2 Project Background

This section provides background information regarding the Whatcom Waterway site, the Bellingham Bay Demonstration Pilot, and the context of this Supplemental EIS. This information is provided to assist readers in understanding the purpose and context of this document. Also included in this section is an introduction to sediment cleanup laws and techniques (Section 2.4) that are relevant to the project.

2.1 Whatcom Waterway Site History

The Whatcom Waterway Site ("Site") consists of lands located within and adjacent to the Whatcom Waterway in Bellingham, Washington (Figure 1-1). Mercury and other contaminants have been detected within the Site at concentrations that exceed cleanup standards defined under MTCA and SMS regulations.

2.1.1 Site-Area History

The vicinity of the Whatcom Waterway site area has been used for industrial activities by multiple parties since the late 1800s. Industrial operations conducted within the area include, but are not limited to, the following:

- Coal shipping
- Log rafting
- Pulp and paper mill operation
- Chemical manufacturing
- Cargo terminal operations
- Grain shipment
- Fish processing and cannery operations
- Bulk petroleum terminal operations (two facilities)
- Boatyard operation
- Handling of sand, gravel, and other mineral ores
- Municipal landfill operations
- Multiple lumber mills and a wood products manufacturing operations
- Operation of a co-generation power plant.

Pulp and paper mills have been operated on the Pulp and Tissue Mill Site (Figure 1-1). In the early 1900s the mills were operated by Puget Sound Pulp and Timber. The mills were later sold to Georgia Pacific (GP) in the 1960s.

In 1965 GP constructed a chlor-alkali plant adjacent to the Log Pond. The plant operated between 1965 and 1999 using a mercury cell process to produce chlorine, sodium hydroxide, and hydrogen. Between 1965 and 1971, mercury-containing wastewaters from the chlor-alkali plant were discharged directly into the Log Pond. Between 1971 and 1979 pretreatment measures were installed to reduce mercury discharges. Chlor-alkali plant wastewater discharges to the Log Pond area were discontinued in 1979, following construction of the Aerated Stabilization Basin (ASB).

The ASB facility was constructed by GP during 1978 and 1979 for management of wastewaters in compliance with the Clean Water Act. The ASB design was approved by Ecology in 1978, and a Corps permit and City Shoreline Substantial Development Permit were obtained. Permitting included completion of an EIS for the project (Brown and Caldwell, 1978). The outfall from the ASB continues to be owned by GP and wastewater and sediment quality in that area are monitored under the National Pollutant Discharge Elimination System (NPDES) permit program (Permit No. WA-000109-1).

The Whatcom Waterway was listed by Ecology as a contaminated site in the early 1990s. The site RI/FS process was initiated after completion of a site hazard assessment by Ecology, and after development of an Agreed Order between Ecology and GP.

2.1.2 The 2000 RI/FS and EIS

In 1996, the RI/FS process for the Whatcom Waterway site was initiated under a MTCA Agreed Order (DE 95TC-N399) between GP and Ecology. Detailed sampling and analysis was performed in 1996 and 1998, and an RI/FS report was completed in July 2000 following public notice and opportunity to comment. Sediment data summaries from the 2000 RI/FS are attached as Appendix B of the FS.

In parallel with the RI/FS activities, a Bellingham Bay Comprehensive Strategy EIS was prepared. The EIS was both a project-specific EIS, evaluating a range of cleanup alternatives for the Whatcom Waterway site, and a programmatic EIS, evaluating the Bellingham Bay Comprehensive Strategy. The Comprehensive Strategy was developed by an interagency consortium known as the Pilot. The Pilot brought together a cooperative partnership of agencies, tribes, local government, and businesses known collectively as the Pilot Work Group, to develop a cooperative approach to expedite source control, sediment cleanup and associated habitat restoration in Bellingham Bay. 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 Bay-wide 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.

The Comprehensive Strategy was finalized as a Final Environmental Impact Statement in October 2000 prepared under SEPA. While it was published as a companion document to the 2000 RI/FS for the Whatcom Waterway site, and while it addressed project impacts associated with the MTCA cleanup of the

Whatcom Waterway site, the 2000 FEIS contained other contemplated actions above-and-beyond the regulatory requirements of the MTCA site cleanup process. For example, the potential habitat restoration actions identified in the Comprehensive Strategy represent additional actions that are not required under state or federal regulations, but which would benefit the ecosystem of Bellingham Bay if implemented. The Pilot Work Group agreed to work cooperatively to identify opportunities to further the goals of the Pilot. The Comprehensive Strategy identified a broad series of potential actions that were considered by the Work Group to be beneficial in furthering the goals of the Pilot throughout Bellingham Bay. These potential actions were organized by subareas within Bellingham Bay, and were published as Appendix A of the 2000 Comprehensive Strategy EIS (a copy of this appendix is also attached to this EIS as Appendix A).

Absent significant changes or new information, the 2000 RI/FS and EIS documents would have formed the basis for Ecology's selection of a cleanup approach for the Whatcom Waterway site. That selection would have been formalized in a CAP. However, subsequent events and new information have made it necessary to complete the supplemental RI/FS and EIS studies.

In 2001 GP closed its pulp mill which dramatically reduced the wastewater treatment needs associated with process operations. The ASB was constructed in 1978 within the Whatcom Waterway site area, on lands impacted by mercury discharges from the chlor-alkali plant. In addition, the ASB facility has received effluent from the chlor-alkali plant and the pulp and tissue mills. The ASB contamination from these sources was not addressed in the 2000 Whatcom Waterway RI/FS investigations of remedial alternatives, because at that time it was an operational wastewater treatment facility. However, with the reduced treatment needs resulting from the 2001 closure of the GP pulp mill, the contamination issues could be addressed as part of the cleanup of the Whatcom Waterway site.

To address this new portion of the Whatcom Waterway site, a new remedial alternative was evaluated in 2002 through a Supplemental FS (Anchor, 2002a) and companion Draft Supplemental EIS (Anchor, 2002b). The new remedial alternative proposed using a portion of the ASB as a near shore fill disposal facility for disposal of contaminated materials removed from areas of the Whatcom Waterway site outside the ASB and from other contaminated sediment sites in Bellingham Bay. The proposal included maintenance of a down-sized wastewater treatment facility constructed within the footprint of the existing ASB.

2.1.3 Log Pond Interim Action

In late 2000 and early 2001, Georgia Pacific implemented a combined sediment cleanup and habitat restoration action at the Log Pond, part of the Whatcom Waterway site. The work was performed under the terms of a MTCA Interim Action Agreed Order with Ecology and as authorized under

Clean Water Act Permit No. 2000-2-00424 administered by the U.S. Army Corps of Engineers (Corps). The Log Pond project beneficially reused 43,000 cubic yards of clean dredging materials from the Swinomish navigation channel and from the Squalicum Waterway. The materials were used to cap contaminated sediments in the Log Pond, and to improve habitat substrate and elevations for use by aquatic organisms. The habitat restoration component of the project was voluntarily implemented by GP in accordance with the Bellingham Bay Comprehensive Strategy.

Monitoring of the Log Pond Interim Action has been performed in Year 1, Year 2 and Year 5. Results of monitoring have confirmed that the cap is successfully meeting most performance objectives, with the exception of some erosion at the shoreline edges of the cap. Enhancements to the shoreline edges of the Log Pond cap to correct these erosional areas cap have been incorporated into the Feasibility Study. Monitoring results have documented the development of habitat functions within the Log Pond (Anchor, 2001b and 2002c). Recommendations for enhancement of long-term shoreline stability have been developed as part of the 2006 Supplemental Feasibility Study.

2.1.4 Supplemental Investigations

During 1999 and 2000, GP closed its chlor-alkali plant, its pulp mill and its chemical plant. The closure of the Georgia Pacific pulp mill dramatically reduced the water treatment needs associated with company operations. Since its construction in 1978, the ASB facility has received effluents from the chlor-alkali plant, pulp and tissue mills and contaminants in ASB sludges include mercury contamination. However, because the ASB had been in operation as a water treatment facility, the ASB facility had not been previously included in the Whatcom Waterway RI/FS investigations or remedial alternatives.

In spring and summer of 2002, following completion of the 2002 Supplemental FS and EIS, additional site data were collected to inform future remedial design activities. The results of these investigations were summarized in a Pre-Remedial Design Evaluation (PRDE) report (attached as Appendix A of the FS). The PRDE data collection included the following major work elements:

- Surface sediment sampling to document natural recovery rates and refine the boundaries of the area of sediment exceeding site cleanup levels
- Subsurface testing of samples located in the Outer Whatcom Waterway area
- Contaminant mobility testing for use in evaluation and design of confined disposal alternatives

- Geotechnical testing, column settling tests and consolidation tests of site sediments for use in dredging, capping and confined disposal alternatives evaluations.

In 2003 Ecology requested additional data collection to better characterize contamination within the ASB. This work was conducted under Addendum 4 of the RI/FS Work Plan and included testing of chemical and physical properties of the ASB sludges and underlying native sands. This sampling was performed in the summer of 2003. Data collected during that investigation are attached as Appendix C of the FS Report.

During 2004 additional site characterization data were collected at the ASB facility. This work was conducted under Addendum No. 5 of the RI/FS Work Plan. The investigation included testing of the chemical and physical properties of the ASB berm sands, bathymetric surveys of the ASB, and dewatering tests of the ASB sludges. Sampling was performed between July and September of 2004.

2.1.5 Purchase of GP Mill Site by Port of Bellingham

After soliciting interest from various potential purchasers, GP ultimately sold its Bellingham mill site to the Port of Bellingham. The property transfer included an extended due diligence period lasting through late 2004. During the due diligence period the Port conducted extensive community outreach, and met with regulatory and resource agencies, and many project stakeholders. The property transfer was finalized in January of 2005. As part of the transfer agreements, the Port agreed to assume leadership of the cleanup of multiple sites, including the Whatcom Waterway site.

Following completion of the property transaction, the Port and Ecology signed an Amendment to the RI/FS Agreed Order and to the Log Pond Agreed Order. The current RI/FS document integrates previous site investigations and studies and provides a comprehensive evaluation of site conditions and cleanup options. The document addresses current and anticipated land uses, and is performed consistent with the Agreed Order and its Amendments. This Supplemental EIS has been prepared consistent with the Programmatic elements of the Pilot Comprehensive Strategy to evaluate environmental impacts associated with the RI/FS remedial alternatives, and to assist in the identification of preferred alternatives for the site.

2.2 History of the Bellingham Bay Pilot and Comprehensive Strategy

This section provides additional background information on the history of the Bellingham Bay Demonstration Pilot and the Comprehensive Strategy.

2.2.1 Initial Development of the Pilot Concept

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

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

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

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

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

2.2.2 The Pilot Team and its Scope of Work

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

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

The Port of Bellingham agreed to be co-project manager with Ecology. Using consensus-based decision-making, the Pilot Team established the Mission Statement and the seven "baywide" goals that it wanted to ultimately achieve. That mission statement is:

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

As part of project goal setting, the Pilot Team defined four fundamental project elements: sediment cleanup and source control, sediment disposal siting, habitat, and land use. The Pilot Team then developed seven baywide Pilot goals that reflect the collective interests of the Pilot Team and the desired outcome of the project. The Pilot goals were formally adopted by the multi-agency work group in 1997, and these goals provide an additional evaluation tool to assess proposed cleanup actions in Bellingham Bay.

Seven 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 Pilot Team compiled, collected and analyzed information for each project element separately. The information and priorities for each of the four project elements were then combined to create the Comprehensive Strategy.

2.2.3 Bellingham Bay Comprehensive Strategy

The Bellingham Bay Comprehensive Strategy was presented in a Final EIS in October of 2000. Following review and evaluation of comments on the Draft EIS (published in August 1999), the Comprehensive Strategy was identified as the Preferred Alternative in the October 2000 FEIS.

The Comprehensive Strategy included both programmatic elements, as well as project alternatives addressing SEPA review for specific projects. The programmatic elements of the Comprehensive Strategy included Bay-Wide Recommendations, Sub-Area Strategies and a Habitat Mitigation Framework. Project elements of the Comprehensive Strategy included SEPA review of specific near-term remedial action alternatives. An overview of these programmatic and project elements of the Comprehensive Strategy is provided below.

General Baywide Recommendations

The Comprehensive Strategy included a number of Baywide recommendations for achieving the seven goals of the Pilot. These general recommendations were listed according to the four project elements. These Baywide Recommendations were programmatic in nature and were not tied to specific project alternatives or actions.

Together with the Mission Statement and the Pilot Goals, the General Baywide Recommendations remain unaffected by land use changes and other actions on Bellingham Bay, and they provide a guide to implementation of sediment cleanup, source control, habitat restoration and land use actions within Bellingham Bay.

Subarea Strategies and Habitat Mitigation Framework

The Comprehensive Strategy also included specific strategy recommendations for each of nine geographic subareas within Bellingham Bay. These Subarea Strategies (Appendix A) provided greater detail on priorities and recommended actions for land use, habitat, sediment cleanup and source control within each geographic subarea.

Some elements of the Subarea Strategies have been affected by the sweeping land use changes that have taken place since development of the Comprehensive Strategy (Section 2.2.4). Ecology has indicated that these Subarea Strategies are to be updated in the near future following completion of community land use planning efforts.

The Pilot Team also developed lists of priority restoration opportunities that were available within Bellingham Bay. This list of restoration opportunities is included in the Subarea Strategies contained in Appendix A of the 2000 FEIS and in Appendix A of this SEIS. A number of these restoration opportunities have been accomplished since development of the initial list. However, project opportunities remain and can be used to guide project planning and prioritization for habitat restoration activities.

In addition to the Subarea Strategies, a Habitat Mitigation Framework (Appendix D of this SEIS) was developed by the Pilot Team to address the analysis of habitat impacts and benefits, and to clarify the types of mitigation and incremental habitat enhancement actions that may be implemented within Bellingham Bay.

Integrated Near-Term Remedial Action Alternatives

As part of the 2000 FEIS, SEPA evaluation was conducted for specific project alternatives that addressed multiple sediment cleanup sites, including the Whatcom Waterway, as well as the Cornwall Avenue Landfill and other sites. For the Whatcom Waterway, it has been necessary to update the project alternatives to address new site data, area land use changes, and actions taken at other cleanup sites. Therefore, this Supplemental EIS has been developed to address these changes. These changes do not affect the programmatic elements of the Pilot which are addressed by the 2000 FEIS.

2.2.4 Recent Changes Affecting the Project

Extensive changes have occurred between 2000 and the present that have necessitated updates to both the Whatcom Waterway RI/FS and the EIS evaluation of project alternatives. These changes include the following:

- 1999 closure of the GP chlor-alkali plant.
- 2001 closure of the GP pulp mill and chemical plant.
- 2004 development of the Waterfront Vision and Framework Plan by the Waterfront Futures Group, a community land use visioning effort initiated by the City and the Port and involving Bellingham citizens. The group developed a suite of Guiding Principles and Recommendations that addressed land use priorities for six areas of Bellingham Bay.
- Completion of marina demand studies and marina alternatives siting analyses by the Port, including identification of the ASB as a preferred location for development of a future small boat marina.
- January 2005 Port acquisition of 137 acres of GP waterfront property, including portions of the Whatcom Waterway site, in accordance with the Waterfront Vision and Framework Plan.
- Additional evaluations of navigation and waterfront infrastructure needs by the Port, DNR and the Army Corps of Engineers relating to the Whatcom Waterway. These evaluations included development of a November 2005 Port-DNR Memorandum of Understanding relating to changing waterfront land use needs (Appendix C), development of a May 2006 Port Resolution #1230 and corresponding federal legislation to make adjustments to the dimensions of the federal channel within the Whatcom Waterway (Appendix E). These changes are intended to support the development of waterfront land use, public access, navigation and habitat restoration improvements consistent with the Waterfront Vision and Framework Plan, while maintaining the viability of the Bellingham Shipping Terminal.
- Initiation of a joint Port-City Master Planning process for the waterfront area in the vicinity of the Whatcom Waterway site. This process is being implemented consistent with Port-City interlocal agreements dated January 2005 and July 2006. The interlocal agreements and the planning actions implemented by those agreements propose to redevelop the area to support mixed residential, commercial, light industrial, institutional and recreational uses and to support the development of transportation, utilities, public access, parks and open space and marine infrastructure including a marina, boat launch, transient moorage and associated parking. Consistent with

the interlocal agreements, the properties within the New Whatcom planning area have been rezoned to mixed-use zoning, contingent on finalization of an approved Master Plan.

- Pending update to the City Shoreline Master Program (SMP). The SMP is a state-mandated shoreline land use planning effort. The SMP update is expected to embrace and elaborate on the work of the Waterfront Futures Group

These factors resulted in changes to the facts relevant to each of the four elements of the Pilot, including sediment cleanup, disposal siting, land use and habitat restoration. An updated RI/FS document and an update to the EIS were required in order to address these changes and ensure an appropriate evaluation of cleanup alternatives.

2.3 Role of the Current EIS

This Supplemental EIS evaluates environmental impacts associated with a specific project, the cleanup of the Whatcom Waterway site.

2.3.1 Proposed Action and EIS Regulatory Role

The purpose of this EIS is to evaluate environmental impacts, benefits and potential mitigation actions associated with the cleanup of the Whatcom Waterway site, together with habitat and land use issues directly associated with that project. The methodology of the environmental review is conducted consistent with SEPA regulatory requirements.

