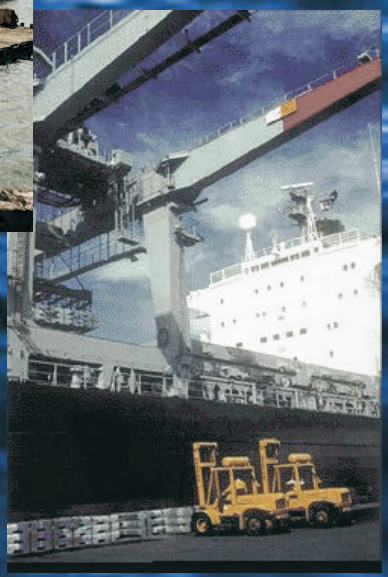
BELLINGHAM BAY COMPREHENSIVE STRATEGY

Draft Supplemental Environmental Impact Statement



WASHINGTON STATE DEPARTMENT OF ECOLOGY

March 2002

DRAFT

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

BELLINGHAM BAY COMPREHENSIVE STRATEGY

Prepared for

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and
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March 2002

FACT SHEET

Project Name: Bellingham Bay Comprehensive Strategy—Modified Preferred Integrated Near-Term Remedial Action Alternative

Proposed Action and Alternatives: The applicant is proposing a new remedial action alternative that modifies the Preferred Integrated Near-Term Remedial Action Alternative proposed in the Final Environmental Impact Statement (FEIS) for the Bellingham Bay Comprehensive Strategy. This modification is a result of a new local upland sediment disposal facility that has been identified since completion of the FEIS. The alternative is evaluated in this Supplemental EIS.

Modified Preferred Integrated Near Term Remedial Action Alternative, Full Removal from Navigational Areas (Upland ASB Disposal/Potential Treatment): The Modified Preferred Integrated Near-Term Remedial Action Alternative is similar to the Preferred Integrated Near-Term Remedial Action Alternative evaluated in the FEIS, except that 21 acres of Georgia-Pacific's (G-P) 29-acre Aerated Stabilization Basin (ASB) would be used for disposal of sediments dredged from the Whatcom Waterway site and potentially other cleanup sites in Bellingham Bay.

This alternative would allow for future deepening of the existing navigational channels through dredging of approximately 760,000 cubic yards of sediment from the Whatcom Waterway. Approximately 400,000 cubic yards of contaminated sediment may be treated if a viable treatment technology is identified. In addition, subtidal aquatic habitat would be converted to intertidal habitat through the use of caps.

Use of the ASB as a disposal site would replace the need for a Confined Aquatic Disposal (CAD) facility, which was proposed in the FEIS. Other elements of the Preferred Integrated Near-Term Remedial Action Alternative would remain equivalent to what was proposed and evaluated in the FEIS.

Project Location: Bellingham Bay

Lead Agency: Washington Department of Ecology

Pilot Work Group:

- 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

Responsible Official:

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Approvals Required:

For the specific cleanup action proposal evaluated in this Supplemental EIS, some or all of the following permits and/or substantive 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 Water Quality Certification (Ecology)
- Aquatic Use Authorization (DNR)
- Coastal Zone Management Certification (Ecology)
- Shoreline Substantial Development (City of Bellingham)
- ESA Compliance (NMFS and USFWS)

Previous Environmental Documents:	This Supplemental EIS supplements the Bellingham Bay Comprehensive Strategy FEIS issued on October 10, 2000.
Authors and Principal Contributors:	Anchor Environmental, L.L.C.
Supplemental EIS Issue Date:	March 11, 2002
Approximate Date of Final Action:	Ecology expects to release its draft Cleanup Action Plans (CAPs) for the Whatcom Waterway and Cornwall Avenue Landfill, and related cleanup study reports (e.g., Harris Avenue Shipyard) in fall 2002. 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 2004. Expedited remedial action at the G-P Log Pond was completed in early 2001.
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.

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1 SUMMARY

1.1 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. However, 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 in 1996.

The Pilot brought together a cooperative partnership of agencies, tribes, local government, and businesses known collectively as the Pilot Work Group, to develop an approach for source control, sediment cleanup and associated habitat restoration in Bellingham Bay (Figure 1). As part of the approach, the Pilot Work Group developed a Comprehensive Strategy that considered contaminated sediments, sources of pollution, habitat restoration, and in-water and shoreline land use from a baywide perspective. The Strategy integrated this information to identify priority issues requiring action in the near-term and to provide long-term guidance to decision-makers.

In October 2000, a Final Environmental Impact Statement (FEIS) was prepared under the State Environmental Policy Act (SEPA), which evaluated the potential environmental impacts of implementing the Bellingham Bay Comprehensive Strategy. Following review and evaluation of comments on the Draft EIS (published in August 1999), the Pilot Work Group identified the Comprehensive Strategy as the Preferred Alternative.

The Comprehensive Strategy also includes a range of project specific Integrated Near-Term Remedial Action Alternatives that address priority sediment cleanup and source control sites in the Bay and integrate habitat restoration and land use considerations with the cleanup. A Preferred Integrated Near-Term Remedial Action Alternative for Bellingham Bay was identified in the FEIS by the Pilot Work Group, based on public comment on the five alternatives presented in the draft EIS. Since the issuance of the FEIS, an Interim Action was implemented under the Preferred Integrated Near-Term Remedial Action Alternative that consisted of capping the G-P Log Pond facility (Figure 2 & Section 2.1).

This Supplemental EIS addresses the potential adverse environmental impacts associated with a new Remedial Action Alternative that modifies the Preferred Integrated Near Term Remedial Action Alternative evaluated in the FEIS. This modification is a result of a new local upland sediment disposal facility that has been identified since completion of the FEIS. No other changes to the Comprehensive Strategy are proposed or evaluated at this time.

This Supplemental EIS incorporates by reference the FEIS. If any discrepancies exist between the Supplemental EIS and the FEIS, the Supplemental EIS shall supercede.

1.2 Principles Used in Developing the Comprehensive Strategy

In developing a Comprehensive Strategy, the Pilot Work Group defined four fundamental project elements–sediment cleanup and source control, sediment disposal siting, habitat, and land use. The Pilot Work Group compiled, collected, and analyzed information for each project element separately and applied seven baywide goals to identify priorities:

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

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, including the Integrated Near-Term Remedial Action Alternatives.

1.3 Summary of the Integrated Near-Term Remedial Action Alternatives Evaluated in FEIS

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 in the FEIS. These alternatives are briefly described here.

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—CY) and disposal of contaminated sediment. Subtidal aquatic habitat would be converted to intertidal aquatic habitat through the use of caps and a confined aquatic disposal (CAD) facility located near Starr Rock. The emphasis of this alternative is minimal disturbance in the near-term, potentially precluding future options to achieve deeper than currently authorized navigation depths. *Note: With the Interim Action of capping at the G-P Log Pond facility, use of the Log Pond as a CAD under this alternative is no longer feasible. However, other disposal opportunities are available for sediment that would have been directed to the Log Pond under Alternative 2A.*

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 CY) 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. *Note: With the Interim Action of capping that has taken place at the Log Pond, a component of this alternative has already been implemented.*

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 a CAD facility near Starr Rock. This alternative includes dredging of approximately 760,000 CY from the Whatcom Waterway site, along with roughly 60,000 CY from other sediment cleanup sites in Bellingham, for a total of approximately 820,000 CY. The emphasis of Alternative 2C is on removal of contaminated sediments to provide maximum flexibility to meet future navigational needs (deeper than currently authorized). *Note: With the Interim Action of capping at the G-P Log Pond facility, use of the Log Pond as a CAD under this alternative is no longer feasible. However, other disposal opportunities are available for sediment that would have been directed to the Log Pond under Alternative 2C.*

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 CY. 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. *Note: With the Interim Action of capping that has taken place at the Log Pond, a component of this alternative has already been implemented.*

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 CY). 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. *Note: with the Interim Action of capping that has taken place at the Log Pond, a component of this alternative has already been implemented.*

Preferred Integrated Near-Term 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 (Figure 3). This alternative removes contaminated material in quantities that 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 a CAD facility. This alternative includes dredging of 820,000 CY (including up to 760,000 CY from the Whatcom Waterway and 60,000 CY from other sites) that may be disposed of in a CAD located adjacent to the Cornwall Avenue Landfill. 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 incorporates possible treatment of contaminated dredged sediments and also acknowledges the potential to beneficially re-use dredged material, if appropriate. The Preferred Remedial Action Alternative was determined to best achieve the seven goals of the Pilot. *Note: With the Interim Action of capping that has taken place at the Log Pond, a component of this alternative has already been implemented.*

1.4 Modified Preferred Integrated Near Term Remedial Action Alternative

Since issuance of the FEIS in October 2000, a potential local upland sediment disposal facility has been identified in Bellingham Bay, which involves using part of the 29-acre Aerated Stabilization Basin (ASB), owned and operated by Georgia Pacific Corporation (G-P) on property that is adjacent to the Whatcom Waterway. For the past 23 years, the ASB has been used by G-P as a component of the wastewater treatment system for their pulp and paper mill operation. With the closure of the pulp mill in 2001, the capacity of the ASB exceeds wastewater treatment needs of G-P's Bellingham Paper Mill.

