks that may lie ahead:

- The Pilot Team would develop additional non-MTCA schedule detail and implementation milestones. Actions related to the MTCA cleanup would be scheduled and detailed through the MTCA process.
- Capping and habitat restoration of the G-P Log Pond, consistent with the Comprehensive Strategy and the MTCA RI/FS, would be expedited to take advantage of clean dredge materials available from regional dredging projects in 2000.
- Through the MTCA process, actions that are expected to occur include:
  - Identify contaminated materials that would be targeted for treatment;
  - Scope treatment options and issues (workshop, bench test, etc.);
- The Pilot Team would:
  - Determine habitat mitigation requirements and liabilities associated with implementation of the near-term remedial action ultimately selected by Ecology;
  - Consider and finalize potential compensation issues re: Tribal Treaty Rights;
  - Consider and finalize potential compensation issues re: Natural Resource Damages; and
  - Determine longer-term habitat restoration obligations, commitments, and priorities per the Comprehensive Strategy.
- The parties responsible for implementing the near-term remedial action ultimately selected by Ecology would:
  - Develop the construct (including funding) of the annuity for future treatment/removal;
  - Finalize liability shares between Principal Group parties;
  - Pursue and facilitate additional funding such as federal Water Resource Development Act authorizations and appropriations;
  - Negotiate and finalize leases and use authorizations such as for the use of state owned aquatic lands;
  - Negotiate and finalize Consent Decree and participation agreements such as indemnity and tribal Treaty Rights arrangements;
  - Obtain all applicable federal, state, and local permits, including public review components; and
  - Adjust as needed the designated boundaries of harbor areas and waterway

To reiterate, the conceptual implementation framework was developed to begin to understand the coordination, actions, and an estimated schedule for implementing the Comprehensive Strategy, including the preferred near-term remedial action alternative, if selected by Ecology. This information will require further review and refinement and may significantly change through the regulatory processes that will follow. Public involvement is a key element of the regulatory processes that will be undertaken in the future.

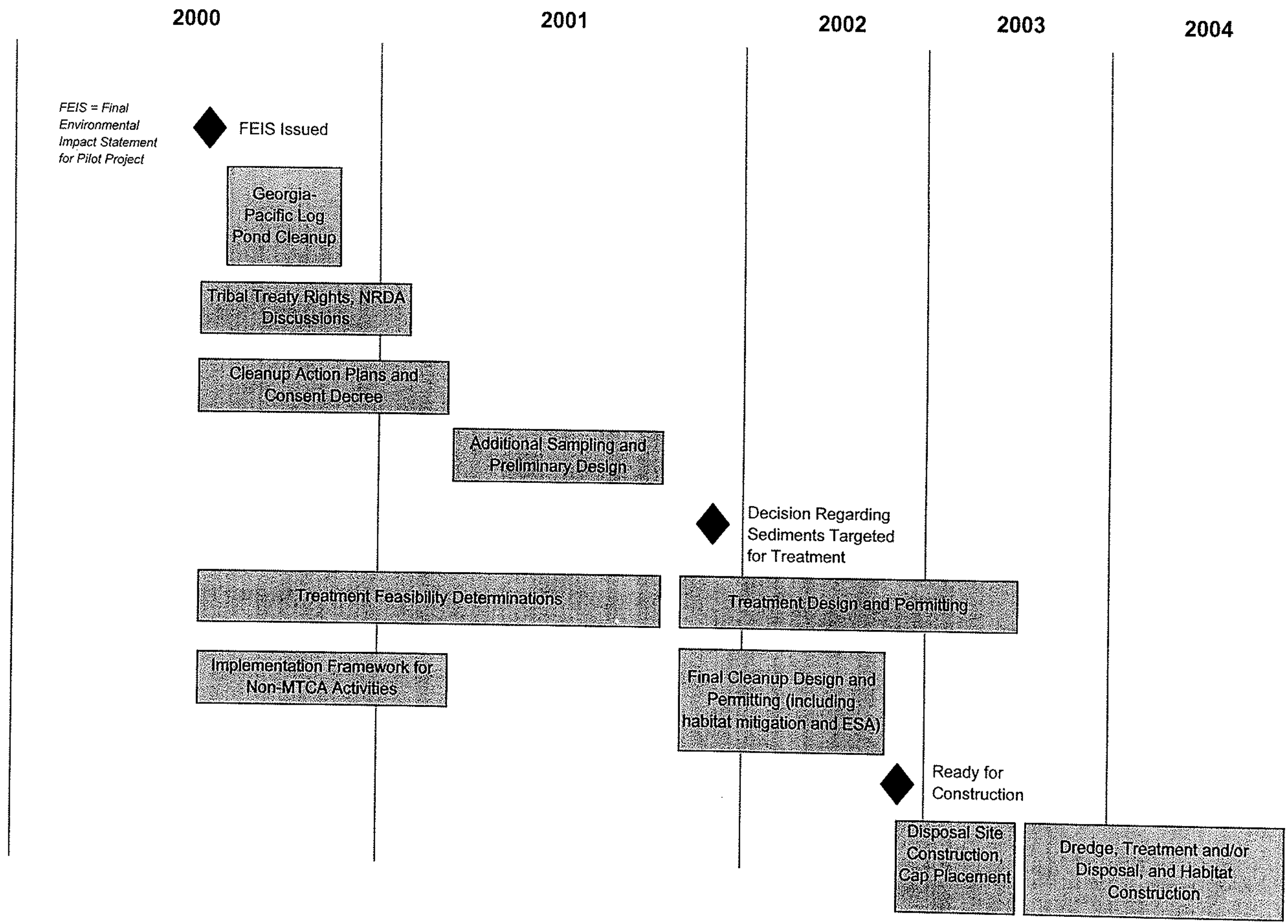

Figure G-1. Bellingham Bay Demonstration Pilot - Estimated Implementation Timeline