In addition, this EIS analysis document reviews the consistency of the proposed action with the goals of the Pilot, as documented in the 2000 Comprehensive Strategy. While consistency with the goals of the Pilot is not a regulatory requirement, the goals do provide an important bay-wide context for regulatory decisions.

2.3.2 Relationship to Previous EIS Documents

As described above, the 2000 FEIS included both programmatic and project elements. The programmatic elements of the FEIS remain unchanged, and are carried forward in this document.

The Subarea Strategies documented in the 2000 FEIS are to be updated by the Department of Ecology and the Pilot Team after completion of the community land use planning process. This EIS discusses factors which have affected the Subarea Strategies, but does not propose final amendments to those Subarea Strategies.

The specific project alternatives evaluated in the 2000 FEIS must be updated in order to address new site data, area land use and navigation changes, and actions taken at other cleanup sites. This EIS provides a current comprehensive analysis of project alternatives for cleanup of the Whatcom Waterway site, and represents a Supplemental EIS with respect to the Whatcom Waterway project elements of the 2000 FEIS.

2.3.3 SEPA Lead Agency

The Department of Ecology is the SEPA lead agency for this Supplemental EIS. This is consistent with the 2000 FEIS, for which Ecology was the SEPA lead agency.

2.3.4 Relationship to Land Use Planning Processes

Community land use planning efforts are ongoing with respect to the future waterfront land uses, infrastructure and associated land use regulations. Activities conducted to date have included the following:

- Early land use priority setting conducted by the Waterfront Futures Group, and subsequent formal adoption of the Waterfront Futures Group Vision and Framework Plan (Appendix B) by the City of Bellingham
- Land use studies conducted for the Central Waterfront area
- Master Planning efforts for the Bellingham Shipping terminal and vicinity
- Review of navigation needs and infrastructure requirements for the Whatcom Waterway, including development of the November 2005 Port-DNR Memorandum of Understanding (Appendix C) and Port Resolution 1230 (Appendix F) addressing the updating of the federal navigation channel
- Alternatives evaluations for siting of new marina facilities to meet regional moorage demand
- Outreach activities conducted by the Port of Bellingham as part of the GP due diligence process during 2004, including soliciting of extensive stakeholder and public input on potential waterfront cleanup actions, land use alternatives and navigation priorities for the Whatcom Waterway
- Community land use planning efforts planning and redevelopment of the New Whatcom area leading to rezoning of the area for mixed-use development. Excerpts from the Master Planning process are attached as Appendix E.
- Outreach activities associated with the Port's amendment to its Comprehensive Scheme of Harbor Improvements in 2004 identifying the need for future aquatic use of the ASB area, and

completion of a community design charette in 2006 (Figure 3-7) by the Port to solicit community input on the integration of habitat and public access elements with the marina uses

- Extensive additional contributions by community groups, research institutions, and project stakeholders.

Upcoming activities associated with this process include development of a final area Master Plan for the "New Whatcom" area of Bellingham's Waterfront. That area extends along the waterfront between the Cornwall Avenue Landfill and the I&J Waterway (see Figure 1-1). The zoning within the New Whatcom area has been updated to a "mixed use" designation by the City, contingent on final development of the area Master Plan. The Master Planning process will include SEPA environmental review of the Master Plan elements. The current Supplemental EIS does not address the activities of the Master Plan, but remains focused on those activities directly associated with the cleanup of the Whatcom Waterway site.

2.3.5 Future Environmental Reviews and Permitting

This Supplemental EIS is not the only vehicle for environmental review of the Whatcom Waterway cleanup action. Cleanup of the Whatcom Waterway site will involve future environmental review and permitting activities.

Federal permitting for in-water construction can be implemented either under a Federal 404 Individual permit, or under a Nationwide 38 permit. The federal permitting process includes review of issues relating to wetlands, tribal treaty rights, threatened and endangered species, habitat impacts, and other factors. It is anticipated that the cleanup of the Whatcom Waterway site will be performed using a Federal 404 Individual permit. Where appropriate, that permit will include related actions (e.g., updates to shoreline infrastructure, habitat enhancement projects). This permitting will be conducted concurrently with other approvals associated with in-water construction activities. National Environmental Policy Act (NEPA) review will be completed at the time of project permitting, with the completion of an environmental review by the Corps of Engineers.

The City is currently updating their State-mandated Shoreline Master Plan (SMP) which regulates and manages uses and activities within 200 feet of the shorelines of the City. Shoreline regulations defer to Ecology for site-specific review of cleanup actions conducted under MTCA, provided that those actions are consistent with the substantive requirements of the Shoreline Master Program. The City and Port are working with the Bellingham community to ensure that the land use vision articulated in the Waterfront Vision and Framework Plan is reflected in the SMP update. The SMP update is expected to be completed in early 2007.

As part of the Cleanup Action Plan development, a request will be made to the City of Bellingham and the Department of Fish and Wildlife for a written description of their substantive permit requirements for the preliminary selected remedy. Additional information will be included in the Cleanup Action Plan.

2.4 Introduction to Sediment Cleanup Laws and Techniques

This section provides an overview of the cleanup laws and techniques that are applicable to the cleanup of the Whatcom Waterway site. These laws and techniques are described in more detail in the RI/FS document. The overview provided in this section includes the following three elements:

- **Sediment Cleanup Laws:** Cleanup of the Whatcom Waterway site is governed primarily by two cleanup laws. These include the Model Toxics Control Act (MTCA) and the Sediment Management Standards (SMS). These laws are discussed in Section 2.4.1 below.
- **Cleanup Levels**: Cleanup levels define the goals for site cleanup and are established under state and federal regulations including MTCA and SMS. The cleanup levels applicable to the cleanup of the Whatcom Waterway site are described below in Section 2.4.2.
- **Sediment Cleanup Techniques:** Sediment cleanup actions involve application of specific cleanup techniques or technologies. The cleanup techniques being considered for the Whatcom Waterway site are described in Section 2.4.3 below.

2.4.1 Sediment Cleanup Laws

The main state law that defines how cleanup decisions are to be made is the Model Toxics Control Act (MTCA). When contaminated sediments are involved, the cleanup levels and other procedures are also regulated by the Sediment Management Standards (SMS). MTCA regulations specify criteria for the evaluation and conduct of a cleanup action. SMS regulations dictate the standards for cleanup. Under both laws, a cleanup must protect human health and the environment, meet environmental standards in other laws that apply, and provide for monitoring to confirm compliance with site cleanup levels.

The cleanup solutions that have proven successful at sediment cleanup are those that block pathways that can expose people or environmental receptors to contaminants, and that provide a healthy environment over the long-term. MTCA regulations place a premium on the use of solutions that are "permanent to the maximum extent practicable," and MTCA regulations define the ways in which different cleanup alternatives are to be compared and ranked.

The implementation of a cleanup action under MTCA and SMS must comply with other state, federal and local laws, regulations and ordnances. The ability for a proposed cleanup action to comply with these requirements is considered as part of the remedy selection process under MTCA.

The key MTCA document for evaluating site cleanup actions is the remedial investigation and feasibility study (RI/FS). In the RI/FS, different potential alternatives for conducting a site cleanup action are defined. The alternatives are then evaluated against MTCA criteria, and one or more preferred alternatives are identified. After reviewing the RI/FS study, and after consideration of public comment, Ecology then selects a cleanup method and documents that selection in a document known as the Cleanup Action Plan. The agency-selected cleanup action is then implemented after completion of project design and permitting.

2.4.2 Site Cleanup Levels

The Whatcom Waterway site is defined by contaminated sediment. Cleanup levels applicable to sediments are defined by SMS regulations as described below. Some cleanup alternatives may trigger the applicability of cleanup levels for other media, particularly soil and groundwater.

Sediment Cleanup Levels

SMS regulations govern the identification and cleanup of contaminated sediment sites and establish two sets of numerical chemical criteria against which surface sediment concentrations are evaluated. The more conservative Sediment Quality Standards (SQS) provide a regulatory goal by identifying surface sediments that have no adverse effects on human health or biological resources. The minimum cleanup level (MCUL) (equivalent to the Cleanup Screening Level or CSL), represents the regulatory level that defines minor adverse effects.

The SQS is Ecology’s preferred cleanup standard, though Ecology may approve an alternate cleanup level within the range of the SQS and the MCUL if justified by a weighing of environmental benefits, technical feasibility, and cost. Chemical concentrations or confirmatory biological testing data may define compliance with the SQS and MCUL criteria.

The primary cleanup levels for the Whatcom Waterway site are defined as the SQS, as measured using bioassay testing procedures. Chemical numeric standards may also be used to evaluate SQS, but bioassays are given preference under SMS regulations because they are considered a more direct and representative measure of potential biological effects. The bioassay test methods that may be used to evaluate compliance with the SQS are defined in current Ecology regulations and guidance and include tests using the amphipod, larval or juvenile polychaete tests.

Based on the series of sediment investigations performed for surface and subsurface sediments in 1996, 1998, and 2002, the key constituents of concern for the sediments in the Whatcom Waterway site areas include mercury and phenolic compounds. The chemical SQS for mercury is 0.41 mg/kg. The chemical MCUL for mercury is 0.59 mg/kg. These levels apply to total mercury, which is the parameter measured directly in the RI chemical testing program. The main phenolic compound detected at elevated concentrations at the site was 4-methylphenol. The SQS and MCUL values for 4-methylphenol are both 0.67 mg/kg. The phenolic compounds phenol and 2,4-dimethylphenol were noted sporadically in surface sediments. The SQS and MCUL values for 2,4-dimethylphenol are both 0.029 mg/kg.

In addition to the evaluation of benthic effects and compliance with the SQS, cleanup levels at the site must protect against other adverse effects to human health and the environment, including food chain effects associated with the potential bioaccumulation of mercury. As described in the RI Report, a site-specific BSL of 1.2 mg/kg mercury was developed as part of the 2000 RI/FS. This BSL provides an area-wide average concentration of mercury in sediments that is protective of subsistence-level human consumption of seafood from Bellingham Bay. Bioaccumulation testing performed as part of the RI/FS and related studies has demonstrated that sediment mercury concentrations below this value do not present a risk of food chain effects to ecological receptors. Ecology has conservatively applied the BSL as a cleanup level that must be met for surface sediments within the site, whether or not the area-wide average concentration of mercury exceeds the BSL. This conservative application of the BSL provides a substantial additional level of protectiveness to site cleanup decisions.

Consistent with the SMS regulations, sediment cleanup levels apply to the sediment bioactive zone. Previous studies performed as part of the RI/FS documented that this zone consists of the upper 12 centimeters of the sediment column. The cleanup levels do not directly apply to subsurface sediments, but remedial action objectives require that the potential risks of the exposure of deeper sediments be considered and be minimized through the implementation of the cleanup action.

Cleanup Levels for Other Media

Under certain remedial scenarios, the sediments at the site could also be regulated under other programs with regulatory cleanup levels different from SMS criteria, or could potentially impact other media. For example, if the sediments were excavated and were reused as upland soil, then MTCA soil and/or groundwater cleanup levels could be relevant. Additional criteria considered include state and federal water quality criteria, the Puget Sound Dredged Disposal Analysis program (PSDDA), the State of Washington

Dangerous Waste Regulations, and the federal Resource Conservation and Recovery Act (RCRA).

2.4.3 Sediment Cleanup Techniques

Different techniques can be used for the cleanup of contaminated sediments. Some of the most common cleanup techniques are summarized in Figure 2-1. The techniques include both active (i.e., dredging to remove impacted sediments) and passive (i.e., allowing nature to naturally isolate impacted sediments) measures.

The goals of each technique are 1) to isolate and confine contaminated sediments so that plants and animals are no longer exposed to the contamination, and 2) to ensure that the sediments within the bioactive zone comply with site cleanup levels. Often, more than one technique is used for cleanup, with different techniques being applied in different site areas. The RI/FS includes detailed discussion of the different sediment cleanup techniques. The main cleanup techniques applicable to the Whatcom Waterway site include the following:

- **Monitored Natural Recovery:** Natural recovery is similar to capping in that it results in containment of the impacted sediments beneath a layer of clean material. The difference between natural recovery and capping is that in natural recovery, the containment is achieved by allowing natural sediment deposition to bury the impacted sediments. The process occurs naturally in areas like Bellingham Bay where rivers are discharging clean sediments at rates that will cap contaminated sediments naturally in the absence of human interference.

- **Institutional Controls:** Institutional controls are mechanisms for ensuring the long-term performance of cleanup actions. They are applicable to most remedies where contaminants are not completely removed from the site, and are applicable to all eight of the remedial alternatives evaluated in the Whatcom Waterway RI/FS. Institutional controls involve administrative and legal tools to document the presence of contaminated materials, regulate the anthropogenic disturbance/management of these materials, and provide for long-term care of remedial actions including long-term monitoring.

- **Containment by Capping:** Capping is an effective technology for use with contaminated sediments that are not located in areas where removal is required for environmental, navigation or land use reasons. Capping involves covering the contaminated sediments with a layer of clean material that will be physically stable under site conditions. Capping avoids resuspension of contaminated sediments that can occur with sediment removal.

Appropriately sited and designed caps can also enhance aquatic habitat conditions.

- **Sediment Removal by Dredging:** Sediments can be removed from the aquatic environment through dredging. Typically dredging is used when impacted sediments are located in areas that conflict with navigation and land use priorities, or where the sediments are not stable if left in place. There are multiple different dredging methods, applicable to different site conditions. Section 4 of the RI/FS document includes a discussion of the different dredging methods and their typical applications. A single project may use multiple types of dredging, with different methods applied in different areas.

- **Confined Disposal Options:** One option for managing contaminated sediments that are removed by dredging is to contain them within specially constructed facilities on the waterfront. The two most common types of waterfront containment facilities are Confined Aquatic Disposal facilities and Confined Nearshore Disposal facilities:

  - Confined Aquatic Disposal (CAD): The CAD technique places the dredged contaminated sediment in a submerged location, and caps (covers) it with clean material. CADs are designed and placed in the locations where they will always be underwater. The thickness of the cap and the grain size of the cleanup sediment are designed to prevent contaminants from migrating back into the aquatic environment. With appropriate design and planning, the surface of the CAD can represent a significant habitat enhancement.

  - Confined Nearshore Disposal: This technique, also known as “nearshore fill” is a type of landfill constructed in aquatic locations along the shoreline. A berm is constructed of clean material to enclose the proposed fill area. Then the dredged sediments are placed within the fill area. The fill is continued so that the upper fill layer is “dry ground” above the tide level. The fill is capped with clean material . Nearshore fills create new land that can be used, but they eliminate aquatic habitat in the areas filled and converted to dry land uses.

- **Upland Disposal:** Sediments removed from the waterfront can be managed by disposal in existing permitted disposal sites. This method has been used extensively within Puget Sound where capping, natural recovery and/or aquatic disposal options were not suitable for management of all impacted sediments. Under this technique the sediments are barged to an offload facility and are then transported to an upland landfill in trucks or in railcars. The upland landfills are contained and monitored consistent with state, local and federal regulations. The technique is typically more expensive than other options.

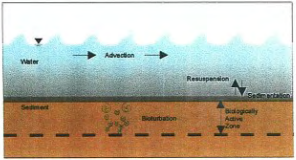
- **Beneficial Reuse:** In some cases, sediments may require removal (e.g., to address land use or navigation needs, or to access other materials) but remain suitable for reuse in aquatic or upland areas. This reuse is known as beneficial reuse. It is similar to recycling in that it conserves other natural resources (e.g., reuse of sandy sediments for capping reduces the need to quarry new sand materials).

- **In-Place Treatment of Dredged Sediments:** Techniques to treat sediments in place, without first requiring their removal have been explored by Ecology, EPA, and others. One such technology was tested at the Whatcom Waterway site as part of the RI/FS process, but it was not found to be effective. Different types of in-place treatment technologies are discussed in the RI/FS document. But workable techniques have not been identified that would be successful at the Whatcom Waterway site.

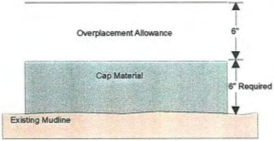
- **Treatment of Dredged Sediments Prior to Disposal**: In some cases it may be appropriate to treat removed sediments prior to disposal of the sediments. For example, sediments that are loose and that have high moisture contents can be treated to remove excess water. This reduces the transportation impacts and the required landfill space used in the ultimate disposal. The appropriateness of treatment technologies varies with the type of material and the type of disposal.

The project cleanup alternatives evaluated in the RI/FS use the above-listed cleanup techniques, in different combinations, to accomplish remediation of the site. The RI/FS alternatives are described in Section 4 of this Supplemental EIS, and in Volume 2 of the RI/FS.

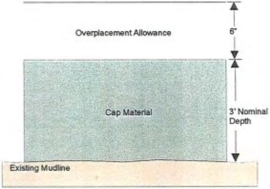
Figure 2-1. Common Sediment Remediation Techniques



Schematic of Natural Recovery

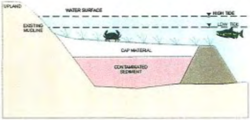


Thin-Layer Cap Section (Typ.)