(With Ecology Industrial Section approval, an 8-acre portion of the ASB and associated outfall structures would be modified and remain in service as secondary wastewater treatment facilities for G-Ps Bellingham Paper Mill.)

This supplemental EIS addresses the potential adverse environmental impacts associated with a new remedial action alternative that modifies the Preferred Integrated Near Term Remedial Action Alternative (Modified Preferred Remedial Action Alternative) evaluated in the EIS by substituting disposal of dredged contaminated sediments at the ASB for disposal at an engineered in-water disposal facility.

1.5 Summary of Potential Impacts and Mitigation

The following table (Table 1) summarizes potential adverse impacts and mitigation measures associated with the Integrated Near-Term Remedial Action Alternatives evaluated in the FEIS, and the Modified Preferred Remedial Action Alternative evaluated in this Supplemental EIS.

Table 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).	<u>Alternatives 2A , 2C and Preferred Remedial Action Alternative</u> • 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.	<u>Alternatives 2B, 2D, and 2E</u> • 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. <u>Modified Preferred Remedial Action Alternative</u> • Relative to the Preferred Remedial Action Alternative, less short-term impacts to water quality from hydraulically dredging contaminated sediments and placing these materials into an upland confined disposal facility via pipeline. • Potential discharge of contaminants from disposal facility to surface water, via ASB and diffused outfall. • Potential exposure to construction personnel from volatilization of organics causing inhalation of toxic chemicals and dust.	<u>Technology</u> • 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. <u>Operation</u> • Develop contingency plans; conduct monitoring to ensure effectiveness of remediation strategy.

Table 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: Mod. Pref. Alt.: 1 acre converted 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: Mod. Pref. Alt: 10 acres converted 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 Habitat1** 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, • 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 & Modified Preferred Remedial Action Alternative • 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, 2E & Modified Preferred Remedial Acton Alternative • 38 acres of epibenthic invertebrate habitat • 38 acres of intertidal benthic habitat and 163 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 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 • 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. • 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 • 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. Modified Preferred Remedial Action Alternative • ASB confined disposal facility would convert a portion of the existing wastewater treatment facility to an upland use. • Use of part of the G-P ASB for sediment disposal could limit future pulp mill operations at the G-P facility, if sufficient wastewater treatment capacity could not be provided by the City of Bellingham.	• 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 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.	Alternatives 2B, 2D and 2E • Potential for volatilization of contaminants or wind transport of sediments during disposal. Modified Preferred Remedial Action Alternative • No additional significant impacts expected.	• 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. • No additional impacts andticipated	Alternative 2C, 2D, 2E & Modified Preferred Remedial Action Alternative • Activities proposed are within areas of low probability for cultural resources. • No additional impacts anticipated	• Coordination with the WA State Office of Archaeology and Historic Preservation (OAHP) to ensure impacts to cultural resources are identified and mitigated. • 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.

2 ALTERNATIVES

The Remedial Alternatives evaluated in the Final Environmental Impact Statement (FEIS) are summarized in Table 2 along with a new remedial action alternative that modifies the Preferred Remedial Action Alternative in the FEIS. This modification is a result of a new local upland sediment disposal facility that has been identified since completion of the FEIS – the Aerated Stabilization Basin (ASB) at the G-P facility on Whatcom Waterway. The new remedial action alternative is known as the Modified Preferred Integrated Near Term Remedial Action Alternative (Modified Preferred Remedial Action Alternative).

Since completion of the FEIS all of the alternatives have changed slightly due to three factors. First, an interim sediment remediation/habitat restoration action was completed at the G-P Log Pond, a portion of the Whatcom Waterway site, in early 2001. Second, the current market rate for disposal at the Roosevelt Regional Landfill has decreased by roughly 10 percent, and third, Citizen's Dock (near the head of Whatcom Waterway) was removed for safety reasons by the City of Bellingham. These changes are reflected in this Supplemental EIS and do not change the environmental impact analysis performed in the FEIS. Revised cost estimates are included in this Supplemental EIS, based on detailed estimates presented in the accompanying Whatcom Waterway Supplemental Feasibility Study (Appendix A).

The remainder of this section provides information on the G-P Log Pond Interim Action and describes the new Modified Preferred Remedial Action Alternative that is evaluated in this Supplemental EIS.

Table 2. 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)	Modified Preferred Remedial Action Alternative (ASB Disposal/Potential Treatment)
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)	Dredge w/ ASB Disposal, Beneficial Reuse and/or Treatment (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)	Dredge and Cap w/ ASB Disposal, and/or Treatment (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)	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]	No Action [2]
G-P Log Pond [11]	4	8		No Action	No Action	No Action	No Action	No Action	No Action	No Action
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	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)	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)	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)	Cap
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)	Partial Dredge with Treatment and/or ASB Disposal
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]	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)	Partial Dredge with Treatment and/or ASB Disposal
Total Cleanup Areas:		207	2,500,000							
Approx. Construction & O&M Costs [10, 11, 12]				$24 Million	$33 Million	$36 Million	$79 Million	$124 Million	$29 Million	$25 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.

Table 2. 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)	Modified Preferred Remedial Action Alternative (ASB Disposal/Potential Treatment)
Preliminary Sediment Cleanup Summary (acres):							
Sediment area remediated by complete removal	24	24	59	97	183	60	60
Sediment area remediated by engineered containment:							
Engineered cap areas (incl. dredge & cap locations; excl. CAD areas)	117	146	108	100	15	108-119	108-119
CAD and associated cap/berm edges:							
CAD/cap/berm footprint over existing sediment contamination	29	0	30	0	0	0-11	0
CAD footprint over clean sediments (not in cleanup total)	21	0	33	0	0	0-14	0
Cap and berm footprint over clean sediments (not in cleanup total)	1	0	4	0	0	0-16	0
Retained subsurface contamination areas with clean surface sediments	37	37	10	10	9	9	9
Total Sediment Area Remediated	207	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	560,000
Total Dredged Sediment Requiring Confinement (CY)	420,000	420,000	820,000	1,100,000	2,400,000	820,000	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)	G-P ASB Facility and /or Potential Treatment
Preliminary Habitat Elements (Inner Bellingham Bay):							
Net Change in Aquatic Habitat Acreage	0	0	0	0	+7 acres (Cornwall Landfill)	0	0
Net Change in Aquatic Habitat Elevation (conceptual design):							
High Intertidal (above +8 to +11 feet MLLW)	0	0	0	0	1	1	0
Middle Intertidal (+4 to +8 feet MLLW)	1	1	1	1	1	8	1
Low Intertidal (0 to +4 feet MLLW)	2	2	1	0	0	11	2
Inter/Subtidal (0 to -4 feet MLLW; potential eelgrass restoration areas)	39	3	61	0	-1	15	3
Shallow Subtidal (-4 to -10 feet MLLW)	-6	3	-6	-9	-7	6	4
Deep Subtidal (below -10 feet MLLW)	-36	-10	-57	7	15	-41	-10
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	16
Harbor Areas (excl. federal channels)	88	88	88	49	0	69	80
Other Aquatic Lands	43	43	43	43	8	43	43
Upland Landfill Areas (assuming 25-ft sediment disposal depth)	6	17	7	34	60	7	28

2.1 G-P Log Pond Interim Action

In late 2000 and early 2001, G-P implemented a combined sediment cleanup/habitat restoration action at the G-P Log Pond, part of the Whatcom Waterway Area (Figures 1 and 2). The integrated remediation and habitat restoration project was designed in a manner consistent with the Preferred Remedial Action Alternative described in the FEIS (Anchor 2000; Ecology 2000), and was performed as an Interim Remedial Action under the authorities of the Model Toxics Control Act (MTCA), as set forth in an Agreed Order for this action between G-P and Ecology. The project was also authorized under Clean Water Act Permit No. 2000-2-00424 administered by the U.S. Army Corps of Engineers (Corps).