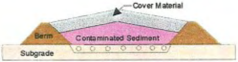


Thick Cap Section (Typ.)

Nearshore Confined Disposal



Confined Aquatic Disposal



Upland Confined Disposal

3 Description of Affected Environment

Section 4 of this EIS describes the Project Alternatives and discusses potential environmental impacts, benefits and mitigation options associated with the different Alternatives. This section provides a description of the environment in which the cleanup will be performed, and highlights features of the environment that are impacted (positively or negatively) by the Alternatives discussed in Section 4.

3.1 Overview of Environmental Features

3.1.1 Elements of the Environment

SEPA regulations (WAC 197-11-444) define different elements of the environment that should be considered in the development of an EIS. Following EIS scoping, the Comprehensive Strategy 1999 draft and 2000 final EIS documents organized these SEPA environmental elements into five categories. These five categories are used in this Supplemental EIS, and include the following:

- **Geology, Water, Environmental Health:** These factors include both the natural and built environment. The geology element includes soil and sediment stability issues. The water element focuses on water quality. The environmental health element incorporates both the pollution control benefits of conducting the cleanup, as well as potential impacts/benefits associated with implementation of the cleanup itself. The Geology, Water and Environmental Health characteristics of the environment are described in detail in Section 3.2.

- **Fish and Wildlife:** This category includes the fish and wildlife in the project area, the different existing habitats, and the potential changes (positive and negative) to those habitats that may occur as part of the cleanup. The fish and wildlife characteristics of the environment are described in Section 3.3.

- **Land Use, Navigation and Public Shoreline Access:** This category includes the uses of the project area, including the aquatic areas and nearby shorelines and waterfront properties. The elements within this category focus on community land use planning efforts, and how these plans are either furthered or adversely impacted by the cleanup alternatives. The land use, navigation and public shoreline access elements of the environment are described in Section 3.4.

- **Air and Noise:** These elements address potential impacts to existing air quality and noise levels, particularly during the construction of the cleanup. The air and noise characteristics of the environment are described in Section 3.5 below.

- **Cultural Resources:** Cultural resources include existing archaeological, cultural and historical resources that may be impacted by the proposed project. These cultural resource characteristics of the environment are described in Section 3.6 below.

3.1.2 Whatcom Waterway Site Units

The Whatcom Waterway site includes different geographic areas of the waterfront. The RI/FS document divides the remediation areas of the site into eight "site units" for evaluation of cleanup alternatives. The RI/FS site units are shown in Figure 1-1. These site units are used in the EIS to assist in the discussion of the affected environment and the different impacts/benefits of the project alternatives. The site units and their subdivisions are described below.

Outer Whatcom Waterway (Unit 1)

The Outer Whatcom Waterway includes portions of the Whatcom Waterway located offshore of the Bellingham Shipping Terminal. Unit 1 is divided into three subareas:

- **Units 1A and 1B:** These sub-areas are located offshore of the Bellingham Shipping terminal and connect the outer portions of the Whatcom Waterway to deepwater areas of Bellingham Bay

- **Unit 1C:** This portion of the Waterway is located immediately adjacent to the Bellingham Shipping Terminal. Based on bathymetry, this unit is subdivided into Units 1C1, 1C2 and 1C3.

Inner Whatcom Waterway (Units 2 and 3)

The Inner Whatcom Waterway extends from the Bellingham Shipping Terminal to the head of the Waterway at Roeder Avenue. The Roeder Avenue Bridge crosses the waterway at that location and precludes navigation further upstream. The Inner Whatcom Waterway has been subdivided into two units designated "Unit 2" and "Unit 3." Each of these site units has been further subdivided:

- **Unit 2A:** Shoaled areas at the head of the 30-foot portion of the 1960s federal navigation channel

- **Unit 2B:** An area between the Whatcom Waterway and the ASB that has been considered for future construction of an access channel as part of ASB marina reuse

- **Unit 2C:** Deep areas of Unit 2, including portions of the federal channel where water depths currently exceed 24 feet below MLLW

- **Unit 3A:** An emergent tideflat area located at the head of the Waterway, adjacent to the Roeder Avenue Bridge

- **Unit 3B:** The shoaled area of the 18ft federal channel in between the emergent tideflat of Unit 3A and Unit 2A.

Log Pond (Unit 4)

The Log Pond area was remediated as part of an Interim Remedial Action, completed by GP in 2000 and early 2001. The Log Pond action included placement of a sediment cap to remediate site sediments, and additional actions to enhance nearshore aquatic habitat in that area. Multiple rounds of monitoring have been performed, documenting the success of that action, including Year 1, Year 2 and ongoing Year 5 monitoring. However, some enhancements to shoreline edges of the Interim Action cap are required to minimize potential cap erosion, and enhance the long-term stability of the cap. These additional actions are described in Appendix D of the FS Report.

Areas Offshore of ASB (Unit 5)

The area offshore of the ASB is a relatively shallow-water area, the majority of which has not been dredged for navigation uses. This area of the site is designated as Unit 5. Unit 5 is subdivided in to three subareas:

- **Unit 5A:** Deeper water areas offshore of the ASB

- **Unit 5B:** High-energy nearshore areas on the “shoulder” of the ASB. Some sediments within this area have mercury concentrations that remain above site cleanup levels

- **Unit 5C:** Shallow-water areas along the southeastern shoulder of the ASB, adjacent to the Inner Whatcom Waterway.

Area Adjacent to BST (Unit 6)

Unit 6 consists of the aquatic lands to the south and southeast of the Whatcom Waterway and Bellingham Shipping Terminal (BST). This area has been subdivided into three subareas:

- **Unit 6A:** Deepwater areas of Unit 6 that comply with sediment cleanup levels

- **Units 6B and 6C:** Deepwater and intermediate-depth areas near the former barge dock where exceedances of bioassay criteria were noted during recent sampling in 2002.

Starr Rock (Unit 7)

Starr Rock consists of a sediment disposal area used for management of sediments dredged from the Whatcom Waterway and adjacent berth areas during the late 1960s. The area was designated for sediment disposal under project Corps of Engineers permits. The area is located in submerged offshore areas near the natural Starr Rock navigation obstruction. This area is designated as Unit 7.

ASB (Unit 8)

Unit 8 consists of the interior of the ASB. This facility was constructed by GP in 1978 for treatment of wastewater from pulp and tissue mill operations. The ASB sludges are the most contaminated materials on the waterfront requiring remediation.

The I&J Waterway

The I&J Waterway sediments were sampled as part of the RI activities. Mercury associated with the Whatcom Waterway site is present at low levels in subsurface sediments in this area. However, testing as part of the RI showed that mercury concentrations did not exceed SMS biological criteria in surface sediments. Characterization of subsurface sediments in the outer portions of the I&J Waterway has shown that the mercury levels do not exceed allowable levels for open-water disposal or beneficial reuse in these areas. No further actions are required under MTCA to address environmental protection in these areas. This area was designated as a no action area during the 2000 RI/FS.

In contrast, contamination of surface sediment with phthalates, nickel, wood waste and other contaminants from localized historical releases has been shown to be present in excess of SMS standards in the inner portion of the I&J Waterway area. During 2003 and 2004, Ecology determined that the I&J Waterway sediments represent a distinct contamination area that was best managed as a separate sediment cleanup site. As described in the RI Report (RI Section 6.1.3) a separate RI/FS is being conducted for this area under an Agreed Order between the Port and Ecology.

Based on the lack of remediation triggers for the outer portion of the I&J Waterway area, and based on the management as a separate site of the inner portion of the I&J Waterway, the I&J Waterway area is not carried forward as a site unit in the Whatcom Waterway FS.

3.2 Geology, Water, and Environmental Health

An overview of the geology, water, and environmental health characteristics of the Whatcom Waterway site environment are described below in Section 3.2.1. These characteristics are described in more detail for each of the Site Units in Section 3.2.2.

3.2.1 Overview of Key Issues

Background discussion of the geology, water quality and environmental health of Bellingham Bay is provided in this section. This discussion was adapted from the 2000 FEIS, and has been updated by new information.

Geology, Shoreline Stability, Seismic Conditions

- **Regional Geologic History:** The Bellingham Bay surrounding geology was shaped by various glacial deposits, derived from the advance and retreat of the Cordilleran Ice Sheet between 18,000 and 14,000 years ago. The Chuckanut Formation, constituting the eastern shore of Bellingham Bay from Governor's Point north to Whatcom Creek, consists of sandstone and carbonaceous shale. Stratified outwash sand and gravels are abundant from the mouth of Whatcom Creek west to the edge of the Nooksack River delta, where terrace deposits associated with the Nooksack floodplain have been developed. From the western edge of the Nooksack River floodplain south to Portage Island contains Bellingham Drift sediment, a blue-gray unsorted and unstratified sandy silt and pebbly clay derived from rock debris that melted from floating ice.

- **Area Sedimentation:** The current shoreline of Bellingham Bay is a result of combined effects of natural geologic and oceanographic processes, as well as anthropogenic influences. Sediment material is continually deposited in to the bay as a result of tributary inputs (Nooksack) and shoreline erosion.

- **Anthropogenic Shoreline Modifications:** Before development, large tidal flats were at the mouths of Squalicum, Whatcom and Padden Creeks. In 1892, three waterways were approved for construction in the northeast portion of Bellingham Bay. Whatcom Creek Waterway dredging by the Corps of Engineers began in 1904 and continued, with associated land modifications, up to 1910. Dredge material was used as fill on the mud flats at the mouth of the creek in order to create building sites for wharves, factories, and streets. Filling activities using material from Whatcom Waterway and other waterways (Squalicum Creek and I&J Waterway) occurred along the east and southeast shore of Bellingham Bay between 1940s and 1960s. The shoreline has also been modified by rip-rap and bulkheading.

- **Seismic Conditions:** Western Washington experiences seismic activity related to plate tectonics and has a history of relatively large earthquakes. More then 1,000 earthquakes occur in the state of Washington each year, with 5 to 20 being severe enough to be felt. No major fault lines exist in the study area. However, small earthquakes have been centered in and around Bellingham Bay in the last century.

- **Flooding, Storm Surge and Tsunami Projections:** Flooding, storm surge, and tsunamis (in decreasing order of probability of occurrence) may increase the water levels in Bellingham Bay on rare occasions. Information on flooding in the Whatcom Waterway, is obtained from the Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRMs) for Bellingham (FEMA 2004). FIRM Panel 1213D shows a base flood elevation at the mouth of Whatcom Creek of 8 feet (NGVD 29). This elevation represents a conservatively high 100-year flood elevation of between 12 and 13 feet above mean lower low water (MLLW). Storm surge is obtained by subtracting the highest observed tide on 5 January 1975 from the predicted tide for that day. The predicted high tide as obtained from NOS (Nobeltec, 2004) for 5 January 1975 was 9.6 feet. The actual measured high tide was 10.4 feet (MLLW). The difference is a storm surge of 0.8 feet. The properties of the storm, especially the wind speed and direction, are unknown. The storm surge may or may not be independent of any flooding in the area, but is assumed to occur over a sufficiently long period of time to occur over the period of higher high water. Tsunami inundation for Bellingham Bay is given by Walsh et al (2004). In the Whatcom Waterway site area, the tsunami depth of inundation to be between 0 and 0.5 m (0 – 1.6 ft). If a tsunami were to occur, this inundation depth would be added to the water elevation in the bay at that time. This means that the water elevation in the site area may increase by up to 1.6 feet above the tidal elevation at the time. This assumes that the tsunami occurs independently from either flooding storm surge.

- **Shoreline Infrastructure:** The characteristics of shoreline infrastructure in the Whatcom Waterway site area vary significantly from site unit to site unit. However, the infrastructure generally has been developed for industrial water-dependent shoreline uses. The infrastructure generally consists of bulkheaded or armored shorelines, with over-water wharves and structures present in Waterway areas. As described in Section 3.2.2 below, the infrastructure in many area of the Whatcom Waterway is obsolete and does not match the channel depth authorization. Much of the infrastructure is in need of repair or replacement.

Surface Water Quality

Bellingham Bay measures approximately twelve miles long by three miles wide and opens to the Puget Sound to the south and southwest. The bay is a component of a system of interconnected bays that meet the Rosario Straits and eventually the Pacific Ocean. Most oceanic waters enter Bellingham Bay at depth from the north end of Rosario Strait. Some water also enters through Bellingham Channel. Surface water is exchanged between Bellingham Bay and Samish Bay to the south. A shallow sill limits water exchange to the west through Hale Passage. The average residence time for water in Bellingham Bay is four to five days, but can range from one to eleven days.

Studies performed by Ecology and others in the 1970s found that the water quality in inner Bellingham Bay was historically degraded as the result of direct discharge of municipal wastes, pulp and paper mill process water, and other point and nonpoint source discharges to the bay. Efforts to address contamination problems in Bellingham Bay have been underway since, resulting in substantial reductions in the amount of contaminants discharged to Bellingham Bay and corresponding improvements in water quality over time. NPDES permit requirements have led to the implementation of technology-based controls on wastewater and industrial dischargers to the bay, including the Post Point WWTP, GP's ASB facilities, and stormwater discharges to the bay (Ecology, 1999).

Two water quality limitations in Bellingham Bay were identified in the 1998 Section 303(d) list, which is a required mechanism for states to report impaired water bodies to USEPA. Waters placed on the 303(d) list are required to have a TMDL developed to set allowable limits of pollutants into the water body. A TMDL for sediment contamination by toxic pollutants has been developed for the bay (Ecology, 2001). The 2001 TMDL submittal addressed impairments to Bellingham Bay due to potential toxic effects from contaminated sediments based on the 1998 Section 303(d) list of impaired waterbodies. The TMDL and subsequent TMDL Detailed Implementation Plan (Ecology, 2003b) identified the cleanup of existing contaminated sites under MTCA as the vehicle to attain water quality standards. Outside of the immediate discharge area for several urban streams, potentially toxic substances have not been detected in Bellingham Bay at concentrations exceeding state or federal water quality criteria.

Characteristics of Bellingham Bay surface water and pollution inputs are described below:

- **Bottom Currents:** Bottom currents have a net southward flow throughout the bay at depth. They are relatively consistent throughout the year and typically range from 0.2 to 0.3 meters per second. In the inner bay area, deep currents vary with tidal fluctuations. The currents generally flow toward the Whatcom

Waterway during the incoming tide. During ebb tides, deep currents generally flow in a clockwise direction in the inner bay.

- **Bellingham Bay Freshwater Inputs:** The inner bay is influenced by tidal-induced marine waters and fresh water inputs from four watersheds of the Nooksack River Water Resource Inventory Area (WRIA1) entering the bay. From north to south the inputs are: the Nooksack River, the Lower Squalicum Creek, Whatcom Creek and Padden Creek. A fifth watershed, Chuckanut Creek, discharges into Chuckanut Bay, south of the inner bay. It drains an area of 13 square miles which is minimally impacted by human activities. Some residential and commercial areas are present.

  - **The Nooksack Watershed:** The Nooksack River watershed drains approximately 800 square miles westward into Bellingham Bay. The Fraser and Sumas systems flow northward into Canada. Lake Whatcom is the largest lake covering 5,000 acres in area. It is drained by Whatcom Creek, which discharges into Bellingham Bay through the Whatcom Waterway. The western boundary of these watershed areas borders over 130 miles of marine shoreline. (WSU, 2005)

  - **Whatcom Creek Watershed:** The Whatcom Creek Watershed drained by Whatcom Creek, which flows through the City of Bellingham, originating at Lake Whatcom and draining into Bellingham Bay. This urban stream has been listed under Section 303(d) of the federal Clean Water Act as not meeting water quality standards for fecal coliform and temperature. A TMDL is being developed for Whatcom Creek for fecal coliform. The creek is also impacted by channelization, vegetation removal and urban stormwater runoff. In June 1999, a petroleum pipeline that crosses under Whatcom Creek ruptured, causing a gasoline spill into the creek. The gasoline was ignited, causing a large fire and explosion. The pipeline has been repaired (Ecology, 1999, 2004c). Whatcom Creek is the only natural surface water outlet of Lake Whatcom, a glacially formed lake located in Whatcom County and the largest lake in the Nooksack River WRIA. Lake Whatcom supplies drinking water for more than 85,000 residents in Bellingham and Whatcom County, as well as process water for several industries. The City of Bellingham diverts flow from river mile 7 of the Middle Fork of the Nooksack River into Lake Whatcom. Water is diverted through a tunnel under Bowman Mountain to Mirror Lake. Water from Mirror Lake flows to Lake Whatcom via Anderson Creek. The City of Bellingham operates a control dam at the outfall of Lake Whatcom as it enters Whatcom Creek. A TMDL is underway for Whatcom Lake for dissolved oxygen and fecal coliform impacts (Ecology, 2004c). Like many municipalities, the City of Bellingham employs Whatcom Creek and its tributaries as part of the stormwater conveyance system. In areas with a high percentage of impervious surfaces, stormwater runoff is a major source of bacteria pollution in streams. Currently 23.6% of the total Whatcom Creek watershed area is covered with impervious surface (Ecology, 2004c).