G-P prepared a Completion Report for the Log Pond project in May 2001 (Anchor 2001). The Completion Report described the placement of approximately 43,000 CY of clean cap/habitat restoration material from regional maintenance dredging projects into the Log Pond. Relatively fine-grained, clean Bellingham Bay (Squalicum Waterway) dredge materials were used to construct the final Log Pond surface. Nearly all of the Log Pond received more than 3 feet of cap/habitat restoration material, tapering to less than 0.5-foot-thick along the perimeter, consistent with the Agreed Order and associated remedial design (Figure 2; Anchor 2001).

The Log Pond remedial/restoration project converted 1.8 acres of deep subtidal, 2.7 acres of shallow subtidal mudflat/debris, and 1.1 acres of low intertidal riprap, all of which previously exceeded State Sediment Management Standards Minimum Cleanup Level (MCUL) criteria, into 2.7 acres of shallow subtidal and 2.9 acres of low intertidal clean silt and sand habitat. The construction project appears to have achieved its intended goal of restoring shallow subtidal and low intertidal habitat to the Log Pond.

G-P performed Year 1 post-construction monitoring within the Log Pond beginning shortly after completion of in-water construction activities. The Year 1 monitoring data verified the integrity and performance of the cap, and documented the development of habitat functions (e.g., biomass and diversity) in the Log Pond within several months of construction. Monitoring will continue during Years 2, 5,

and 10 to document the long-term effectiveness of the remedial/habitat restoration action.

The Log Pond Interim Action will be reviewed by Ecology as part of the development of a Cleanup Action Plan for the entire Whatcom Waterway site. Ecology will determine at that time whether the Log Pond Interim Action is sufficient to act as an element of the final remedy for the Whatcom Waterway site.

2.2 Preferred Remedial Action Alternative from 2000 FEIS

The Preferred Remedial Action Alternative would achieve SQS at priority sediment cleanup sites within Bellingham Bay (Figure 3). This alternative removes contaminated material in quantities that 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 CY (including up to 760,000 CY from the Whatcom Waterway and 60,000 CY from other sites) that may be disposed of in a CAD located adjacent to the Cornwall Avenue Landfill. 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 incorporates possible treatment of contaminated dredged sediments and also acknowledges the potential to beneficially re-use dredged material, if appropriate. The Preferred Remedial Action Alternative was determined to best achieve the seven goals of the Pilot. *Note: With the Interim Action of capping at the G-P Log Pond facility, a component of this alternative has already been implemented.*

2.3 Modified Preferred Remedial Action Alternative

The Modified Preferred Remedial Action Alternative is similar to the Preferred Remedial Action Alternative presented in the 2000 FEIS, and includes provisions for treatment. Under the Modified Preferred Remedial Action Alternative, sediment disposal at the G-P ASB facility would substitute the CAD disposal component of the Preferred Remedial Action Alternative to provide permanent confined sediment disposal. The overall objective of the Modified Preferred Remedial Action Alternative is to achieve state SQS criteria in inner Bellingham Bay, including the

Whatcom Waterway Site, allowing for potential future deepening of the navigation channels, and avoiding disposal on state-owned aquatic lands.

The Modified Preferred Remedial Action Alternative is not a cleanup decision for the purposes of MTCA. Rather, the Modified Preferred Remedial Action Alternative evaluated in this Supplemental EIS can be used to inform future cleanup decisions under MTCA.

A layout of the Modified Preferred Remedial Action Alternative is presented in Figure 4. A representative cross-section of the constructed ASB and adjoining areas is presented in Figure 5, extending from the Whatcom Waterway, through the ASB, and into the I&J Waterway. More detailed descriptions and analyses of the prospective ASB Confined Disposal Facility (CDF) are presented in the accompanying Whatcom Waterway Supplemental Feasibility Study.

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 (primarily using hydraulic cutterhead dredges), 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.
- Potential treatment 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 21-acre portion of the 29-acre ASB facility owned and operated by G-P on property adjacent to the Whatcom Waterway. The specific configuration of the ASB CDF would be determined during subsequent remedial design, and would have the following general characteristics:
    - 760,000 cubic yard disposal capacity, to accommodate contaminated sediment disposal from the Whatcom Waterway site. Since some of the

Whatcom Waterway sediments may be suitable for beneficial reuse (e.g., as ASB capping material), there is a high likelihood of an additional 60,000 cubic yard capacity to accommodate disposal of contaminated sediments from other sites in Bellingham Bay. Thus, the G-P ASB CDF likely has sufficient capacity for confined disposal of all contaminated sediments targeted by the Modified Preferred Remedial Action Alternative (Table 2).

- Retention of navigation and commerce uses within the harbor area, including shoreline access from the water to Cornwall uplands
- Maintenance / provision of public access near Cornwall Avenue, including the corner shallow beach area within the Port Log Rafting Area
- Separation of the 8 acre-portion of the ASB (including influent and outfall structures), which would continue to provide secondary treatment unit for the Bellingham Paper Mill, from the 21-acre sediment disposal facility would likely be accomplished by installing a vertical sheet piling bulkhead near the southern portion of the existing ASB (generally depicted on Figure 4).
- Dredged sediments from the Whatcom Waterway Area that are discharged into the ASB via hydraulic pipeline would undergo sedimentation, resulting in a thickened deposit of material overlain by clarified water (supernatant). The supernatant from the disposal area would be decanted by an overflow weir and discharged into the modified 8-acre secondary treatment facility, where it would be combined with treated effluent from the Bellingham Paper Mill before being discharged through the existing offshore diffused outfall.
- Following placement of contaminated sediments to be confined within the ASB CDF (i.e., up to a maximum consolidated elevation of roughly +18 feet MLLW), capping materials would be placed to raise the grade to the surrounding uplands elevation of approximately +23 feet MLLW.

- Sediments in the G-P Log Pond would continue to be confined below a thick cap finished at elevations that convert subtidal aquatic habitat to intertidal aquatic habitat. Under the Interim Action, land use in this area has been converted from navigation and commerce to provide intertidal habitat. (See Section 2.1 of this Supplemental EIS).
- 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 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. Additional suitable sediment material could be placed in this area to create habitat that would function as a salmonid migratory corridor, while maintaining navigation and commerce access to Cornwall uplands.
- All capped and contained sediment areas would have operation, monitoring, maintenance and adaptive management commitment, with associated funding assurance.

2.3.1 Sediment Sites and Source Control/Sediment Disposal Siting

The Modified 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, upland disposal at the G-P ASB facility, and capping technologies with an opportunity for treatment.

If a viable treatment technology were developed within the timeframe necessary for making critical decisions regarding dredging and disposal at the ASB facility, some or all of the contaminated dredged sediments could be treated. Depending on the amount of sediment treated, a reduced volume of material (from the maximum dredged amount) would be disposed of at the ASB. The final capacity of the ASB would be determined during remedial design based on considerations of detailed engineering designs, Puget Sound Dredge Disposal

Analysis (PSDDA) characterization (see Whatcom Waterway discussion below), and treatment viability.

Specific components of the Modified Preferred Remedial Action Alternative include:

- **Whatcom Waterway Federal Navigation Channel.** Approximately 760,000 CY of surface and subsurface sediments within the Whatcom Waterway federal navigation channel would be primarily hydraulically dredged to the clean, native layer, with portions of the extreme head of the federal channel away from existing mudflats also 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.

  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, suitable material (e.g., passing PSDDA and SMS evaluations) would be beneficially reused within the inner Bay for fills to enhance habitat function, or as ASB cap materials. Dredged material that does not meet these criteria would require confined disposal if treatment were not available.

- **I&J Waterway.** 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 to determine suitability for beneficial reuse or disposal 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 for disposal in the ASB 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.

- **GP Log Pond.** Under an Interim Action, the G-P Log Pond has been capped with an average thickness of 7 feet of clean sediments, finished at intertidal elevations that provide approximately 6 acres of habitat. Adjacent upland remedial activities would be designed to ensure continued protection of surface water and sediments.
- **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). 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.** Approximately 60,000 CY of contaminated sediment 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 of at the ASB facility. 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 mechanically 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.** Shoreline areas of the Cornwall Landfill 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. Additional clean sediment could be placed to create habitat suitable for creation of a salmonid migratory corridor.
- **Harris Avenue Shipyard.** Approximately 20,000 CY of contaminated sediment would be dredged (to the clean native layer) and disposed of at the ASB facility. A 2-acre 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.** Monitoring at this site shows that sediment contamination at the outfall area has recovered to levels that are below SQS cleanup criteria. Additional monitoring at this site will continue under G-Ps NPDES permit to verify that sediment contaminate levels continue to remain below cleanup standards.
- **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 ASB facility. These materials would come from contaminated sediment sites in Bellingham Bay that are currently undergoing Remedial Investigation/Feasibility Studies under Ecology's supervision.

2.3.2 Habitat

The Modified Preferred Remedial Action Alternative converts subtidal aquatic habitat to intertidal aquatic habitat through the use of caps. 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.

- Approximately 6 acres of intertidal and shallow subtidal mudflat habitat that has already been created through implementation of the Log Pond Interim Action would remain in place.
- A habitat bench adjacent to the Cornwall Avenue Landfill would likely convert approximately 3 to 5 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 18 to 20 acres of subtidal habitat would be converted to intertidal habitat.

2.3.3 Land Use

The land use component of the Modified Preferred Remedial Action Alternative is similar to Preferred Remedial Action Alternative, with the exception of eliminating the Cornwall CAD facility and converting a portion of the ASB wastewater treatment facility to upland use. The ASB CDF would be designed to allow for future upland development at this site.

As with the Preferred Remedial Action Alternative in the FEIS, dredging of contaminated sediments at the head of the Whatcom Waterway would provide flexibility to accommodate the navigation and public access issues associated with the Whatcom Creek Waterfront Action Program and New West Fisheries. The Modified Preferred Remedial Action Alternative includes full removal (where technically feasible) of contaminated sediment from the Whatcom Waterway federal navigation channel. The Modified 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.

Finally, G-P and the Port of Bellingham, as property owners of the Log Pond, have converted land use at this facility from navigation and commerce to intertidal habitat.

2.3.4 Comparative Evaluation of Remedial Alternatives

All of the Integrated Near-Term Remedial Action Alternatives proposed during the development of the Bellingham Bay Comprehensive Strategy 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. In the FEIS, a comparative evaluation of the Integrated Near-Term Remedial Action Alternatives was presented, indicating that the Preferred Remedial Action Alternative achieved the highest rating when measured against the seven baywide goals.

Because the G-P ASB facility was not available for sediment disposal at the time of the screening, it was not included in the original mix of Integrated Near-Term Remedial Action Alternatives. Table 3 presents a similar comparison of all of the Integrated Near-Term Remedial Action Alternatives, including the Modified Preferred Remedial Action Alternative. As evidenced by this evaluation the Modified Preferred Remedial Action Alternative may better achieve the Pilot goals over the Preferred Remedial Action Alternative identified in the FEIS.

Table 3. 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	Modified Preferred Remedial Action Alt.
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[4] Implement actions that will protect, restore, or enhance habitat components making up the bay's ecosystem (5)	**High.** Provides most protection at head of Whatcom Waterway; 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.	**High.** Provides protection at head of Whatcom Waterway; 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.	**Medium.**[1] Loss of habitat at head of Whatcom Waterway; 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 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.	**Meduim/High.** Provides protection at head of Whatcom Waterway; enhances salmonid migratory corridor adjacent to Cornwall Landfill.
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.**	**High.** 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.	**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; avoids potential impacts to tribal fishing areas.
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 in FEIS 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.						**Highest.** Use of the ASB CDF would maximize re-use of existing resources for sediment disposal; on site disposal reduces resource requirements of transport to off-site upland facilities.
"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.	**High.** Achieves multiple objectives; proportional habitat benefit with cost of additional dredging; provides opportunity for treatment	**Highest.** Achieves multiple objectives while maximizing use of existing resources; 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.	**High.** Current and future navigation needs addressed in larger portion of the channel.	**Highest.** Current and future navigation needs addressed in larger portion of the channel; potential for upland redevelopment at ASB site.
Evaluation Summary[5] 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.	**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.	**Highest.** Cleanup activities serve multi-purposes; creation of habitat enhancement corridors; 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.

3 ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION – MODIFIED PREFERRED REMEDIAL ACTION ALTERNATIVE

The Modified Preferred Remedial Action Alternative is similar to the Preferred Remedial Action Alternative identified in the FEIS, with the exception of using a portion of the G-P ASB facility as the primary disposal facility for contaminated sediments, rather than the Cornwall CAD. By using existing on-site resources for disposal, this Modified Preferred Remedial Action Alternative best achieves the seven interrelated goals of the Pilot (Section 1.2).

The following section describes the potential impacts and proposed mitigation associated with implementation of the Modified 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.

3.1 Geology, Water, Sediment, and Environmental Health

3.1.1 Impacts

Potential adverse impacts to geology, water, sediment, and environmental health associated with implementation of the Modified Preferred Remedial Action Alternative are similar to those impacts associated with the Preferred Remedial Action Alternative and are mainly associated with (1) dredging and transport, (2) the long-term operation and effectiveness of the G-P ASB CDF and (3) the long-term effectiveness of cap structures. Potential water quality impacts are lessened under the Modified Preferred Remedial Action Alternative, as no short-term water quality impacts associated with CAD construction and the disposal of contaminated sediments within CADs would occur (Table 1).

3.1.1.1 Dredging and Transport

As described in the FEIS, 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, including localized turbidity and associated contaminant concentrations, and reduction in dissolved oxygen levels. By generating contaminated sediment residuals that remain after

successive dredging passes, sediment resuspension can also complicate effective removal of contaminated sediments.

The Modified Preferred Remedial Action Alternative proposes using a hydraulic cutterhead mechanism to dredge contaminated sediments from the Whatcom Waterway Site. While hydraulic dredging and transport (consisting of a hydraulic suction pipeline with a rotating cutterhead attached to the suction intake) was considered in the FEIS, this option was not carried forward for evaluation because a large local CDF was not available at the time the FEIS was completed to accommodate the dredge slurry. However, this Supplemental EIS evaluates a large local CDF, the G-P ASB, which may now be made available for use as a disposal facility for sediments dredged from the Whatcom Waterway and other suitable sites in Bellingham Bay. With the availability of this large local CDF, water quality requirements could be met at the disposal site and reasonable production rates achieved with hydraulic dredging and transport.

Sediment resuspension rates associated with typical operation of mechanical and hydraulic cutterhead dredges are discussed in detail in the accompanying Supplemental Feasibility Study for Whatcom Waterway. Based on the available empirical data, sediment resuspension rates are clearly lower for hydraulic cutterhead dredges, as compared with mechanical dredges. Thus, the use of hydraulic cutterhead dredges in the Modified Preferred Remedial Action Alternative is expected to have fewer short-term water quality impacts and improve implementability (reduced contaminated sediment residuals) benefits, relative to the other removal alternatives.

Water quality discharge limitations applicable to the ASB treatment facility outfall would be addressed during (and following) the sediment disposal in the ASB. Appropriate discharge limitations from the ASB during the remedial action/sediment disposal period will be developed as part of remedial design, consistent with state and federal regulations.

As discussed in the Supplemental Feasibility Study for Whatcom Waterway, in order to ensure that prospective discharge limits are not exceeded, up to a 16-inch hydraulic dredge could operate continuously or a larger 26-inch

dredge could be operated approximately 12 hours per day. Both the 16-inch and 26-inch dredges are capable of completing dredging of approximately 760,000 CY in the Whatcom Waterway area within a 2- to 5-month time frame.

A detailed water quality assessment of dredging and disposal actions would be performed during remedial design to assess the need for and scope of operational limitations to ensure water quality protection. These evaluations would include assessment of potential short-term increases in contaminant mobility during hydraulic dredging, along with detailed assessment of sediment settling within the ASB. Concurrent with remedial design, potential modifications of the ASB would be evaluated by Ecology under its existing NPDES authorities, to ensure that the facility continues to provide required wastewater treatment for G-P's Bellingham Paper Mill.

3.1.1.2 Long-Term ASB Operation

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

- Stability of the ASB CDF facility
- Isolation and long-term integrity of the ASB CDF
- Water quality protection

The FEIS presented a detailed evaluation of CDFs relative to each of these three criteria. Briefly, among other design criterion, upland CDFs such as the ASB 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). To achieve this criterion, contaminated sediments are often confined within berms of selected imported fill that has a higher strength than the native sediments. The existing CDF berm (Figure 5) was designed and constructed to maintain the stability of the ASB during strong seismic shaking. Long-term stability of the ASB and interior sheet piling structures would be re-evaluated during remedial design to ensure that the disposal facility continues to retain its integrity.