- **Squalicum Creek Watershed:** The Squalicum Creek watershed drains 26 square miles of land. Squalicum Creek originates at Squalicum Lake and also flows through Bellingham. The combined creeks and tributaries of the watershed combine to form 84 kilometers of stream habitat that drain water from land of varying uses. As an urban stream, the creek is influenced by channelization, vegetation removal, and urban storm water runoff (Ecology, 1999, 2004b).

- **Stormwater and Industrial Discharges:** In addition to these natural discharges, the City maintains a stormwater collection and conveyance system that includes eighteen storm drains that discharge to Bellingham Bay. Stormwater discharges are a potential source of water and sediment contamination to the bay, and the city is regulated under Phase II of the federal NPDES Storm Water Program. The City of Bellingham stormwater program, along with other permitted discharges, described in the Inner Bellingham Bay Sediment TMDL, are described below. A total of 40 waterfront or surface water discharge source locations to the bay were identified. The potential sources included 10 waterfront NPDES discharges, 12 suspected or confirmed contaminated sites, and the 18 city storm water outfalls. However, no ongoing sources have been identified that have the potential to affect water or sediment quality beyond the immediate discharge zone.

  - **City of Bellingham Stormwater System:** The City of Bellingham originally developed a local stormwater program and submitted it to the Department of Ecology in 1999. It included an extensive source cleanup program, which incorporated vactor truck waste activities. After review of the program, Ecology recommended that the city concentrate on improvements in following two areas: 1) coordinate the stormwater program with the planned sediment cleanup in Bellingham Bay; and 2) improve the stormwater plan requirements for redevelopment. Bellingham is also a “Phase II” city in the federal stormwater NPDES permitting program, which requires stormwater programs meeting the federal requirements to be in place (Ecology, 2001).

- **Port of Bellingham Stormwater Program:** The Port leads environmental protection efforts at its properties around Bellingham Bay. As part of this role, the Port recently created a Stormwater Master Plan for Squalicum Harbor. The Plan conforms to the City of Bellingham's stormwater requirements as well as the Department of Ecology's Puget Sound Stormwater Technical Manual for all development and redevelopment activities in the Harbor. The Stormwater Master Plan includes a series of pollution prevention operational and structural BMPs and treatment alternatives to reduce or eliminate adverse impacts from Port activities on stormwater and receiving waters. The planned efforts for Squalicum Harbor and Marina are intended to provide a model for Port source control activities throughout Bellingham Bay. The Port also carries three baseline general stormwater NPDES permits for facilities that drain to or otherwise potentially impact Bellingham Bay. One general permit is for the Bellingham Airport. The Port also has coverage for the maintenance shop near the shipping terminal on Whatcom Waterway and for the Alaska ferry terminal in Fairhaven. Data for these facilities covered under the general permit does not show they are a source of sediment contamination (Ecology, 2001).

- The C Street CSO is regulated under the Bellingham Post Point NPDES Permit (No. WA-002374-4). Post Point is the location of the city's Waste Water Treatment Plant (WWTP). Department of Ecology records show that there have been three CSO overflow events since 1995. However, the City has made substantial system improvements in recent years to minimize overflow events. In addition the C Street stormwater discharge was identified as an outfall of concern in the development of the City of Bellingham Comprehensive Stormwater Program and under the NPDES general stormwater program.

- **Bornstein Seafoods:** Bornstein Seafoods carries a State Waste Discharge Permit (ST7304) for the discharge of screened seafood processing wastewater to the Bellingham Post Point WWTP. They have a Baseline General Permit for Industrial Stormwater (SO3-000679). The Department of Ecology administers both permits. Bornstein Seafoods is not identified as an ongoing source of contaminated sediments (Ecology, 2001).

Soil and Groundwater Quality

Several upland and shoreline properties in the vicinity of the Whatcom Waterway site are cleanup sites managed by the Department of Ecology under MTCA regulations. These include the following:

- **Holly Street Landfill**: The Holly Street Landfill site is a 13-acre historic solid waste landfill located in the Old Town district of Bellingham. In the late 1800s, the site was part of the original Whatcom Creek estuary and mudflat. Around 1905, private property owners began filling portions of the site with dredge spoils and other materials to increase useable upland areas. From 1937 to 1953, municipal waste was used by owners to fill private tidelands within the former Whatcom Creek estuary. Wastes, including debris and scrap materials, were disposed of according to landfill disposal practices of the time (Ecology, 2004a). Solid waste covers approximately 9.1 acres on the northwest side of Whatcom Creek and 3.8 acres on the southeast side (Maritime Heritage Park). The City of Bellingham currently owns 8.3 acres of the 13-acre landfill site, including all landfill properties located along the Whatcom Creek shoreline (Ecology, 2004a). Refuse along the northern shoreline of Whatcom Creek was excavated in conjunction with construction of an engineered cap, and material will be placed along the southern shoreline to stabilize the bank. The northern shoreline excavation and cap system controls releases of copper and zinc to Whatcom Creek that occur when estuary water mixes with the solid waste in the bank. The cleanup also included long term protection through legal restrictions on property use and monitoring of the cleanup action. Excavation for the project removed approximately 12,400 tons of solid waste, primarily from the northern bank prior to constructing the cap with clean materials (Ecology, 2004a).

- **Cornwall Avenue Landfill:** The Cornwall Avenue Landfill site, located at the south end of Cornwall Avenue, measures approximately eight acres and is adjacent to Bellingham Bay. Most of the site was originally tide flats and sub-tidal areas of Bellingham Bay. From 1888 to 1946, the site was used for sawmill operations, including log storage and wood disposal. From 1946 to 1965, the Port of Bellingham held the lease on the state-owned land. The property was subleased to the City of Bellingham from 1953 to 1962. The City used the site for municipal waste disposal. The City continued waste disposal at the site under a sublease from American Fabricators from 1962 until 1965. Landfill operations ended at the site in 1965, and a soil layer was placed on top of the municipal waste (Ecology, 2004a). Previous environmental investigations of the site indicate the presence of hazardous substances in groundwater, surface water, soil and sediments above state cleanup standards. These substances include arsenic, copper, lead, mercury, silver, zinc, cyanide, polychlorinated biphenyls (PCB), bis(2-ethylhexyl) phthalate, PAH compounds and fecal coliform. The Port is leading the completion of an RI/FS for cleanup of this site in coordination with the City and DNR. The completion of this study is expected during 2006 and will include remediation measures for impacted uplands and nearshore sediments. Ecology is ensuring that cleanup activities are appropriately coordinated with the adjacent RG Haley site.

- **RG Haley Site:** Soil and groundwater at this upland contaminated site contain concentrations of pentachlorophenol, petroleum and associated constituents that exceed water quality and sediment protection criteria, respectively. In 2001, an oil seep was observed discharging into Bellingham Bay from the shoreline along the northern boundary of the site. An investigation revealed that portions of the site were contaminated with chemicals consistent with the site's former use as a wood treatment facility. The contaminants were found at levels exceeding state regulatory cleanup levels in surface water, shallow groundwater, sediment and soil (Ecology, 2004a). The visible release of contamination from the site into Bellingham Bay was controlled through the installation of a barrier wall and a product recovery system. The temporary contaminant recovery system continues to operate. An RI/FS is being conducted under an Agreed Order with Ecology and a draft report is scheduled to be released for public review during 2006. The cleanup at this site will include remediation of impacted uplands and nearshore sediments. Ecology is ensuring that cleanup activities are appropriately coordinated with the adjacent Cornwall Avenue Landfill site.

- **Central Waterfront Site:** The Central Waterfront site includes four former cleanup sites that have been combined into a single site to comprehensively manage commingled groundwater contamination. The site includes properties formerly known as the Roeder Avenue Landfill, the Chevron Bulk Fuels Facility, The Boat Yard at Colony Wharf, and the Olivine Uplands site (Ecology, 2004a). The Roeder Avenue Landfill was a bermed municipal landfill operated between 1965 and 1974. The Chevron Bulk Fuels Facility is located along C-Street and is an area where soils and groundwater are impacted by petroleum hydrocarbons associated with historic fuel handling practices. This has been purchased by the Port of Bellingham. The Boatyard at Colony Wharf is an operational boatyard. Soils and groundwater at the site are impacted by low levels of metals contamination, principally copper. Petroleum has also been detected in soil and groundwater. The site has been purchased by the City of Bellingham, and cleanup activities are being managed by the Port under an Interlocal Agreement with the City. The Olivine site was formerly used by previous Port tenants for operation of a lumber mill, and later for operation of a rock crushing plant. Contaminants identified at the site include petroleum hydrocarbons, PAHs, and low levels of heavy metals, principally nickel. The Port and City are conducting the cleanup of the Central Waterfront site and expect to complete an uplands RI/FS for public review in early 2007 under an Agreed Order with Ecology.

- **Chlor-Alkali Plant**: The chlor-alkali plant site was recently acquired by the Port from GP. Soils and groundwater at that site contain elevated levels of mercury from historic operations of the chlor-alkali plant by GP. Two rounds of RI/FS investigations have been performed at the site, and additional studies were performed as part of the Whatcom Waterway Log Pond Interim Action. Results indicate that soil and groundwater conditions at the site do not represent a current source control concern for Whatcom Waterway site sediments or surface water quality. The Port, GP, and Ecology plan to amend an existing Agreed Order to complete an RI/FS of this site.

- **Former GP Pulp and Tissue Mill Site:** The Pulp and Tissue Mill site was also recently acquired by the Port from GP. This property has been used since the early 1900s for pulp and tissue mill operation. Some impacts to soil and groundwater were identified at the site during environmental investigations performed at the site during 2004, and the site was listed by Ecology as a contaminated site. The key issues at the site include petroleum contamination near old bunker fuel storage areas, and low-level metals impacts in groundwater near the former acid plant area of the pulp mill. Based on patterns of sediment contamination in the Whatcom Waterway, neither of these areas appears to represent an ongoing source of contamination to Whatcom Waterway sediments. However, additional actions will be required to address these contamination problems and finalize plans for site cleanup and redevelopment of the Pulp and Tissue Mill site. Under the terms of the GP property acquisition, the Port will conduct the investigation and cleanup of this site, with oversight by the Department of Ecology.

Sediment Quality and Source Control

Sediment quality issues have been directly evaluated by the Whatcom Waterway RI/FS process. Readers should refer to that document for a thorough discussion of site conditions. This section provides a brief summary of that information.

- **Sedimentation Patterns**: The Nooksack River, Whatcom Creek, Squalicum Creek, Chuckanut Creek, and Padden Creek Watersheds contribute sediment to Bellingham Bay. The largest volume of water and sediment entering Bellingham Bay is the Nooksack River. As previous discussed, dredging and shoreline modifications have affected the natural sedimentation process in Bellingham Bay. This is particularly true in the inner bay, where industrial and commercial/shipping activities have been focused. The "net sedimentation rate" is a measure of the long-term burial rate of sediments beneath more recently deposited sediment materials. (Within contaminated areas of Bellingham Bay, this measurement provides an indication of how rapidly "clean" sediments are being deposited over contaminated material.) The net sedimentation rate in inner Bellingham Bay has been estimated at roughly 1.6 cm/year. Estimates of net sedimentation rates within Whatcom Waterway has been determined using sediment core studies and by calculating net changes in mud line elevation of the waterways between 1975 and 1996. These rates vary considerably within the channel area, ranging from 0 to 9.4 cm/year.

- **Sediment Bioactive Zone:** Sediment is the material suspended in or settled on the bottom of a water body. It is typically a mixture of sand, silt and clay. When describing the characteristics of sediment, reference to different sediment layers is made. "Surface" sediments reside directly below the mud line and represent the "biologically active zone." The extent of the surface sediment layer can vary from site to site, and may extend to a depth of between 10 and 16 centimeters below mud line within the bay. Previous evaluations for the Whatcom Waterway site indicated that the bioactive zone thickness within the site averages 12 centimeters. "Subsurface" sediments are located below surface sediments.

- **Sediment Contamination:** As stated earlier, efforts to address contamination problems in Bellingham Bay have been underway since the early 1970s. Over these past 25 years, the amount of contaminants discharged to the bay has been substantially reduced, which has led to improvements in water and sediment quality. However, recent studies have found that certain contaminants continue to persist in sediments, and could pose a potential risk to aquatic organisms that live in these areas. Contaminated sediments occur primarily in localized areas within the northeast corner of the bay. The existing sediment conditions in Bellingham Bay are currently being evaluated through a number of site-specific RI/FS efforts and general status investigations. Of more than 50 chemicals analyzed, three have been regularly detected in Bellingham Bay sediments at concentrations that exceed the current SQS chemical criteria. These chemicals of potential concern are mercury, 4-methylphenol and phenol concentrations. Solid waste accumulations have also been mapped adjacent to the former Cornwall Avenue Landfill. Compliance with sediment cleanup standards considers potential future changes to the surface sediment layer that would result from dredging. In Bellingham Bay, subsurface contamination has been detected in the federal navigation channels. These sediments could potentially be exposed by dredging and become "surface" sediments. A brief description of contaminants of concern is provided here, followed by a description of their occurrence within the study area.

- **Mercury:** A naturally-occurring metal, mercury is ubiquitous within the environment. Elevated concentrations of mercury in the aquatic environment have been associated with chlor-alkali facilities, shipyards, mining operations, dental processes, fungicide applications, and other sources. Releases of mercury to Bellingham Bay peaked during the 1965 to 1971 period, largely related to releases from the GP chlor-alkali facility. However, this source of mercury to Bellingham Bay has since been eliminated. Mercury exists in many forms within the aquatic environment; the three most predominant forms are elemental mercury, inorganic mercury and methylmercury. The high vapor pressure of elemental mercury makes it possible for this chemical to volatilize from water into air. Inorganic mercury, which comprises the greatest fraction in sediments is strongly absorbed to and transported with sediment particles. Methylmercury is the most toxic and readily bioaccummulated form of mercury. Methylaton of inorganic mercury by microbes occurs at or near the sediment:water interface where oxygen has been depleted. Although methylmercury typically comprises less than 10 percent of the total mercury burden in Puget Sound sediments, more than 90 percent of the total mercury present in fish and shellfish tissue is methylmercury. The relationship between total mercury concentrations in surface sediments and tissue in Bellingham Bay was characterized in the Whatcom Waterway RI/FS, and was used to develop site-specific sediment cleanup levels (Ecology, 1999).

- **Phenolic Compounds:** Both phenol and 4-methylphenol are also ubiquitous within the environment, and are often detected in stormwater runoff. Phenol and 4-methylphenol are known degradation products of natural wood products, and accumulations of these compounds in regional sediments is frequently associated with wood material deposits (Ecology, 1999).

- **Sediment TMDL Study**: A TMDL for mercury contamination in sediments was established for the Inner Bellingham Bay in 2001. The TMDL sets an allowable daily load of pollutants to the water body from point and nonpoint sources. Sediment sampling in Bellingham Bay has found mercury and other contaminants at levels that exceed the state Sediment Management Standards chemical criteria. The presence of contaminated sediments in Inner Bellingham Bay has been documented to be due to historical practices. No ongoing sources have been identified as causing violations of marine Sediment Quality Standards (SQS), however, some sources may affect small areas of the bay immediately adjacent to outfall pipes (Ecology, 2001).The key areas of Inner Bellingham Bay on the 303(d) list are identified as Whatcom Waterway, I&J Waterway, GP Outfall, and Harris Avenue Shipyard. Of the more than fifty chemicals analyzed, only those described above were regularly detected at concentrations that exceed current state SQS chemical criteria in the Whatcom Waterway site area. Surface concentrations of mercury, 4-methylphenol, and wood material in the Whatcom Waterway area were significantly lower than concentrations detected several feet below the mudline. These patterns correspond to decreasing surface sediment concentrations over the past 25 years, due to source controls implemented at the GP facility and in other areas of Bellingham Bay beginning in the early 1970's. This process of natural recovery is also a result of the gradual incorporation of clean sediment deposits loading primarily from the Nooksack River Watershed (Ecology, 2001).

- **Sediment Areas Managed Separately**: In addition to the remediation areas being addressed under the Whatcom Waterway site, Ecology is conducting the cleanup of other areas under separate site designations or under the NPDES water quality program. These separate sediment management areas include the following:

  - **I&J Waterway:** Surface sediment sampling in I&J Waterway have been shown to be impacted with contaminants different from those present in the Whatcom Waterway site area. These include phthalates and nickel, and also PAH compounds. The Port is currently conducting a sediments RI/FS for this area under an Agreed Order with Ecology. The completion of that study is expected during 2006.

  - **GP Outfall**: The GP Outfall area was identified as a 303(d)-listed contaminated sediment site in Bellingham Bay due to levels of mercury above the cleanup screening level. A detailed contaminant transport analysis was carried out to evaluate the sediment recontamination potential for mercury for the current discharge levels of the GP Outfall. The modeling process predicted the current GP Outfall discharge will not cause mercury sediment contamination to SQS levels in Bellingham Bay. Furthermore, the dynamic model showed that existing sediments within the immediate outfall area were predicted to recover to below the mercury SQS chemical criteria prior to 1999. Sampling data from 1999 confirmed model predictions and demonstrated that the sediments within the vicinity of the GP outfall comply with SQS cleanup criteria for mercury. In addition, the GP chlor-alkali plant (the mercury discharge source) has been closed and pulping operations have terminated, which will improve the discharge quality from the outfall (Ecology, 2001). Biological confirmatory tests were run on the samples from the three highest-concentration stations in the station cluster. All biological tests passed SQS biological screening criteria. Therefore, the confirmatory biological testing procedures under SMS do not qualify this station cluster as a contaminated sediment site and demonstrates compliance with the SQS criteria through the principal of biological override (Ecology, 2001).