As described in the Whatcom Waterway RI/FS (Anchor and Hart Crowser 2000) and accompanying Supplemental FS, the Corps, EPA and others have developed detailed procedures to ensure the long-term protectiveness of upland CDFs. Based on initial application of these procedures, no water quality controls are likely necessary at the G-P ASB to ensure long-term water quality protection. Moreover, all leachate generated by the ASB during the dewatering/consolidation period (and thereafter) would be discharged into the secondary treatment unit, prior to being discharged through an offshore diffused outfall. Nevertheless, a detailed long-term water quality assessment of the disposal site would be performed during remedial design, using the results of sediment leachate testing. These evaluations would assess the need for and scope of design requirements at the disposal site to ensure long-term water quality protection.

Based on data collected during the RI/FS (Anchor and Hart Crowser 2000), sediment concentrations within the Whatcom Waterway area dredge prism (Figure 4) are below MTCA soil cleanup levels for unrestricted land uses, particularly if water quality is already addressed (see above). For example, the MTCA unrestricted land use cleanup level for mercury in soil to protect from potential soil contact exposures is 18 milligrams per kilogram (mg/kg; Ecology 2001) while the maximum sediment mercury concentration within the dredge prism is 12 mg/kg. Thus, few if any restrictions on the future upland use of the ASB CDF are likely. The need for and/or scope of possible future controls at the ASB would be determined during remedial design.

The G-P ASB was constructed in 1978, and has been used since that time for secondary wastewater treatment, particularly for G-P's former pulp mill operations. The Corps' 1978 Clean Water Act permit to G-P for construction of the ASB (Permit No. 071-OYB-2-004368), along with other approvals required for that action, included off-site mitigation for habitat losses that resulted from construction. Federal Clean Water Act permitting for dredging, transport/placement, and capping actions under the Modified Preferred Remedial Action Alternative would likely be performed as part of a Nationwide 38 permit for the entire Whatcom Waterway Area cleanup action.

3.1.1.3 Cap Construction & Long-Term Effectiveness of Cap Structures

Isolation and Long-Term Integrity of the Capping System

The long-term performance of cap structures is evaluated by the 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. During design, engineering analysis is performed to ensure isolation and integrity of the cap 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 potential for bioturbation and/or exposure of deep burrowing aquatic life to subsurface contaminants is considered during design. 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 occur 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, 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.

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.

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.

Water Quality Protection

There are short-term impacts associated with cap construction including 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.

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 these sites 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 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.

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.

3.1.2 Mitigation

Mitigation for this alternative would be similar to that described for the Preferred Remedial Action Alternative in the FEIS, with measures taken to ensure water quality standards are met during construction and operation.

3.1.2.1 Dredging and Transport

Water quality monitoring for turbidity, dissolved oxygen, and selected contaminants of concern is normally required for contaminated sediment dredging projects. Initially, monitoring is performed frequently and in "real time" to rapidly identify if concerns exist. If water quality concerns are not identified, then monitoring frequencies may be reduced. However, if unacceptable contaminant releases, turbidity levels, or other water quality criteria are exceeded during the monitoring, dredging would be terminated until operations or equipment can be altered to ensure environmental compliance.

Water quality control measures available to the contractor during dredging operations include:

- Oil booms. Oil booms are appropriate for sediments that are likely to release oils when disturbed. Such booms typically consist of a series of synthetic foam floats encased in fabric and connected with a cable or chains. Oil booms are not anticipated to be required for work in most of Bellingham Bay, although localized sites requiring this equipment may be identified during final design and as a result of construction monitoring.
- Silt curtains/screens. Curtain and screens are flexible barriers that hang down from the water surface. Both curtains and screens use a series of floats on the surface and a ballast chain or anchors along the bottom. Silt curtains are made from impervious material such as coated nylon and primarily redirect flow around the dredging area rather than blocking the entire water column. In contrast, silt screens are made from synthetic geotextile fabrics, which allow water to flow through but retain a fraction of the suspended solids. Tidal fluctuations, wind, currents, and vessel traffic can hamper the effectiveness and use of silt curtains/screens. Nevertheless, such equipment may be specified during final design, often as a final permitting requirement.
- Bubble walls. Bubble walls are produced by temporary piping laid on the sediment surface surrounding the dredge area that produce a steady stream of air bubbles up to the surface. The flow of the bubbles up through the water column produces a barrier to suspended materials.

Wind or currents can impact bubble walls. Bubble walls have not been used extensively by contractors in Puget Sound, though design-level analyses suggest that they perform as well or better than silt curtains in certain tidal environments.

- Dredging or transport modifications. The contractor can modify dredging procedures if water quality becomes a concern. Controlling the rate of descent and retrieval of the clamshell bucket can effectively reduce sediment resuspension and turbidity during dredging, which leads to reductions in water quality impacts during dredging operation.

3.1.2.2 Cap Construction

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

- Use watertight buckets and mechanically dredge
- Site the cap in a low current environment
- Use bottom-dump barges
- Use a downpipe
- Optimize tidal currents

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

3.1.2.3 Long-Term Cap Operation

Confirmatory 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 it appeared that boat anchors were affecting the integrity of a cap structure, navigation restrictions could be imposed. Contingencies could be implemented after construction of the original cleanup action.

3.2 Fish and Wildlife

3.2.1 Impacts

3.2.1.1 Aquatic Habitat/Resources

Adverse and beneficial impacts for aquatic habitat, fish, shellfish, and benthic/epibenthic organisms are listed in Table 4.

Potential impacts from implementing the Modified Preferred Remedial Action Alternative would be reduced from those described in the FEIS for the Preferred Remedial Action Alternative. Both alternatives include the loss of approximately 0.5 acres of eelgrass habitat at Cornwall Avenue Landfill, disturbance of approximately 38 acres of intertidal habit, and conversion of roughly 1 acre of intertidal to subtidal habitat, with a corresponding loss of rearing/foraging habitat for juvenile finfish, Dungeness crab, salmonids, flatfish, hardshell clams, and pandalid shrimp. However, compared to the original Preferred Remedial Action Alternative, the Modified Preferred Remedial Action Alternative would avoid disturbance to approximately 16 acres of subtidal benthic habitat. The original Preferred Remedial Action Alternative converted 40 acres of subtidal habitat to intertidal/shallow subtidal habitat, with a corresponding loss of rearing habitat for juvenile finfish, Dungeness crab, and pandalid shrimp. The Modified Preferred Remedial Action Alternative would only convert approximately 20 acres of subtidal habitat to intertidal/shallow subtidal habitat.

3.2.1.2 Upland Habitat

Potential impacts would be as described for the Preferred Remedial Action Alternative in the FEIS—the Modified Preferred Remedial Action Alternative would not alter any functional upland habitat, and no impacts to terrestrial wildlife are expected.

Table 4. Modified Preferred Remedial Action 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	The Modified Preferred Remedial Action Alternative would consist of: ▪ 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	The Modified Preferred Remedial Action Alternative would consist of: ▪ 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	The Modified Preferred Remedial Action Alternative would consist of: ▪ 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 Work Group.	▪ 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 (completed under Interim Action)	▪ No changes	▪ No changes	▪ No changes

Table 4. Modified Preferred Remedial Action Alternative: Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
G-P Aerated Stabilization Basin (Capping Element)	The Modified Preferred Remedial Action Alternative would consist of: ▪ 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 Work Group.	▪ 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 Work Group. ▪ Capped areas could be enhanced. ▪ 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.
Port Log Rafting Area	Modified Preferred Remedial Action Alternative would consist of: ▪ 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 Work Group.
Starr Rock	Modified Preferred Remedial Action Alternative would consist of: ▪ 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.