- **Cornwall Avenue Landfill**: The Cornwall Avenue Landfill is managed as a separate cleanup site. The Port is leading the completion of an RI/FS for cleanup of this site, in coordination with the City and DNR. The completion of this study is expected during 2006. Cleanup of this site will be completed after finalization of the RI/FS and development of a Consent Decree.

- **RG Haley**: An RI/FS is in progress at this site. Sediments in the nearshore areas of this site have been impacted by pentachlorophenol, petroleum and selected PAH compounds. The RI/FS is being conducted under an Agreed Order with Ecology and a draft report is expected during 2006. The cleanup at this site will include remediation of impacted nearshore sediments. Ecology is ensuring that cleanup activities are appropriately coordinated with the adjacent Cornwall Avenue Landfill site.

3.2.2 Issues by Site Area

Relevant geology, water quality and environmental health issues are discussed below. The discussion is organized by geographic area using the site units shown in Figure 1-1.

Outer Whatcom Waterway (Unit 1)

The Outer Whatcom Waterway consists of deep-water areas of the Whatcom Waterway navigation channel. Current water depths in this area vary from approximately 30 feet to greater than 36 feet. These depths are largely the result of historical dredging activities in the Waterway.

Sediments in the Outer Whatcom Waterway are dominated by fine particle size distributions (silts and clays), with a total fines content generally greater than 80%. The TOC content of the sediments is generally between 1 and 5%, consistent with average TOC distribution for the site.

The bathymetry in most areas of the Outer Whatcom Waterway is relatively flat, with slopes flatter than 10H:1V. However, slopes become significant along the outer edges of the Waterway, including at the Bellingham Shipping Terminal. The Bellingham Shipping terminal is an engineered slope, including a pile-supported concrete bulkhead and areas of armored slope.

Surface sediments within the Outer Whatcom Waterway (Figure 3-1) have recovered through sedimentation and natural recovery. All of the surface samples collected recently in this area have passed bioassay testing, and no exceedances of the site-specific bioaccumulation screening level (BSL) for mercury were noted.

Subsurface sediment concentrations in the Outer Whatcom Waterway are generally quite low (Figure 3-2 and Figure 3-3). Previous sediment testing suggests that the sediments in Units 1A and 1B may be suitable for open-water disposal or beneficial reuse. In the areas of Unit 1C, sediment contaminant levels are higher, likely precluding sediments from open water disposal. However, contaminant concentrations are well below those in the most contaminated remaining portion of the site, the ASB sludges.

Inner Whatcom Waterway (Units 2 and 3)

The water depths within the Inner Whatcom Waterway vary greatly. Existing water depths range from greater than 30 feet below MLLW, to intertidal areas that are exposed at low tide. Areas of shallow-water habitat are predominantly located in Unit 3A at the head of the channel and along the berth areas on either side of the federal channel.

The bathymetry of the federal channel is relatively flat. However, sideslopes along either side of the waterway steepen in the berth areas. Historically these side-slopes were hardened with infrastructure for industrial water-dependent uses. Most shorelines include armored slopes, bulkheads and over-water wharves, consistent with typical deep draft infrastructure requirements as shown in Figure 3-5. However, much of the Inner Whatcom Waterway shoreline infrastructure is in fair to poor condition. In portions of the Central Waterfornt, bulkheads have failed in part or in full, and portions of wharves have collapsed. The state of repair for shoreline infrastructure varies parcel by parcel along the waterway.

Currently, the effective water depths for the Inner Whatcom Waterway are controlled by the restrictions of the federal navigation channel. Construction is not allowed past the pierhead line, so the water depths at the pierhead line establish the effective water depth for the Inner Whatcom Waterway. That effective water depth varies from less than zero (in areas where sediments at the pierhead line have shoaled and are exposed at low tide) to a maximum of approximately 22 feet below MLLW. Though the project depth for portions of the federal channel is 30 feet, this depth is not currently maintained in any berth areas, and is not supported by requisite shoreline infrastructure in most areas. Most of the shoreline infrastructure in the Central Waterfront area and near the head of the waterway was established when the waterway project depth was 18 feet. The ability to establish and maintain the full project depth is restricted by the relatively narrow width of the waterway and the existing shoreline conditions.

Sediment texture in the Inner Whatcom Waterway is generally dominated by fine sediments. The total fines content of Inner Whatcom Waterway sediments is generally in excess of 80 percent. However, berth areas are armored with rubble, asphalt debris and armor stone in most areas. Sand and gravel are present in some emergent tideflat areas at the head of the waterway, and in beach areas along-side portions of the waterway.

Whatcom Creek enters the Whatcom Waterway upstream of the Roeder Avenue Bridge. Salinities of the Inner Whatcom Waterway vary with tide stage and flood level of Whatcom Creek, as freshwater discharges from the creek and mixes with saline waters of Bellingham Bay.

Surface sediment (Figure 3-1) quality within most areas of the Inner Whatcom Waterway has naturally recovered. With the exception of localized areas adjacent to the Colony Wharf site and one area near the Log Pond, surface sediments within the Inner Whatcom Waterway comply with SMS bioassay criteria, and mercury concentrations are well below the site-specific BSL. Subsurface contaminant concentrations are relatively low in comparison to the ASB sludges (Figure 3-2 and Figure 3-3). However, previous testing has indicated that sediments removed from the Inner Whatcom Waterway are unlikely to be suitable for open water disposal or beneficial reuse

Log Pond (Unit 4)

The Log Pond was created as various fills were placed around the area. It was used for log handling and was the location of the original wastewater outfall from the Georgia Pacific chlor-alkali plant to Bellingham Bay, prior to construction of the ASB. A cleanup action consisting of construction of a combination sediment cap and habitat enhancement was completed in the GP Log Pond in 2001.

The Log Pond prior to the Interim Action had a bottom elevation that was typically approximately -10 feet MLLW, with slopes up to the shorelines, and down to approximately -26 feet MLLW at the intersection with the Whatcom Waterway. During the Interim Action, approximately 43,000 cubic yards of sediment were placed, with thicknesses ranging up to 6 feet, with a typical design thickness of greater than 3 feet, and an average thickness as placed of 3 to 4 feet. This brought the bottom elevation up so that it was generally on the order of -3 to -4 feet MLLW, and sloped up to the shorelines, and down to the Whatcom Waterway.

Currently, there are very few structures within the Log Pond. A pile-supported conveyor system exists along the Bellingham Shipping Terminal shoreline, a dolphin (i.e., cluster of pilings) is located within the log pond, and there are numerous pilings along the shoreline. A wharf extends to the southwest, in front of the Log Pond along a portion of the Waterway.

The shoreline prior to construction was generally composed of rip-rap and concrete rubble slopes and wooden and steel sheet-piling bulkheads down to a depth of approximately -5 feet MLLW. These shorelines were left in place through construction.

The sediments in the GP Log Pond prior to construction ranged from sandy to very sandy organic silt and clay with a slightly clayey sand with some gravel near the shoreline. The solids content of the sediments ranged from approximately 25 to 40%, with an average around 30 to 35%. In the northeast end of the pond, a large (>50%) content of shell fragments was noted.

The material placed as part of the Interim Action consisted of beneficially reused dredge materials from two sources. The first was navigational dredging spoils from the Swinomish Channel near La Conner, Washington. This material was a sand, with less than 4% fines, and 1 to 8% gravel. The other material used was dredge material from the Squalicum Creek Waterway in Bellingham. This material was generally classified as a silty clay. A grab sample taken during the 2001 construction indicated that the material was an organic clay, and contained 5% sand, 78% silt, and 17% clay.

TOC concentrations in the GP Log Pond prior to construction ranged from 2.7 to 15 percent, with an average of approximately 6 to 10 percent. TOC measurements were not made of the Swinomish Channel materials. The Squalicum Creek materials were approximately 1.5 to 1.7 percent TOC. The current surface in the GP Log Pond is largely these Squalicum Creek materials.

As described in Appendix D of Volume 2 of the RI/FS, the Log Pond is partially sheltered from prevailing winds. However some westerly winds can enter the Log Pond and subject portions of the shoreline to erosive forces. Remaining areas of the shoreline are protected from these wind and wave forces, though northerly winds and vessel wakes can produce some smaller waves. Cap monitoring has shown good long-term stability for the majority of the cap area. Some erosion effects have been noted in limited shoreline areas of the cap. Enhancements to the shoreline conditions to provide for long-term stability of these areas under site wind and wave conditions are presented in the RI/FS and will be implemented as part of the final remedial action for the site.

As described in the Environmental Design Report for the Interim Action, the subsurface mercury concentrations in the Log Pond are elevated due to historic mercury discharges from the former chlor-alkali plant. Ecology determined that removal of the sediments was not technically practicable. The Log Pond Interim Action has been successful at containing these sediments, and no migration of contaminants upward through the cap or through cap porewater has been observed.

As described in Appendix D of Volume 2 of the RI/FS, most surface sediments within the Log Pond comply with sediment cleanup levels. A localized area of recontamination was noted during Year-5 monitoring in the southwest corner of the Log Pond, adjacent to an area of shoreline not included in the Interim Action cap boundaries. Shoreline enhancements to this area will be performed as part of the final remedial action, including extension of the cap area to include this adjacent area, and placement of appropriately-graded materials to ensure long-term stability of the cap edges.

Areas Offshore of ASB (Unit 5)

Water depths within Unit 5 vary by area. In Unit 5-B the depths are shallow, ranging from approximately 6 feet to approximately 12 feet below MLLW. Similarly, Unit 5-C water depths are shallow, ranging from approximately 2 feet below MLLW along the edge of the ASB, to depths of approximately 18 feet below MLLW along the Whatcom Waterway.

Water depths in Unit 5-A vary from relatively deepwater (up to 26 feet below MLLW) offshore areas, to shallow water areas adjacent to the ASB (as shallow as 4 feet below MLLW. Depths shoal gradually, consistent with natural bathymetric conditions within the Bay. The depth contours along the Whatcom Waterway edges of these areas have been affected by historic dredging patterns within the Waterway.

The sediments within Unit 5 range from fine-grained sediments in deepwater areas, to sandy sediments with some gravel in shallow-water, high-energy areas of Unit 5-B. The particle size distribution is controlled by area wave energies.

Wave energies in Unit 5-C are lower than in Unit 5-B due to the partial sheltering of this area by the ASB structure and the Bellingham Shipping Terminal. Further reductions in wave energies in this area are anticipated as part of future marina construction improvements.

Throughout most of Unit 5 the surface sediments (Figure 3-1) have naturally recovered and are compliant with site cleanup levels. Subsurface sediment concentrations are relatively low as shown in Figure 3-2 and Figure 3-3. However, wave energies within Unit 5-B are higher than in other areas and have slowed natural recovery rates and the deposition of fine sediments in this area. Recent sampling in 2002 demonstrated that sediments in this area do not exceed bioassay criteria established under SMS. But mercury levels remain elevated within Unit 5-B due to the lower levels of natural recovery in this area.

Area Adjacent to BST (Unit 6)

Most of Unit 6 consists of deepwater areas, with elevations greater than 18 feet below MLLW. However, shallow-water areas are located immediately adjacent to the Bellingham Shipping Terminal. The shorelines in this area consist of engineered slopes, armored to resist wind and wave erosion.

Sediments in deepwater areas of Unit 6 consist of fine-grained sediments typical of the Whatcom Waterway site. The total fines content typically exceeds 80 percent. TOC levels range from 1 to 5 percent, consistent with average Whatcom Waterway site conditions.

The principle contaminants historically identified in the Unit 6 area are phenolic compounds. The primary sources of these compounds appears to be from historical log rafting activities. Natural recovery processes for these materials include both deposition and burial, as well as biodegradation (phenolic compounds are biodegradable under both aerobic and anaerobic conditions).

During sediment testing in 2002, a single failure was noted in an amphipod bioassay test performed at station AN-SS-30 (see Figure 3-1). Mercury levels were below the numeric SQS in this sample. No bioassay exceedances or elevated mercury levels were noted in other areas of Unit 6 during 2002 sampling activities.

Starr Rock (Unit 7)

Water depths in Area 7 range from a low of approximately 20 feet below MLLW to a maximum of approximately 40 feet. Due to its deepwater location, Unit 7 is not subject to significant wave energies. Sediments in this area are predominantly fine-grained materials, with total fines contents of greater than 80 percent. Like most areas of the Whatcom Waterway, the TOC content of sediments in this area is generally between 1 and 5 percent. Localized deposits of woody materials were noted, with some TOC contents exceeding 5 percent.

The surface sediments (Figure 3-1) within Unit 7 have naturally recovered. Surface sediments in this area do not contain any exceedances of the site-specific mercury BSL, and no exceedances of SMS criteria were noted in sediment bioassays.

ASB (Unit 8)

The ASB is approximately 1000 feet wide north-south, and varies from approximately 1000 to 1400 feet wide east-west. The ASB berms enclose Unit 8 and separate it from Bellingham Bay. The ASB berms enclose an area of approximately 28 acres.

Figure 3-4 shows in schematic cross-section the construction of the ASB berm. The berms were constructed of quarried sand and stone materials placed at the time of construction. The interior of the ASB was dredged to depths approximately 15 feet below MLLW. A bentonite material was used to reduce the permeability of the berm and make it suitable for wastewater uses. An asphalt surface was placed around the berm interior edges to prevent wind and wave erosion of the berm structure. The outer edges of the berm are armored with stone to protect against wave erosion. Wastewater elevations within the ASB are maintained by active pumping at approximately 19 to 20 feet above MLLW. This elevation is significantly higher than the water elevations in Bellingham Bay, and provides hydraulic head necessary to discharge treated wastewater by gravity flow through the GP-owned outfall.

Since construction of the ASB facility, biotreatment sludges have accumulated in the ASB. These sludges are soft, wet and are extremely high in TOC content. The solids content of these materials is less than 30 percent and averages about 14 percent. The TOC content is very high, averaging between 30 and 50 percent. The sludges consist of pulp solids and microbial biomass produced during biotreatment of facility wastewaters.

In contrast to the ASB sludges, the berm materials consist primarily of clean coarse sand obtained from quarry sites during ASB construction. These materials were tested for physical properties and chemical properties as part of the Remedial Investigation activities. Sediments underlying the ASB also consist of sandy materials.

The exterior of the ASB was constructed with a final cover of large armoring rock, generally of 300 to 4400 pounds. These exterior slopes were constructed between 2.5 and 3:1 (H:V). The interior slopes are finished at slopes of approximately 2.5:1 (H:V).

As described in the RI/FS, the ASB sludges contain the highest contaminant levels of all of the materials requiring remediation (Figure 3-2 and Figure 3-3). Contaminant levels include elevated mercury levels from chlor-alkali plant wastewaters, but also contain very high levels of phenolic compounds and other inorganic and organic contaminants including cadmium, zinc, phthalates and polynuclear aromatic hydrocarbon (PAH) compounds.

The ASB sludges are soft, wet and have very high TOC contents. If managed as part of a nearshore fill, these sludges would be subject to primary and secondary consolidation, and would likely produce methane during anaerobic decomposition.

Materials in the ASB berms were directly tested as part of Remedial Investigation Activities. The berm sands were free from anthropogenic contaminants and were suitable for material reuse, provided that ASB sludges are first removed so that the materials can be safely accessed.

3.3 Fish and Wildlife

An overview of the fish and wildlife characteristics of the Whatcom Waterway site are described in Section 3.3.1 below. The particular considerations for each of the Site Units are described in Section 3.3.2.

3.3.1 Overview of Key Issues

This section describes fish and wildlife habitats in the Whatcom Waterway, which is located on the northeastern side of inner Bellingham Bay. Detailed information on Bay-wide habitat conditions and habitat maps can be found in the Data Compilation Report (Pacific International Engineering and Anchor Environmental, 1999).

Most of the habitats in Bellingham Bay are used by a variety of marine and terrestrial species for feeding, reproduction, rearing, and/or refuge. The Whatcom Waterway specifically hosts various benthic macroinvertebrates (bivalves, crabs, polychaetes), as well as providing habitat or passage for various fish species (both bottomfish and pelagic species such as salmon).

Types and Functions of Habitats

Three different elevations of habitat are considered within this EIS: intertidal, shallow subtidal, and subtidal. Although separated by only a few feet, these three strata have distinct soil textures and support varying plant and animal communities. Each stratum has two types of substrata: sand/mud/cobble and gravel/rocky shore. The habitat typically found in these strata is summarized here to preface more detailed descriptions of fish and wildlife habitat in the Bay.