Table 4. Modified Preferred Remedial Action Alternative: Summary of Aquatic Resource Adverse Impacts and Benefits (continued)

Contaminated Sediment Cleanup Areas	Changes / Impacts	Changes / Benefits	Summary
Cornwall Avenue Landfill	Without the construction of a CAD facility there would be fewer changes or impacts to aquatic resources. However, similar to the Preferred Remedial Action Alternative, the Modified Preferred Remedial Action Alternative would include: ▪ Capping of the existing solid waste substrate adjacent to the Cornwall Landfill, resulting in the loss of 0.5 acres of existing eelgrass.	Without the construction of the CAD facility, there would be fewer habitat benefits provided than with the Preferred Remedial Action Alternative. However, the Modified Preferred Remedial Action Alternative would provide the following changes/benefits: ▪ Restoration and improved 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. ▪ Enhanced migratory corridor and the potential for eelgrass restoration are both consistent with the habitat objectives developed by the Pilot Work Group.	Without the CAD construction the Modified Preferred Remedial Action Alternative would not achieve the same level of aquatic habitat benefits that were presented in the FEIS for the Preferred Remedial Action Alternative. However, the Modified Preferred Remedial Action Alternative would include many of the same attributes as the Preferred Remedial Action Alternative: ▪ Proposed action would eliminate the exposure of aquatic organisms to deleterious substances. ▪ 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

As with the Preferred Remedial Action Alternative, dredging and capping construction activities under the Modified Preferred Remedial Action Alternative 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. Under the Interim Action, approximately 6 acres of mudflat has been developed in the G-P Log Pond that provides 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. Following construction, the physical elevations will be appropriate for the potential development of 5+ acres of eelgrass habitat, which, if successful, could provide benefits for black brant, geese, and other aquatic birds that feed on species that use eelgrass beds.

Marine Mammals

As with the Preferred Remedial Action Alternative, under the Modified Remedial Action Alternative, no haul out sites or pupping areas occur at or near the sites affected by dredging and capping 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. As with the Preferred Remedial Action Alternative, under the Modified Preferred

Remedial Action Alternative, 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

As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, 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.

Similar to the Preferred Remedial Action Alternative, juvenile salmon, including chinook, should benefit from habitat restoration actions under the Modified Preferred Remedial Action Alternative, as there would be a substantial increase in the available area of intertidal mudflat within the Whatcom Waterway (including nearly 6 acres already established under the Interim Action 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 the Modified Preferred Remedial Action Alternative. The sites proposed for dredging and capping 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.

As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, 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 the Modified Preferred Remedial Action Alternative, 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.

3.2.2 Mitigation

Mitigation for this alternative would be similar to that described for the Preferred Remedial Action Alternative in the FEIS, with permit/approval mechanisms applied at the discretion of the applicable regulatory agencies, such as the required Corps permit, Ecology water quality certification, and Endangered Species Act consultation with the federal services (NMFS and USFWS). To protect critical life-cycle periods of key resources from possible exposure to contaminant releases and other potential water quality impacts resulting from dredging and capping operations, such operations are prohibited during some portions of the year. Although adult and sub-adult chinook and coho salmon (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 Clean Water Act Section 401 for protection of water quality and aquatic species, and through the development of habitat conservation measures identified through Section 7 Endangered Species Act consultation. The same potential protection measures identified for juvenile salmonids would also be protective of juvenile bull trout.

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 the FEIS) could be used during future permitting activities to quantify mitigation requirements.

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

3.3.1 Impacts

3.3.1.1 Navigation and Commerce

The impacts of the Modified Preferred Remedial Action Alternative would be similar to those described for the Preferred Remedial Action Alternative in the FEIS and are summarized in Table 5. However, without the construction of a CAD facility, barge traffic during construction would be reduced under this alternative. Water dependent access would be enhanced at the northwest side of the head of the Whatcom Waterway.

In capped areas, elevations would shift to intertidal or shallow subtidal, potentially limiting the use of the area for boating during low tide periods. To reduce the risk of navigational accidents in capped areas, a Restricted Navigational Area (RNA) may be established. These RNAs will limit the anchorage associated with commercial shipping operations due to concerns about anchor scour on the cap surface. Water dependent access would continue to be enhanced at the northwest side of the head of the Whatcom Waterway.

3.3.1.2 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 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.

Potential impacts to tribal and commercial fishing would be less under this alternative than the Preferred Remedial Action Alternative since a CAD facility would not be constructed.

3.3.1.3 Recreational Uses and Public Access

Potential impacts to recreational uses and public access would be as described for the Preferred Remedial Action Alternative in the FEIS. An 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.

The proposed change in use of the existing ASB facility is consistent with the current zoning code and Shoreline Master Program designation for the site. Future use or re-development of the CDF at the ASB facility is not considered in this SEIS, but may require a subsequent environmental review process.

3.3.2 Mitigation

The need for potential mitigation measures is reduced under this alternative from those measures described for the Preferred Remedial Action Alternative in the FEIS, primarily due to the elimination of a CAD disposal facility. Restricted Navigation Areas may be necessary to ensure the integrity of capped areas.

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 to address Tribal Treaty Rights will be identified by the Lummi and Nooksack tribes prior to permitting.

3.4 Air and Noise

3.4.1 Impacts

The impacts of the Modified Preferred Remedial Action Alternative would be similar to those described for the Preferred Remedial Action Alternative in the

FEIS. 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.

3.4.2 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.

3.5 Cultural Resources

3.5.1 Impacts

The impacts of the Modified Preferred Remedial Action Alternative would be similar to those described for the Preferred Remedial Action Alternative in the FEIS. However, without the construction of a CAD facility, the potential for a CAD to be placed over an area that contains unidentified cultural resources would be avoided. 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.

3.5.2 Mitigation

No mitigation measures are anticipated to be required for this alternative. However, in the event that cultural artifacts are uncovered during remedial design activities 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.

Table 5 Potential Navigation and Commerce Impacts Associated with the Modified Preferred Remedial Action 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.	As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, 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.	As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, there would be no change in current use.
G-P Log Pond (8 acres)	Shared ownership by the Port and G-P. The area was recently capped under an Interim Action, containing contaminated sediments in this location and creating new habitat.	Under the Interim Action, the G-P Log Pond has been converted to habitat use, preventing use of the area for 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 upland area is used primarily for small boat traffic along the shoreline. Some tribal/commercial fishing.	As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, 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 would 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 limitation may be necessary to protect cap integrity.
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).	As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, proposed 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 the current log rafting uses, but may limit future uses.
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.	As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, 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.	Under the Modified Preferred Remedial Action Alternative, a portion of this area would be capped (not included as part of a CAD), and elevations would shift to intertidal or shallow subtidal, potentially 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 G-P ASB above). Existing beach access would be maintained along portions of Cornwall Avenue Landfill.
Harris Ave. Shipyard (4 acres)	Shipyard activities including the operation of a drydock	As with the Preferred Remedial Action Alternative, under the Modified Preferred Remedial Action Alternative, this area would 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.