- **Intertidal: 4 feet below to 11 feet above MLLW**
    - **Sand/mud/cobble.** This area supports rooted plants to varying degrees, with increased numbers and variety occurring at higher elevations. Native eelgrass is most commonly found at 0 to 4 feet below MLLW, while rushes, sedges, and pickleweed can be found at 11 to 8 above MLLW. These plants provide food and refuge to various organisms, including juvenile salmon, shrimp, crab, and flat fish. Mudflats found in this

substratum support epibenthic prey that are consumed by juvenile salmon migrating through the area. Pacific herring may also use the eelgrass and macroalgae found in the intertidal zone as spawning habitat. The finer substrate at higher elevations (8 to 11 feet above MLLW) provides spawning habitat for sand lance and surf smelt. Premium intertidal habitat of this kind, with the appropriate substrate, energy levels and other conditions providing maximum benefit to juvenile salmonids, is limited in the Whatcom Waterway area to areas at the head of the Whatcom and I&J Waterways, areas along portions of the sides of the Whatcom Waterway, in beach areas at the foot of Hilton Avenue and at the foot of Pine Street and in portions of the Log Pond following completion of the Interim Remedial Action.

- ► **Gravel/rocky shore.** Native eelgrass is occasionally found in pools and channels on the rocky shores at about 0 feet MLLW. Brown, green, and red algae are also found throughout this area. The higher elevations of this substratum are affected by higher tides; plant material can consist of lichens, some flowering plants, and leadwort. Animals commonly encountered include crabs, shrimp, sponges, sea anemones, worms, sea stars, oysters, and various fish (e.g., perch, prickleback, flat fish, and some juvenile salmon). Fish use this area for feeding, refuge, and reproduction, and this intertidal can represent premium nearshore habitat for juvenile salmonids. Armored and rocky areas of the Whatcom Waterway with this type of habitat are located along the sides of the Whatcom and I&J waterways, along the shoreline of the ASB, and in portions of the Log Pond.

- **Shallow Subtidal: 4 to 10 feet below MLLW**

  - ► **Sand/mud/cobble.** The plant and animal communities and functions in this substratum are similar to those described in lower elevations of the intertidal habitat; a notable exception is native eelgrass, which is typically more common within the -4 to 10 feet below MLLW zone. Mudflats within this substratum support epibenthic prey that is consumed by juvenile salmon migrating through the area. The substrate within this elevation can also provide suitable habitat for Dungeness crab mating and egg brooding. Shallow subtidal areas are located at the heads and along portions of the sides of the Whatcom and I&J waterways, in areas at the foot of Hilton Avenue and Pine Street, in the ASB shoulder area and in the Log Pond.

- **Gravel/rocky shore.** Native eelgrass is occasionally found in this area, as are a variety of brown, red and green algae. Animals common to this substratum include crabs, shrimp, sponges, sea anemones, worms, sea stars, oysters, and a variety of fish such as perch, prickleback, flat fish, and some juvenile salmon. The fish use this area for feeding, refuge and reproduction. Rocky shallow subtidal habitats are located along portions of the Whatcom and I&J Waterways and along the shorelines of the ASB and in portions of the Log Pond.

- **Subtidal: Greater than 10 feet below MLLW**

  - **Sand/mud/cobble.** Native eelgrass is still relatively common between 10 and 20 feet below MLLW; however, beyond 20 feet below, light is limited and eelgrass and macroalgae are less prevalent. Some varieties of hardshell clams are also less abundant with increased depth, while the geoduck clam tends to be more abundant in deeper water. The substrate within this elevation can provide suitable habitat for Dungeness crab mating and egg brooding. The substrate and water column are also used for feeding by a variety of fish, including sub-adult and adult juvenile salmon. Most portions of the Site consist of subtidal habitat with sand or mud bottom.

  - **Gravel/rocky shore.** Larger-sized fish and shellfish often occur in deeper waters. Greater than 20 feet below MLLW, light reaching the sea floor limits the abundance and growth of macroalgae. In addition, the occurrence of some species such as oyster is rare. Rocky subtidal shorelines within the site predominantly occur along the developed shorelines of the Whatcom and I&J Waterways. Some rocky outcroppings occur at subtidal elevations at Starr Rock.

Fisheries and Invertebrate Resources

Documented fisheries resources for Bellingham Bay include the following:

- **Surf Smelt and Sand Lance:** Surf smelt and Pacific sand lance are common fish that spawn in the high intertidal portions of coarse sand and gravel beaches (WDF, 1992). Surveys by Washington Department of Fish and Wildlife (WDFW) have documented spawning beaches in Bellingham Bay. However, no surf smelt or sand lance spawning has been documented in inner Bellingham Bay, presumably because suitable substrates are not available.

- **Pacific Herring:** Pacific herring spawn in inland marine waters of Puget Sound between January and June in specific locations. There is typically a 2-month peak within the overall spawning season. Herring, which deposit their eggs on marine vegetation such as eelgrass and algae in the shallow subtidal and intertidal zones between 1 foot above and 5 feet below MLLW, are known to congregate in the deeper water of Bellingham Bay. However, only relatively low-density spawning deposition occurs in the Bay, and none of that has been documented in the vicinity of the Whatcom Waterway.

- **Salmonids:** Bellingham Bay is used extensively by anadromous salmon species (Shea et al., 1981). Each of the streams flowing into Bellingham Bay is used by one or more of the economically important species listed in Table 3-1. The Nooksack River has the largest salmon runs in Bellingham Bay, followed by Squalicum and Whatcom creeks. Concentrations of chum, coho, and chinook salmon along the shoreline and in offshore waters in Bellingham Bay peak annually about mid-May. Juvenile coho and chinook salmon appear to have different migration habits. Coho remain in the Bay for approximately 30 to 35 days, while chinooks remain about 20 days. More recent studies on the distribution of chinook salmon (Ballinger and Vanderhorst, 1995) indicate relatively high numbers of juvenile chinook salmon and average numbers of coho salmon use the area in the vicinity of the Whatcom Waterway.

- **Groundfish:** Several species of groundfish occur in both shallow and deep waters in Bellingham Bay for part or all of their life. Detailed information on groundfish species and their timing and use of Bellingham Bay is not available. Key characteristics of groundfish occurring in northern Puget Sound are generally applicable to Bellingham Bay.

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

- **Clams, Geoduck and Oysters:** The predominant bivalves in Bellingham Bay are intertidal and subtidal hardshell clams. Intertidal shell clam types include butter, littleneck, horse, and soft-shell clams and cockles. Subtidal clam resources consist of butter, littleneck, and horse clams. Native oyster and Pacific geoduck are also known to occur in Bellingham Bay (Palm, 1995; WDF, 1981; WDFW, 1992; Webber, 1974). Shellfish densities are relatively low along the eastern shore of Bellingham Bay in the vicinity of the Whatcom Waterway, although bivalves are the dominant benthic organism within the Waterway (Anchor Environmental, 1999). Scattered oysters also occur along the shoreline of the Whatcom Creek estuary (Palm, 1995). Geoduck, which is only present in a handful of locations in the Bay, does not occur within the Whatcom Waterway.

- **Shrimp:** Seven species of pandalid shrimp, including, pink, coonstripe, dock, and spot shrimp, occur in nearshore and deeper waters of Bellingham Bay. For example, coonstripe shrimp have been observed in intertidal areas immediately offshore of the Cornwall Avenue Landfill (which is just south of the Whatcom Waterway), and this species is common around piers and floats. Shrimp densities in the areas surrounding the Whatcom Waterway are moderate when the Bay is viewed as a whole.

- **Crab:** Crab trawls conducted for the Puget Sound Dredge Disposal Analysis (PSDDA) investigations indicate that the predominate crab resources in Bellingham Bay are the non-edible purple or graceful crab, the edible red rock crab, and the edible Dungeness crab. The highest densities of rock crab occur in relatively shallow water (30 to 45 feet below MLLW) in areas extending from the Lummi Peninsula to inner Bellingham Bay. Rock and Dungeness crab are likely to occur in shallower waters of Bellingham Bay not sampled as part of the PSDDA investigations. Dungeness crab is generally abundant in most areas of Bellingham Bay, and has been documented in the Whatcom Waterway. The northern and eastern shorelines of Bellingham Bay serve as nursery/rearing areas for juvenile Dungeness crab. A shell substrate is a preferred habitat for the first 8 to 10 weeks after larvae settle. However, other substrates, such as small cobbles and gravel, algae, and eelgrass, are also recognized as important rearing habitat for juvenile crab. Because the Whatcom Waterway has relatively limited quantities of these habitats, its usefulness as a nursery/rearing area is likely limited.

Table 3-1 Salmon and Trout Fisheries in Bellingham Bay

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

Sea Birds and Marine Mammals

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

Glaucous-winged gulls use inner Bellingham Bay for resting and foraging. Pigeon guillemonts use the shoreline area in and around the Whatcom Waterway for nesting and foraging. The Habitat Restoration Documentation Report (Pacific International Engineering, 1999) describes the individual bird species and their use of Bellingham Bay by season.

Limited information is available on the presence and residence time of marine mammals in Bellingham Bay (PTI, 1989). Bay-wide, several species have been reported: the harbor seal, sea lions, Orca whale, gray whale, and harbor porpoise. As described below, the local population of Orca whale is being listed as endangered under the Endangered Species Act (ESA). The other marine mammals are not threatened or endangered species under ESA, but they are protected from hunting under the Marine Mammal Protection Act. Seals and sea lions have been noted using the Log Pond and portions of the I&J Waterway for resting areas. Migrating gray whales have been noted to enter Bellingham Bay and to feed in subtidal areas of Puget Sound. Orca whales are occasionally observed in and near Bellingham Bay, though they are more typically observed in Rosario Strait and near the San Juan Islands.

Threatened, Endangered, Sensitive and Candidate Species

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

- **Bald Eagle:** The majority of bald eagle nest sites occur in the eastern portion of Bellingham Bay, primarily in the Nooksack River delta along the shoreline and in inland areas of the Lummi Peninsula. There are also some nests along the shoreline of Portage Island and Chuckanut Bay. Nest trees in the Pacific Northwest are typically tall conifers located in forested or semiforested areas within about 1 mile of large bodies of water with adequate food supplies. Marine and freshwater fish are eagles' preferred prey; birds contribute a smaller proportion of the eagle diet. Prey may also include small mammals. Nesting eagles generally forage within 10 square miles of their nest site. Thus, while the Whatcom Waterway vicinity does not appear to provide eagle habitat, it may serve as a food source. The bald eagle was proposed for delisting as of July 6, 1999 due to apparent recovery of the species in the U.S. (Federal Register 50 CFR Part 17). The bird is still be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The United States Fish and Wildlife Service (USFWS) also works with state wildlife agencies to monitor the status of the species as required by the ESA.

- **Peregrine Falcon:** Peregrine falcons are also found in Bellingham Bay. They feed almost exclusively on birds captured in flight, particularly waterfowl, shorebirds, and game birds. Peregrine falcons typically nest on cliff ledges greater than 150 feet in height that are close to the water. The Whatcom Waterway has no documented Peregrine falcon nests.

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

- **Salmon:** On March 16, 1999, the National Marine Fisheries Service (NMFS) added nine West Coast salmon to the Endangered Species List. Of the nine listed species, one occurs within the project area: the Puget Sound chinook salmon, which was listed as a threatened species. Two races of chinook salmon (spring and fall) are found in Bellingham Bay. The timing of adult migration to freshwater differs between these two races, but the timing of the return of adult fish, spawning, and emigration of juveniles overlap. Fall chinook is the most common run of chinook salmon observed in Puget Sound. Juvenile fall chinook generally emigrate to the estuary between February and August as sub-yearlings (within the first year after being spawned) or as yearlings. Individual fish may only use Bellingham Bay for a period of days to a few weeks before heading into the greater Puget Sound estuary. They may use the estuaries and intertidal areas between April and November for further rearing and growth. As juvenile fish move into neritic habitats, they preferentially consume emergent insects and epibenthic crustaceans in salt marsh habitat or decapod larvae, larvae, and other prey (Simenstad et al., 1991). Whatcom Creek and the Whatcom Waterway are utilized by salmon, although the Whatcom Waterway serves more as a migration corridor between Whatcom Creek and the Whatcom Creek Estuary than nursery/rearing habitat given the lack of suitable substrate and refuge.

- **Bull Trout:** Bull trout, listed as a threatened species under the ESA by the USFWS, are a member of the North American salmon family. Bull trout occur in the Nooksack River, and presumably spend some time in Bellingham Bay. Many are resident to a single stream; others migrate on a fluvial (i.e., spawn in headwaters streams and live downstream in larger rivers) or adfluvial basis (spawn in streams but live in lakes). Bull trout tend to prefer cold, clear waters (no more than 64 degrees Fahrenheit). Whatcom Creek does host bull trout, indicating that the trout use the Whatcom Waterway as a migratory path if not a refuge and rearing area.

- **Orca Whales:** On November 15, 2005, the National Oceanic and Atmospheric Administration (NOAA) Fisheries announced its decision to list the North Pacific Southern Resident Orca whale (Orcinus orca) population as endangered under the Endangered Species Act (ESA). The listing was effective on February 6, 2006 (50CFR 223/224). The listing is specific to the three resident whale pods (J, K, and L pod) with spring through fall ranges in Puget Sound and the Straits of Georgia and Juan de Fuca. This population was previously (December 16, 2004) proposed for listing as threatened. NOAA Fisheries has announced that they are preparing language for proposed Orca whale critical habitat for this population. A number of factors have been identified by NOAA Fisheries as having resulted in the listing of these Orca whales as endangered. Sound and disturbance from vessel traffic, toxic chemicals which accumulate in top predators, and uncertain prey availability (primarily salmon) all have been identified as concerns for the continued survival of this population. The small number of whales in this group, and relatively slow rate of population recovery since a 20 percent population decline during the 1990s also puts this historically small group at risk of extinction during a catastrophic event such as an oil spill or disease outbreak..

Priority Restoration Opportunities

In the Final Habitat Restoration Documentation Report for the Bellingham Bay Demonstration Pilot Project, the Habitat Subcommittee identified the following target species for Bellingham Bay.

- All salmonid species including Cutthroat trout and Steelhead
- Dolly Varden (bull trout)
- Bull trout (thought to occur in the Nooksack River)
- Sand lance and surf smelt
- Pacific herring
- Ling cod
- Flatfish (e.g., English sole)
- Pandalid shrimp
- Dungeness crab
- Hardshell clams

Based on the recent listing of the Orca whales, it appears appropriate to target restoration activities on those actions that would also support protection of those marine mammals.

In addition to the listing of target species, the Habitat Subcommittee identified the following focused habitat restoration/protection objectives:

- Provide clean sediments to support functions and species

- Restore the 200+ acres of historical native eelgrass bed that was formerly located in inner Bellingham Bay to the extent possible

- Restore/enhance degraded estuaries of Whatcom, Squalicum, Padden, and Little Squalicum Creeks to support salmonids, salmonid prey, and functions such as refuge, feeding, and rearing

- Restore/enhance/protect viable habitat that provides connective corridors between estuary and open water habitats and between other habitats in the open water environment

- Restore/enhance/protect natural habitat forming processes that create and maintain habitat

- Net gain in aquatic area and function

- Preserve existing viable habitat that tends to either concentrate sensitive life history stages and/or supports large numbers of species of concern

- Maximize habitat restoration/protection opportunities (including marine buffer) with remediation and/or shoreline projects

- Restore lost habitat attributes by removing shoreline fills, shoreline landfills, remnant structures, and removing/replacing treated timber structures.

Specific habitat opportunities prioritized under the Pilot were generally those that achieve restoration and enhancement of habitat for juvenile salmonids. In general, the actions that achieve restoration of salmonid habitat are beneficial to marine mammals including Orca whales. Habitat for juvenile salmon would improve due to the project; therefore, the availability of this important class of prey may increase. The following discussion addresses priority issues related to enhancement of salmonid habitats in Bellingham Bay.

While many species of salmonids may be present in nearshore estuarine and marine waters of Bellingham Bay, those species that enter saltwater early during their first year (some chinook, chum, and pink salmon) are typically considered to be more nearshore reliant. These fish are predominantly surface oriented, inhabiting the top meter or two or the water column moving in and out with the tides over shallow subtidal and intertidal areas.

These juvenile salmon are nearshore dependent for two main reasons, forage opportunities and refuge from larger, deeper water predators. They feed on organisms at the water-substrate interface (epibenthos), in the water column (plankton), and at the surface (neuston). Chum and chinook early in their saltwater residence feed primarily on epibenthos, although some neustonic and planktonic feeding occurs, especially as fish become larger. Pinks feed primarily on plankton from their initial entry into salt water. A number of physical and biological factors in the nearshore environment interact to create conditions that can enhance or detract from forage and refuge opportunities. Four physical factors in particular, tidal elevation, substrate type, and slope, and salinity influence habitat suitability for these fish, all of which can be modified by exposure to current or waves. Habitat that optimizes each of these factors represents premium habitat for juvenile salmonids..