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APPENDIX A: COST ESTIMATE

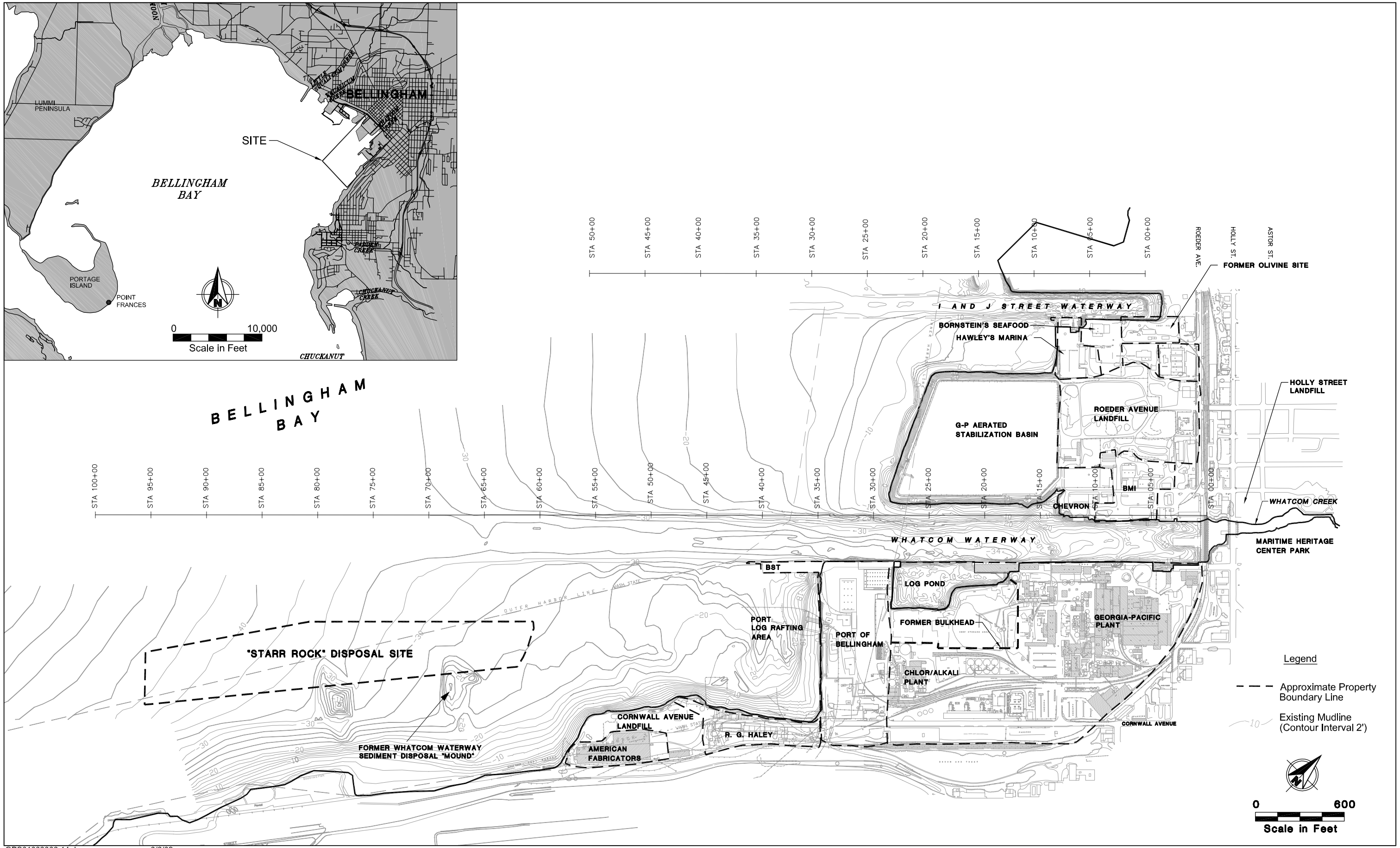

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Figure 1
Vicinity Map
Draft Supplemental EIS - Bellingham Bay Comprehensive Strategy

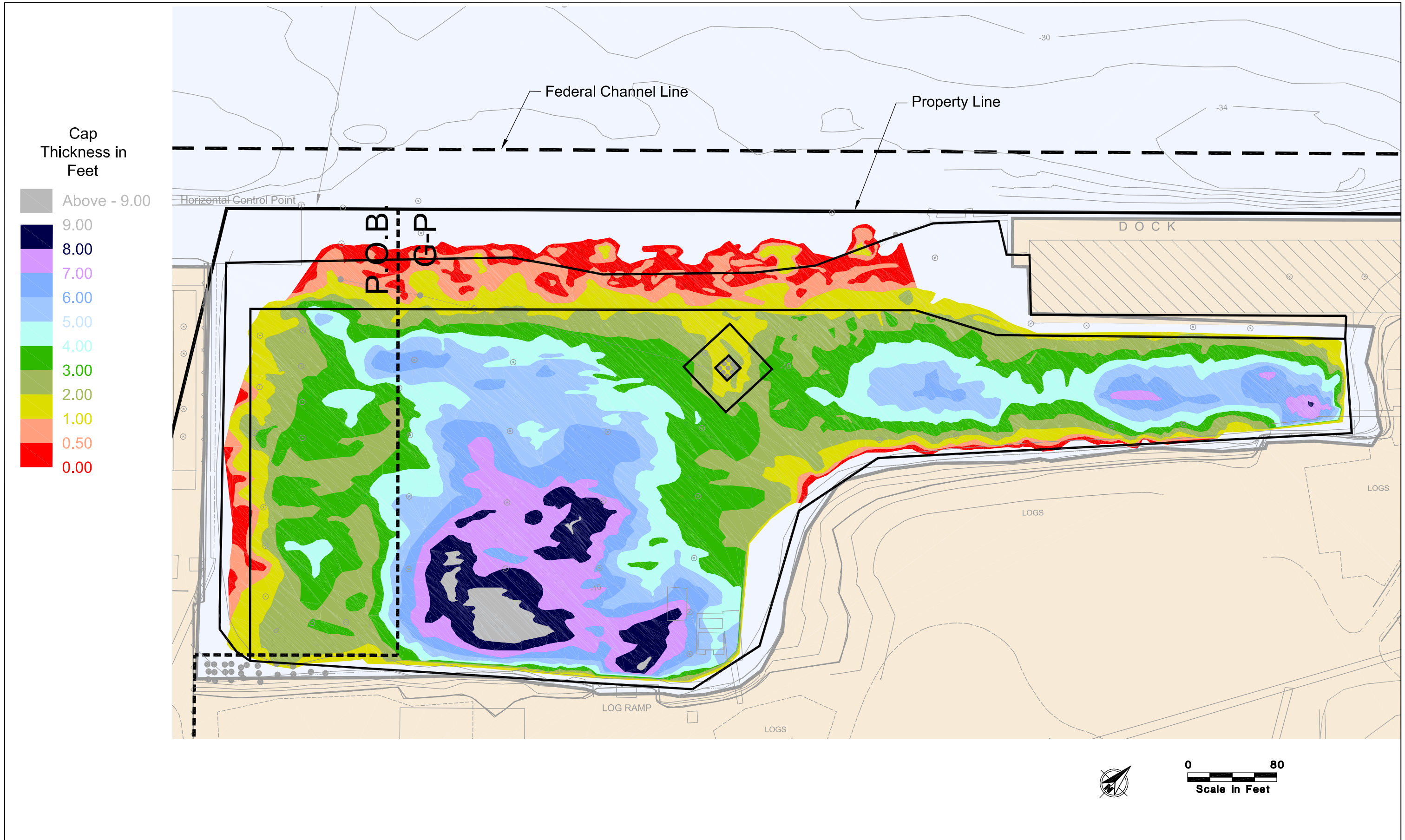

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Figure 2
Log Pond Interim Action Cleanup and Habitat Restoration - Cap Thickness
Draft Supplemental EIS - Bellingham Bay Comprehensive Strategy

Sediment Site Unit

1. Whatcom Waterway (−30)
2. Head of Whatcom (−30)
3. Head of Whatcom (−18)
4. G−P Log Pond
5. G−P Aerated Stabilization Basin
6. Port Log Rafting Area
7. Starr Rock
8. I & J Street Waterway

Cap footprint modified to avoid existing eelgrass

Navigation/Public Access addressed. Existing habitat protected.

Dredge former disposal mound to stable slopes (approx. 2,000 CY).

Dredge and cap area. Existing effluent pipeline prevents full removal.

Thick cap/Intertidal Habitat constructed in G-P Log Pond (completed)

MAXIMUM CORNWALL CAD (820k CY - 26 acres)

MINIMUM CORNWALL CAD (300k CY - 11 acres)

10:1 Slope

Water-Dependent Access Area

Water-Dependent Access Area

Other Sediment Sites:
Dredge up to 60,000 CY from Harris Ave. Shipyard, Olivine Nearshore Area, and other sites; dispose in Cornwall CAD or treat. Capping also likely to occur.

REMEDIAL ACTION LEGEND

- Dredge and Dispose
- Possible Dredge and Beneficial Re-use (Pending PSDDA and MTCA testing)
- Dredge and Dispose, Followed by Cap
- Cap (Nominal 3')
- Cap with Armor/Habitat Areas
- Existing Eelgrass Bed
- Salmonid Migration Enhancement Corridors
- ASB Sediment Disposal Areas
- No Action

CAD LEGEND

- CAD Footprint over Unemcumbered State Owned Aquatic Land (SOAL)
- CAD Footprint over >50% Solid Waste Deposits on SOAL

Mudline Bathymetry in Feet
Contour Interval = 2 feet
Contour Interval = 10 feet

0 600
SCALE IN FEET

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Figure 3
Preferred Integrated Near-Term Remedial Action Alternative
Draft Supplemental EIS - Bellingham Bay Comprehensive Strategy

Sediment Site Unit

1. Whatcom Waterway (−30)
2. Head of Whatcom (−30)
3. Head of Whatcom (−18)
4. G−P Log Pond
5. G−P Aerated Stabilization Basin
6. Port Log Rafting Area
7. Starr Rock
8. I & J Street Waterway

Cap footprint modified to avoid existing eelgrass

G.P. Upland Disposal Site with Nominal 5-Foot Cap (Approx. 760,000 CY Capacity)

Navigation/Public Access addressed. Existing habitat protected.

Dredge former disposal mound to stable slopes (approx. 2,000 CY).

Dredge and cap area. Existing effluent pipeline prevents full removal.