- **Tidal Elevation:** Tidal elevation of a particular area dictates the duration of tidal exposure (dry periods between tides). This affects the conditions that can develop at different elevations. Shallow subtidal areas experience relatively high light levels, but essentially no tidal exposure. Larger macroalgae, eelgrass, and other organisms that might be susceptible to desiccation can survive at these elevations. The vegetation in this area supports prey organisms and can provide refuge for juvenile salmon. These fish spend a relatively small proportion of their time in waters over this elevation (primarily during very low tides) because they are primarily surface oriented. Low to middle intertidal areas (-4 to +4 ft MLLW) experience relatively short periods of tidal exposure, averaged over an entire season, and also receive a great deal of light. This area can be very productive for desiccation resistant macroalgae and invertebrate populations, including those epibenthos on which chum and chinook feed. Because they move in and out with the tides, juvenile salmon also spend a large proportion of their time in water over substrate at low to middle tidal elevations. While juvenile salmon spend relatively little time at higher tidal elevations (e.g., above MHHW, 8.46 MLLW in Bellingham Bay), the fringing salt tolerant plants that thrive in these areas can produce invertebrates, including chironomid fly larvae which also are important prey organisms. Tidal elevation characteristics relative to light and duration of exposure are not substantially altered with differences in wave or current regimes in shallow subtidal areas. The upper range of low to middle intertidal macroalgae may be expanded as desiccation during tidal exposure is reduced due to wave action, and the upper intertidal and supratidal areas, or "splash zone" can be expanded to even higher elevations, increasing upper range of salt tolerant plants.

- **Substrate Type:** Substrate type is a factor in providing suitable foraging opportunities for juvenile salmon. The epibenthic invertebrate assemblage can vary both in terms of composition and density based on substrate type. Generally, finer substrates (e.g., silts, sand, and mud) are correlated with higher densities of those epibenthos on which juvenile salmon most often feed. This includes both those organisms associated with the substrate itself, and those organisms associated with aquatic vegetation (e.g., eelgrass). An exception to this generality is where exposure to wave or current energy is relatively high, in which case more coarse substrates (e.g., gravel or cobble) are correlated with higher densities of epibenthos. This is particularly the case with those organisms associated with macroalgae (e.g., certain types of amphipods), is more likely to be present or accumulate in areas with coarser substrate. Coarser substrates also allow for more dissipation of water energy on the substrate surface.

- **Slope:** Slope is a factor that affects both foraging and refuge function of nearshore environments. Shallower slopes, particularly in the lower to middle tidal elevations, improves conditions for epibenthos, and therefore juvenile salmon foraging opportunity, by reducing desiccation rates during tidal exposure. They increase retention of organic detritus for processing into the food web at the epibenthic level. Shallower slopes also provide greater functional habitat area for juvenile salmon at given tidal elevations. Because juvenile salmon stay in the top meter or two of the water column, tidal profiles that allow them to stay in shallow water during most or all stages of the tidal cycle provide refuge from deeper water predators, including larger salmonids that feed from below. By contrast, steeply sloped nearshore areas provide less total area of less productive habitat at any given elevation, and little if any refuge from predators deeper in the water column. There are exceptions to this general case depending on wave exposure. In highly exposed areas, and shallowly sloped nearshore area will experience significantly more wave run up and a higher energy surf-zone that may outweigh the benefits of greater and higher functioning habitat area, and also shallow water refuge. Steeper slope profiles at specific elevations and/or coarser substrate can mitigate wave run up and surf break in higher energy areas.

- **Salinity:** Salinity influences habitat suitability for juvenile salmon by determining the physiological regime and the biological assemblage. The biological assemblage, including aquatic vegetation and invertebrates, of a given area is strongly tied to salinity. In areas of freshwater input, like the Whatcom Waterway, a salinity gradient exists along which this assemblage shifts from freshwater to marine organisms, with specialists in estuarine conditions in the middle. Surface oriented juvenile salmon in the nearshore, particularly chum and chinook, forage extensively in estuarine habitats. This is the case both for fish in their natal estuaries, and also fish that have already entered salt water and subsequently encounter lower salinity conditions. Low salinity areas are limited habitats in inner Bellingham Bay and provide important habitats for juvenile salmonids undergoing the physiological transition to saltwater.

In summary, the characteristics of premium habitat for juvenile salmonids and other selected species requires the optimization of multiple factors. The functions and values of the created habitat vary depending on this collection of factors.

Habitat Issues and Navigation Infrastructure

Portions of the Whatcom Waterway site area have been developed for navigation uses with infrastructure improvements. This infrastructure affects the types of habitat conditions that are present in these areas. Other than depth modifications (i.e., dredging) the main types of navigation infrastructure that exist in the Whatcom Waterway site area include bulkheads, armored slopes and over-water structures. These are illustrated in Figure 3-5. Habitat considerations associated with these features are described below:

- **Bulkheads:** The term bulkhead refers to constructed sheer vertical walls that stabilize the shoreline. Typically they are concrete or metal sheet pile, although many older bulkheads are constructed from treated timber. In the Whatcom Waterway, bulkheads are a common feature in the intertidal zone. Most extend from above mean higher high water to the structure design depth (varies from mean lower low water to depths greater than 10 feet below MLLW depending on the required water depth at the face of the bulkhead). Bulkheads are often installed in conjunction with armored slopes below the toe of the bulkhead. A bulkhead yields a habitat with no depth variability and no horizontal surfaces to support primary production, secondary production, or processing of detritus. While sessile organisms, including barnacles and some macroalgae, can attach to the vertical bulkheads, it is not suitable for producing epibenthic prey organisms for juvenile salmon. The vertical slope also means that juvenile salmon using the top one to two meters of the water column are in much deeper water during most or all tidal cycles, depending on the bottom elevation of the bulkhead, compared to a naturally sloping nearshore area. This may increase their susceptibility to predators. Juvenile salmon use waters adjacent to bulkheads, and can forage on prey items derived from planktonic or neustonic sources. However, due to the lack of epibenthic organisms, overall prey resources are typically considered to be reduced relative to sloped habitat.

- **Armored Slopes:** Slopes armored with large stones or "riprap" are typically steep and compress the horizontal habitat profile yielding less habitat within the desired zones for juvenile salmonids than do more gently sloped habitats. Unlike bulkheads, the resulting habitat does have surfaces to support primary productions, secondary production, and processing of detritus. Substrate size of riprap slopes differs from the fine silts or sands that would have been typical of the depositional delta area in the historic Whatcom Creek, or even more coarse gravel or cobble substrates farther from the mouth of the creek. At elevations that are exposed to regular, significant wave energy, riprap has essentially no ability to retain water or organic material on its own, except in depressions in individual pieces. Exposed rock surfaces at these elevations eventually develop sessile biological matrices, including macroalgae and invertebrates, which reduce desiccation at small scales and allows for an assemblage including mobile invertebrates. At lower elevations that do not have significant wave exposure, riprap can provide a suitable substrate for many different species of macroalgae and also provides habitat areas in its interstices for invertebrates. A common means of improving the productivity of riprap slopes is to fill the interstices of the rock with a finer material (e.g., gravel) that can increase both water and organic material retention, and increase the ability of the bulkhead slope to support an assemblage include juvenile salmon prey organisms. This method may not be appropriate in higher energy areas where substrate may not be retained at mid and higher elevations. The biological assemblages on riprap substrate are more comparable to that of a rocky nearshore area than beaches. While there are epibenthic prey available for juvenile salmon in these areas, habitat function is reduced compared to areas with smaller substrate. Juvenile salmon use waters adjacent to riprap and can forage on prey items derived from planktonic or neustonic sources as well as the limited epibenthic prey.

- **Overwater Structures:** Intertidal and shallow subtidal shading has decreased light levels underneath and around overwater structures. Shading is of primary concern because it reduces light available for photosynthesis by aquatic vegetation. Reduced primary productivity has implications both in terms of habitat structure and complexity (reduction or loss of aquatic vegetation), and in terms supporting productivity elsewhere in the food web, including juvenile salmon prey organisms. Shading impacts extend beyond the structural footprint of the structure as the sun's movement across the sky over a day or season results in a larger shaded area as it is oriented in different aspects. Small structures, such as narrow piers, shade relatively less area than large or wide structures such as pier aprons. Depending on the orientation of the narrow structure, direct sunlight can reach most the shade footprint over the course of a day or season. The distance from the lighted edge to the center of the structure footprint is also relatively smaller than at a wider structure, resulting in higher levels of ambient light. In contrast with wide structures, large proportions of the shade footprint may never receive direct sunlight. Wider structures also decrease the ratio of lighted edge to shaded area, and increase the distance from the lighted edge to the center of the structure footprint. This results in less ambient light under wider structures and therefore more intense impacts associated with shading. This has implications for productivity and can reduce the habitat function of an area for juvenile salmon foraging. Nearshore habitat function may be reduced underneath and immediately adjacent to overwater structures. For juvenile salmon, this impact is relatively greater at the typically highly productive low to middle intertidal zone, although impacts on macroalgae in the shallow subtidal and salt tolerant plants in the supratidal splash zone also can affect productivity in these zones. As with bulkheads, foraging function around overwater structures may be reduced due to decreased productivity but alternative food sources (plankton, neuston) are available. Those juvenile salmon that move into deeper water to avoid overwater structures may be more susceptible to deeper water predators, but this behavior is not always the response to encountering a structure.

In summary, premium habitats minimize the presence of bulkheads, steep armored slopes and over-water structures. However, waterfront navigation needs force compromises to be made between navigation and habitat features in most waterfront industrial areas. The cleanup and redevelopment of the Whatcom Waterway and New Whatcom areas provides a unique opportunity to reevaluate required infrastructure needs and achieve gains in premium nearshore habitat while simultaneously meeting the needs of waterfront navigation and land use.

3.3.2 Environmental Characteristics by Site Area

Environmental characteristics of the Whatcom Waterway site area described below by site unit with a focus on fish and wildlife habitats.

Outer Whatcom Waterway (Unit 1)

The areas of the Outer Whatcom Waterway are composed largely of deepwater aquatic areas. Shallow-water nearshore habitats in the Outer Whatcom Waterway area are limited to under-dock areas along the Bellingham Shipping Terminal. Potential habitat enhancement opportunities in these areas are limited by the infrastructure needs associated with operation of a deep draft moorage area in support the operations of the federal navigation channel (Figure 3-5).

Inner Whatcom Waterway (Units 2 and 3)

The Inner Whatcom Waterway includes a mixture of deepwater areas, and areas of emergent shallow-water habitat. The shallow-water habitat areas at the head of the Waterway and along its sides are extremely valuable as part of migration corridors for juvenile salmonids. The preservation and enhancement of these areas was identified as a priority action under the Demonstration Pilot. However, the ability to accomplish this action is subject to balancing of habitat needs with infrastructure and navigation requirements.

During the Bellingham Demonstration Pilot, the area within Site Unit 3-A was identified as a priority location for maintenance and enhancement of premium shallow-water habitat. A former wharf structure was removed by the City as part of cleanup and restoration actions in this area. Adjusting navigation dredging dimensions to preserve the emergent tideflat area was proposed as part of the preferred alternative from the 2000 FEIS.

The reevaluation of Whatcom Waterway navigation needs and associated shoreline infrastructure requirements completed as part of the Whatcom Waterway and New Whatcom projects provides an opportunity to preserve and enhance nearshore habitat located long the sides of the Whatcom Waterway. Preliminary design concepts for how waterfront infrastructure might be integrated with the needs of a mixed-use waterfront in the Inner Whatcom Waterway are shown in Figure 1-2, Figures 3-6 and 3-7 and in Appendix E. These concepts locate navigation infrastructure offshore of premium nearshore habitat benches. The bulkheads, over-water wharves and steep armored shorelines typical of industrial waterfront areas are minimized under these concepts. The ability to implement this type of shoreline treatment will be dependent on cleanup and land use decision-making.

Log Pond (Unit 4)

The Bellingham Bay Work Group identified habitat enhancement opportunities within the Log Pond as a priority restoration opportunity (BBWG, 1999). Monitoring has confirmed the use of the restored area by juvenile salmonids, juvenile Dungeness crabs and other aquatic organisms and marine mammals.

Some eel grass colonization has occurred since implementation of the Interim Action. However, the colonization has been limited to date to a relatively small number established blades. A pilot program has been funded under the Bellingham Bay Demonstration Pilot to enhance natural colonization rates through seeding of the area with eel grass. This pilot test is ongoing.

There are some remaining opportunities for habitat enhancements within the Log Pond. These include potential removal of the conveyor system and remaining pilings and/or dolphins. Some areas of the Log Pond remain deeper than -4 feet MLLW, and increases to these mudline elevations could further enhance habitat quality in these areas

Areas Offshore of ASB (Unit 5)

The Habitat Restoration Documentation Report (BBWG, 1999) documented high priority restoration opportunities are within Unit 5. The Unit 5 areas were considered valuable as salmonid migration corridors, and as potential premium nearshore aquatic habitat. Shallow water habitat could be established by raising the elevation next to the ASB, and by creating structures that would reduce wave energies and allow for eel grass colonization. To the north of the ASB, along Hilton Avenue, an eel grass bed has become established. This area has elevations generally shallower than 5 feet below MLLW, and the area is partially protected from wave energies by the ASB and by a shallow-water leading edge.

Figure 3-4 shows a conceptual design for a premium nearshore habitat bench that could be within Unit 5B to improve the habitat quality of this area. These enhancements include raising of sediment elevations to depths between 3 and 6 feet below MLLW, and providing a stone leading edge to trip incoming waves and reduce resultant wave energies in shallow-water areas. These features would largely replicate conditions already present in the eel grass flat located in the Hilton Avenue area. The figure shows the different wave energy and depth regimes both along the outside (Unit 5) and inside (Unit 8) of the ASB per preliminary design concepts developed by the Port after consultation with resource agencies and project stakeholders. Any final design for this area would be subject to additional refinement during design and permitting for site cleanup, marina development and habitat enhancement activities.

Area Adjacent to BST (Unit 6)

Like Unit 5, the area within Unit 6 has some potential value for enhancement of nearshore habitat. However, the navigation uses within this area restrict the potential for development of significant habitat benches as described above for Unit 5.

Starr Rock (Unit 7)

Unit 7 consists of a deepwater habitat area. The depths in this area do not allow for enhancement of shallow-water habitat uses

ASB (Unit 8)

During the Bellingham Bay Demonstration Pilot, the potential to conduct habitat enhancement activities inside the ASB area was identified. While these uses conflict with current wastewater and cooling water treatment uses, they can be potentially integrated into future marina reuse of the facility. The preliminary design concepts developed by the Port for a future ASB marina incorporated such habitat enhancement features.

If opened to the aquatic environment, the ASB would restore 28 acres of open-water habitat. This would also develop just under 4,500 linear feet of new salmonid migration corridors. The acreage of premium nearshore aquatic habitat developed as part of marina reuse would vary depending on final design and berm configurations, with potential habitat bench areas located on the inside and/or the outside of the berm. Figures 1-2 and 3-4 show one preliminary design concept illustrating the different habitat opportunities that exist with berm reconfiguration.

3.4 Land Use, Navigation, and Public Shoreline Access

An overview of the land use, navigation and public shoreline access considerations of the Whatcom Waterway site area is provided in Section 3.4.1 below. The particular considerations associated with each of the Site Units are described in Section 3.4.2.

3.4.1 Overview of Key Issues

Land use issues are discussed below and include both 1) regulations and plans that govern waterfront land uses, and 2) priority uses that have been identified by the local community for focusing waterfront redevelopment efforts.

Land Use Regulations and Planning

Multiple jurisdictions govern land uses on the shoreline of Bellingham Bay near the Whatcom Waterway Site – the City of Bellingham, Whatcom County, Port of Bellingham, and the Department of Natural Resources. Through comprehensive plans and shoreline master programs, these organizations determine what activities and facilities are approved within the shoreline of their jurisdiction.

- **Bellingham Shoreline Master Program**: The City of Bellingham's Shoreline Master Program (SMP) regulates and manages uses and activities within 200 feet of the shorelines within the City. In doing so, the SMP attempts to create an appropriate balance between economic development, water quality, conservation, and public uses. The SMP manages this range of environments through the use of shoreline designations. These designations include broad goals for the area within each respective designation and actions the City will undertake to help achieve those goals. The existing SMP was adopted in 1989, and the City is presently updating it. The updated SMP will have new environmental designations, goal statements and action strategies for accomplishing those goals and a set of environmental expectations. The purpose of the updated SMP is twofold: (1) to promote the public's health, safety and welfare along the shorelines, and (2) to encourage redevelopment, increase public access, improve water quality and enhance habitat within the shoreline jurisdiction. The City and Port are working with the Bellingham community to ensure that the land use vision articulated in the Waterfront Vision and Framework Plan is reflected in the SMP update. The SMP update is expected to be completed in early 2007.

- **Bellingham Comprehensive Plan**: Bellingham Bay Comprehensive Strategy was developed by a cooperative partnership of agencies, tribes, local government, and businesses known collectively as the Pilot Work Group. The Comprehensive Strategy was intended to provide long-term guidance to decision-makers relating to implementation of sediment cleanup, source control, and habitat restoration actions in Bellingham Bay. The Comprehensive Strategy was finalized as a Final Environmental Impact Statement in October 2000, and it preceded some of the significant land-use changes that have occurred since that time. Yet much of the work of the Pilot, especially that regarding potential habitat restoration actions, remains relevant. While the Port and City are not bound by regulation to implement these potential restoration actions, many of the habitat restoration actions that were identified in Appendix A of the 2000 FEIS as furthering Pilot goals have been either implemented, or have been carried forward as part of community land use planning efforts since 2000. These habitat goals are reflected in the Waterfront Futures Group Vision and Framework Plan, and in marine infrastructure planning for the Whatcom Waterway area. The Port, City and other Pilot Work Group members have sought ways to implement the Pilot goals in the context of changing community land use needs

- **Whatcom County Shoreline Master Program:** As with Bellingham's Shoreline Master Program (SMP), the overall goal of the Whatcom County Shoreline Master Program is to achieve rational, balanced, and responsible use of the County's irreplaceable shorelines. To achieve that goal, the program strives to promote the public health, safety, and general welfare by providing long range, comprehensive policies and effective, reasonable regulations for development and use of Whatcom County shorelines. There are seven elements in the County's shoreline program – Economic Development, Public Access, Recreation, Circulation, Shoreline Use, Conservation, and Historic-Cultural. The purpose of the designations is to provide a systematic, rational, and equitable basis upon which to guide and regulate development within specific shoreline reaches.