Figure 5 Cross Section

G-P Log Pond Interim Action

Other Sediment Sites: Dredge up to 60,000 CY from Harris Ave. Shipyard, Olivine Nearshore Area, and other sites; dispose in Cornwall CAD or treat. Capping also likely to occur.

REMEDIAL ACTION LEGEND

- Dredge and Dispose
- Possible Dredge and Beneficial Re-use (Pending PSDDA and MTCA testing)
- Dredge and Dispose, Followed by Cap
- Cap (Nominal 3')
- Cap with Armor/Habitat Areas
- Existing Eelgrass Bed
- Salmonid Migration Enhancement Corridors
- ASB Sediment Disposal Areas
- No Action

Mudline Bathymetry in Feet
Contour Interval = 2 feet
Contour Interval = 10 feet

0 600
SCALE IN FEET

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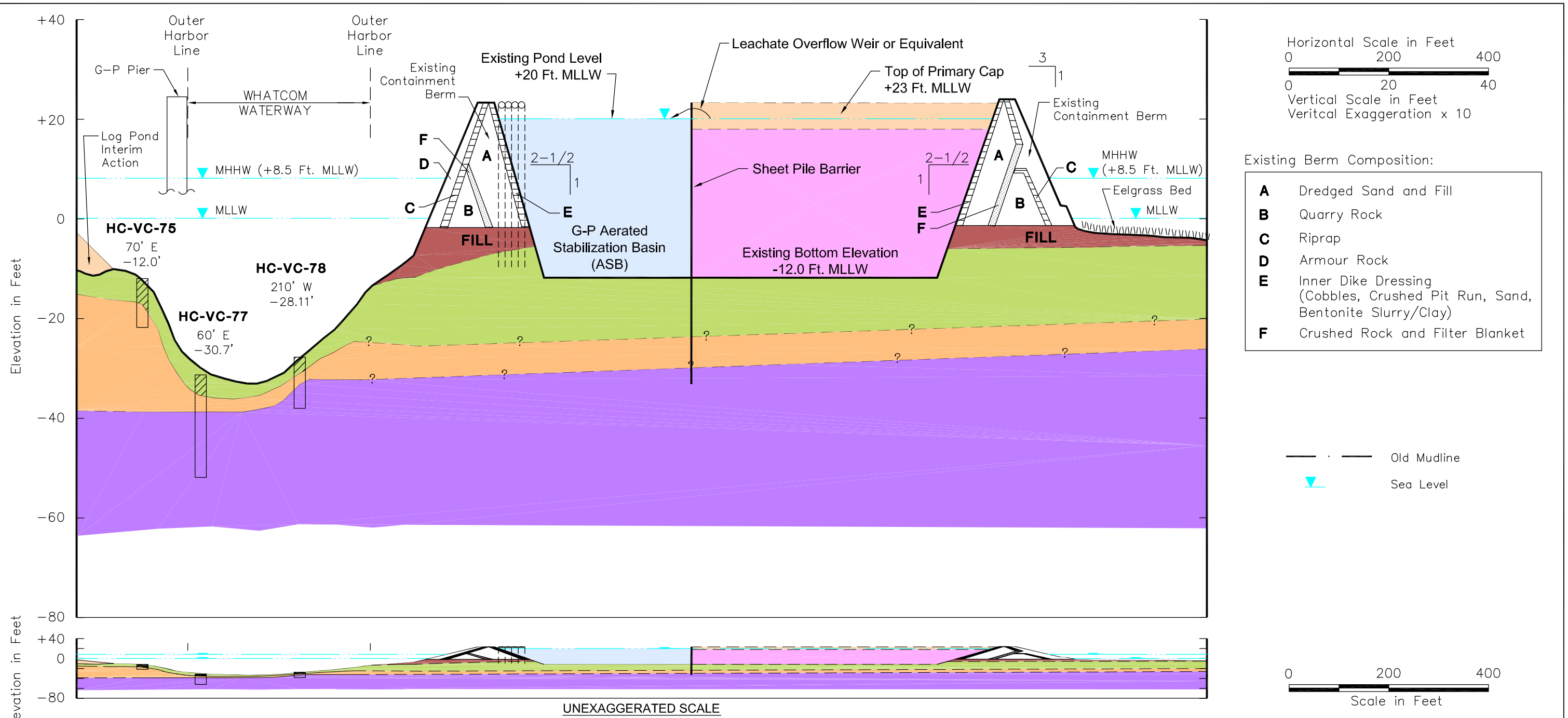
Figure 4
Modified Preferred Integrated Near-Term Remedial Alternative
Draft Supplemental EIS - Bellingham Bay Comprehensive Strategy



Existing Berm Composition:

A	Dredged Sand and Fill
B	Quarry Rock
C	Riprap
D	Armour Rock
E	Inner Dike Dressing (Cobbles, Crushed Pit Run, Sand, Bentonite Slurry/Clay)
F	Crushed Rock and Filter Blanket

HC-VC-74 Core Number

290' E
−4.2
Offset Distance and Direction
Elevation in Feet MLLW

Mudline Elevation
Bottom of Core Drive
Depth of SQS Exceedences for Mercury and Phenols

- Dredged Material from Remedial Activities in Bellingham Bay
- Minimum 5−Foot−Thick Sand/Gravel Cap
- Construction Fill consisting of SAND and GRAVEL with varying amounts of debris.
- Recent Deposits of very soft, (soupy), black SILT with sand, wood, and plant fragments.
- Pre−Dredge Fluvial Deposits of (medium dense), gray, non−silty to silty, fine to medium SAND with scattered shell fragments, gravel, and silt lenses.
- Glacial Marine Outwash deposits of (stiff), gray, silty CLAY with scattered gravels and sand lenses.

Notes:
1. Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.
2. Inferred sediment contacts and lithology changes are gradual and may vary. Refer to core logs in Appendix A for detailed descriptions and elevations.
3. G−P Biotreatment Lagoon schematics based on Corps inspection records and permit plans, May 1977. As−built drawings may differ from cross section plan.
4. Vertical datum based on Mean Lower Low Water Datum (MLLW) Sea Level = 0 feet.
5. Drawing modified from electronic file provided by Hart Crowser entitled "44780616.dwg", dated June 29, 1998.

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Figure 5
Typical Cross-Section
GP-ASB Confined Disposal Facility
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Cost Estimate
Modified Preferred Remedial Action Alternative

Item	Unit	Unit Cost	No. of Units	Total Cost
Mobilization/Demobilization	PERCENT	4%	$15,813,000	$633,000
Outer/Mid Whatcom Waterway - SSU 1				
- Cap	CY	$15.0	42,800	$642,000
- Hydraulic Dredge and Pipeline Transfer to G-P ASB	CY	$4.0	570,000	$2,280,000
Head of Whatcom Waterway (30' Channel) - SSU 2				
- Cap	CY	$15.0	34,000	$510,000
- Hydraulic Dredge and Pipeline Transfer to G-P ASB	CY	$4.0	80,000	$320,000
Head of Whatcom Waterway (18' Channel) - SSU 3				
- Cap	CY	$15.0	0	$0
- Hydraulic Dredge and Pipeline Transfer to G-P ASB	CY	$4.0	40,000	$160,000
G-P Log Pond - SSU 4				
- Maintain existing Interim Action cap	-	-	-	-
G-P ASB - SSU 5				
- Cap	CY	$15.0	146,700	$2,201,000
- Hydraulic Dredge and Pipeline Transfer to G-P ASB	CY	$4.0	10,000	$40,000
Port Log Rafting Area - SSU 6				
- Cap	CY	$15.0	48,700	$731,000
- Hydraulic Dredge and Pipeline Transfer to G-P ASB	CY	$4.0	60,000	$240,000
Starr Rock - SSU 7				
- Cap	CY	$15.0	145,900	$2,189,000
I&J Street Waterway - SSU 8				
- No Action	-	-	-	-
Cornwall Landfill				
-Cap	CY	$15.0	58,000	$870,000
Disposal - G-P ASB Upland CDF				
- Internal sheet piling wall to separate disposal area from ASB	LF	$2,400	1,000	$2,400,000
- Silt curtains	LS	$150,000	1	$150,000
- Structural cap	CY	$22.0	140,000	$3,080,000
Engineering Design	PERCENT	10%	$15,813,000	$1,581,000
Construction Monitoring/Management	PERCENT	5%	$15,813,000	$791,000
Long-term Monitoring	LS	$500,000	1	$500,000
Contingency	PERCENT	30%	$19,318,000	$5,795,000
TOTAL ESTIMATED COST				$25,113,000