- **Port Planning Activities:** The Port of Bellingham is responsible to the citizens of Whatcom County for providing shipping and marine cargo facilities, general boating, and maritime industry facilities, as well as assisting in maintaining and developing a healthy regional economy. The Port's main planning tools are area Master Plans, and the Port's Comprehensive Scheme of Harbor Improvements. Over the past 10 years, the Port has led and participated in extensive land use planning activities related to Bellingham's waterfront areas. Examples of these activities include the following:

  - Land use studies conducted during 1999 and 2000 for the Central Waterfront area.

  - Master Planning efforts for the Bellingham Shipping terminal and vicinity, also completed in 1999 and 2000.

  - Alternatives evaluations for siting of new marina facilities to meet regional moorage demand.

  - Outreach activities conducted by the Port of Bellingham as part of the GP due diligence process during 2004, including soliciting of extensive stakeholder and public input on potential waterfront cleanup actions, land use alternatives and navigation priorities for the Whatcom Waterway.

  - Amendment to the Port Comprehensive Scheme of Harbor Improvements identifying the need for future aquatic use of the ASB area for marina development.

  - Ongoing Port and City leadership land use planning efforts for the redevelopment of the New Whatcom area, including pending development of a final area Master Plan for the "New Whatcom" area of Bellingham's Waterfront. The Master Planning process will include SEPA environmental review of the Master Plan elements.

- **Port Management Agreement (Port and DNR)**: The Port of Bellingham and DNR entered into a cooperative agreement in September 1997 to allow the Port to manage certain state-owned aquatic lands through a Port Management Agreement (PMA) (RCW 79.90.475). The Port is responsible for managing the aquatic lands covered under the PMA consistent with federal and state regulations and laws, and DNR's aquatic land management goals of fostering water-dependent uses, ensuring environmental protection, encouraging public use and access, promoting production on a continuing basis of renewable resources, and generating income from the use of aquatic lands consistent with the goals. Parcel 3 of the current PMA includes portions of the Bellingham Shipping Terminal, and adjacent aquatic lands near the barge dock area.

- **State-Owned Aquatic Lands (DNR):** State-owned aquatic lands in Bellingham Bay include bedlands, tidelands, filled tidelands, designated Harbor Areas and state waterways. State regulations guide the use and management of these lands. Bedlands are those lands lying waterward of the extreme low tide mark, or the outer harbor line. Harbor areas are the areas located between the inner and outer harbor lines. The Bellingham Harbor Areas were originally established by the state of Washington as two separate harbor areas – New Whatcom and Fairhaven – on September 1, 1891. Currently, state-owned aquatic lands include the three Bellingham waterways (Whatcom Waterway, I&J Street Waterway and Squalicum Waterway). The Port of Bellingham and DNR have signed a Memorandum of Understanding (Appendix C) committing to update harbor area and waterway designations as part of the ongoing land use planning process.

Waterfront Land Use Priorities

Waterfront land use priorities in the Whatcom Waterway site area have historically been characterized by a focus on water-dependent industrial uses like those formerly located at the Georgia Pacific mill site and the Bellingham Shipping Terminal. However, the Bellingham waterfront has undergone a series of unprecedented land use changes. The community's land use priorities for waterfront areas, particularly those in the Inner Whatcom Waterway, are best reflected in the Vision and Framework Plan of the Waterfront Futures Group (Appendix B). Key elements of that plan for the areas of the Whatcom Water site (described in the Vision and Framework Plan as the City Center area) include the following:

- Develop a mixed-use waterfront neighborhood including new job opportunities and urban housing.

- Complete the cleanup and opening of the ASB to accommodate either a new marina or new marine habitat combined with stormwater treatment or some combination of those uses.
- Maintain deepwater moorage in the Whatcom Waterway, consistent with other uses and preservation of critical habitat areas.
- Reinforce the Inherent Qualities of Each Place on the Waterfront including integration of water-dependent uses with new commercial, institutional, educational, and residential uses and public spaces.
- Restore the Health of Land and Water including enhancement of natural systems, tailoring of cleanup strategies and remediation to planned uses, and restoration and enhancement of beaches wherever possible.
- Improve Waterfront Access including connections between uplands and waterfront areas and links to regional trail systems, while respecting natural habitat.
- Encourage and promote fisheries and ocean-related research industrial and facilities.
- Promote a health and Dynamic Waterfront Economy including mixed-use redevelopment of the former Georgia Pacific Mill site and the uplands area adjacent to the Cornwall Avenue Landfill site.
- Provide transient moorage in the Inner Whatcom Waterway, while avoiding impacts to critical habitat in this area
- Provide hand-carry boat landing opportunities within the project area, including at the Cornwall Avenue Landfill and near the ASB.
- Enhance the system of connected public open spaces between the Whatcom Waterway and the south end of the Cornwall Avenue Landfill, including open spaces along the waterfront and completion of the over-water walkway between the Cornwall Avenue Landfill and Boulevard Park.

These land use priorities require a more complex, balanced approach than the historical "industrial only" approach to the Bellingham Waterfront.

Navigation Priorities

The Port of Bellingham is and has historically been the local sponsor responsible for working with the U.S. Army Corps of Engineers on the development and maintenance of federal navigation channels. Currently, the Whatcom, I&J, and Squalicum waterways are federally-authorized channels for navigation and commerce. The Whatcom Waterway was initially authorized for dredging by the River and Harbors Act of June 15, 1910.

Public Law 86-645, Section 7 (May 5, 1965) first authorized the I&J Waterway. The dimensions of both channels have been modified through time.

The Port of Bellingham operates a marine shipping facility at the Bellingham Shipping Terminal (BST). The main products historically handled at the terminal included wood pulp and aluminum ingots, automobiles, powdered milk, logs and other cargo. A Burlington Northern-Santa Fe main line runs adjacent to the BST. A rail spur runs from the terminal to the main line; a rail barge transfer span is on site. The Burlington Northern-Santa Fe main line connects with Canada's Canadian National, Canadian Pacific, and BC Rail lines.

Deep-draft vessels approaching Bellingham Bay from the north use the channel between Lummi and Sinclair Islands. Vessels approaching from the south generally use the Bellingham Channel that leads eastward from Rosario Straight. Shallow-draft vessels proceeding to Bellingham from the south frequently use Swinomish Channel and Padilla Bay, and from the north, Hale Passage. Two federally designated anchorage areas have been established in the Bay, outside of the Whatcom Waterway site area. The bottom of these areas consists of a thin accumulation of mud over hardpan forming rather poor holding ground in heavy weather. General Anchorage has a circular radius of 2,000 yards, and Explosives Anchorage has a circular radius of 1,000 yards (Navigation Data Center 1998).

The Port of Bellingham conducted an assessment of the three waterways in 1998 (BST Associates 1998). This assessment examined the changes to the shipping fleet over the past twenty to thirty years. The study documented changes in cargo shipping practices, including a trend of increasing draft for cargo vessels. The drafts common for vessels calling on Ports in the Pacific Northwest was between 37 and more than 45 feet. The depths and widths of the Whatcom Waterway are not sufficient, particularly the narrow constraints of the Inner Whatcom Waterway, to accommodate cargo shipping given the demands of the shipping industry. Specific navigation priorities for the Outer Whatcom Waterway and Inner Whatcom Waterway areas are described in Section 3.4.2 below.

The development of a combined marina, aquatic habitat and public shoreline access uses in the ASB area is an element of the Port's planning for the Whatcom Waterway area. These uses are consistent with the Vision and Framework Plan of the Waterfront Futures Group (Appendix B) and are carried forward as part of the New Whatcom Master Plan process (Appendix E). The concept for the ASB area is described below in section 3.4.2.

Recreation and Public Shoreline Access

Enhancing waterfront recreation and shoreline access opportunities has been a key element of the Waterfront Futures Group work and of supplemental land use planning activities. Significant information on these opportunities is described below:

- **Bellingham Parks**: A variety of parks are found in the area, including 23 neighborhood parks, 8 community parks, 18 special use areas and 24 natural open space areas owned by the State, County, Port, Bellingham School District and City (Bellingham 1995). Some of the larger parks along the shoreline include Little Squalicum Park, Maritime Heritage Center Park, Boulevard Park, and the Port of Bellingham Marine Park. A few non-motorized trails exist along the shoreline, however, the City Parks and Recreation Department's Open Space, Parks, and Recreation Plan indicates the number of trail miles available to the local population is a slightly below the recommended standard. Accordingly, the Parks and Recreation Department is interested in adding to their existing trail system. Potential trail corridors have been identified by the City along the entire shoreline of the inner bay. New parks, open space and trail areas are being incorporated into the planning for the New Whatcom area.

- **Public Shoreline Access:** Enhancing public shoreline access in waterfront areas is a key priority of the New Whatcom planning effort. This is particularly true for the Inner Whatcom Waterway where public shoreline access has been historically restricted by navigation and industrial use activities. Enhancement of public shoreline access was also a key priority in the preliminary design concepts developed by the Port for a new marina for the ASB area.

- **Shellfish Harvesting:** Within Bellingham Bay there are two tribal groups with fishing rights: the Lummi Nation and Nooksack Tribe. They use and enjoy a variety of fisheries resources from Bellingham Bay and surrounding streams and rivers for subsistence, ceremonial, and commercial purposes. These resources include a wide variety of salmon, other fish, crab, and clams, which have varying harvest times. Major tribal shellfish areas are found in and around Portage Bay and Portage Island, and along the Lummi Peninsula. Primary species harvested by the Lummi Nation include Pacific oysters, native littleneck clams, and Manila clams. Clam harvests, primarily from the Lummi Nation, have increased considerably over the past 25 years. Crab landings have remained stable over the past 25 years, at an annual baywide harvest of approximately 233,000 pounds per year (tribal and commercial landings). The only commercial shellfish harvesting area in Bellingham Bay is the Portage Island area.

- **Salmon Fisheries:** Tribal and non-tribal commercial salmon fishing occurs throughout Bellingham Bay. Sport fishing is generally restricted to an area south of Post Point to Chuckanut Bay and off Governors Point. The most lucrative fisheries in Bellingham Bay are the chinook, coho, and chum salmon. Although there are no targeted fisheries for pink and sockeye salmon, these species are incidentally caught in the Bay. Sockeye salmon are also caught incidentally in the Nooksack River fisheries. Over the past 15 years, salmon have represented the largest portion of total catch from Bellingham Bay. Many of the habitat restoration priorities for Bellingham Bay have focused on the preservation and enhancement of critical habitats for salmon, consistent with the social and cultural importance of the salmon fisheries and the troubled condition of many of the salmon stocks.

- **Groundfish Fisheries:** Several groundfish species occur in Bellingham Bay. These species are used by the Tribes and are harvested by other users of the Bay, and are considered to be economically and ecologically important. These species include but are not limited to Pacific cod, Rockfish, Lingcod, Rock Sole, English sole, and Starry flounder. Except for inner Bellingham Bay, the entire bottom of the Bay is considered part of the recreational fishery for marine fisheries resources (CH2M Hill 1984). Commercial fishing for these species occurs primarily in the deeper water of the central part of the Bay. Prior to about 1984, there was a relatively large herring fishery. However, declines in the length and age of fish were observed by WDFW in 1980. These data, along with uncertainties regarding the origin of local stock, prompted closure of the fishery in 1984.

3.4.2 Land Use, Navigation, and Shoreline Issues by Site Area

Land use, navigation and shoreline public access issues are summarized below by geographic area, using the Site Unit designations shown in Figure 1-1.

Outer Whatcom Waterway (Unit 1)

Navigation uses in the Outer Whatcom Waterway offshore of the Bellingham Shipping Terminal are largely transitory, with vessels coming into and traveling out of the Waterway. Vessels are generally not anchored in these areas, and there are no permanent dock structures or mooring dolphins.

A federal navigation channel is located in the Outer Whatcom Waterway. Federal navigation channels represent a conditional agreement between the Corps of Engineers and a local entity (the “local sponsor,” in this case the Port of Bellingham) under which the federal government shares the cost and assists with the implementation of certain defined navigation maintenance activities. The limits of the federal commitment are defined geographically by the dimensions of the “project.” For the Outer Whatcom Waterway, the project depth is defined as 30 feet below mean lower low water (MLLW) and the width varies from 263 feet near the Shipping Terminal to 363 feet in offshore areas.

Under the federal channel maintenance program, the local sponsor can request the Corps to maintain the project depths by periodic maintenance dredging. Subject to federal funds availability, the Corps conducts such dredging under its Operations and Maintenance program. The federal participation is subject to a navigation needs analysis that must show that the dredging is in the national economic interest. This needs analysis considers industrial and commercial navigation uses (e.g., cargo operations, commercial fishing, institutional users) but does not consider recreational, public access, or habitat uses.

If maintenance dredging is performed by the Corps in a federal channel, the local sponsor must provide for sediment disposal, and must share certain other costs. The sponsor is responsible for coordinating the costs of development and maintenance of “berth” areas and shoreline infrastructure with local property owners and other interests. The berth areas are the areas located along-side the federal channel that are used for mooring of vessels. In order for the water depth of a federal channel to be usable, the depths in berth areas must be consistent with those in the channel. Otherwise a vessel traveling in the channel would not be able to moor along-side a wharf.

Figure 3-5 illustrates the essential characteristics of the federal channel and berth areas applicable to Unit 1C of the Outer Whatcom Waterway. The current water depths in the Outer Whatcom Waterway are at or slightly below the “project depth” of 30 feet in the federal channel areas. The federal channel boundaries are offset from the wharf areas by approximately 50 feet. This “berth” area is defined along the inshore edge by the “pierhead line” and along the offshore edge by the federal channel boundary. Depths in this area are maintained by local interests. Construction is generally prohibited in areas offshore of the pierhead line, and is regulated by the Corps of Engineers and the Coast Guard. The pierhead line runs along the face of the docks at the Bellingham Shipping Terminal.

As shown in Figure 3-5, the maintenance of water depths in the berth areas of the Shipping Terminal requires maintenance of substantial shoreline infrastructure. That infrastructure includes bulkheads, engineered armored slopes, and over-water wharves that provide for mooring and loading/unloading of vessels moored at the berths. In order to meet the economic needs test of the Corps of Engineers maintenance dredging program, upland land uses have been restricted and are designated in the Shipping Terminal area for appropriate water-dependent uses, consistent with the federal channel designation.

The Bellingham Shipping Terminal has been used since the early 1900s for cargo shipping and warehousing activities. Multiple future uses have been considered as part of the evaluation of land use changes in the New Whatcom planning area (Appendix E). The Shipping Terminal areas are currently anticipated to continue in water dependent uses. Potential future uses include operation of appropriate institutional users (e.g., Coast Guard or NOAA), limited cargo shipping, or other deep draft navigation uses.

The Port recently completed a review of navigation and infrastructure requirements associated with the Whatcom Waterway. As discussed in Port Resolution 1230 (Appendix F) it is anticipated that the federal channel will be maintained in the Outer Whatcom Waterway areas consistent with its current dimensions. The shoreline infrastructure required for operation of a shipping terminal is present in this area, though significant maintenance and potential upgrades may be required prior to resumption of deep draft uses.

Shallow-water nearshore habitats in the Outer Whatcom Waterway area are limited to under-dock areas along the Bellingham Shipping Terminal. Potential habitat restoration enhancement opportunities in these areas are limited by the infrastructure needs associated with operation of a deep draft moorage area in support the operations of the federal navigation channel. The Bellingham Bay Comprehensive Strategy reflects this and has no specific restoration recommendations for this area.

Inner Whatcom Waterway (Units 2 and 3)

Like the Outer Whatcom Waterway, the Inner Whatcom Waterway has historically been used for industrial water-dependent uses. These have included operation of lumber mills, the GP pulp and paper mill, gravel shipping, fish processing and bulk petroleum terminal operations. The federal navigation channel was initially established in the early 1900s with project depths of 18 feet below MLLW (Inner Whatcom Waterway) and 26 feet (Outer Whatcom Waterway). This deeper portion of the channel was expanded between 1958 and 1961. Most of the Central Waterfront area was developed when the project depth was 18 feet below MLLW.

The federal project boundaries prohibit Corps dredging within 50 feet of the pierhead lines and structures. This limits the effective water depth in this area due to the lack of supporting berth area depths and requisite shoreline infrastructure. The width of the Waterway is constrained by developed fill areas and upland features adjacent to the Waterway.

Effective water depths in the Inner Whatcom Waterway are currently limited by the restrictions of the federal navigation channel to the depths at the pierhead line. These depths range from less than zero in some shoaled areas to as much as 22 feet in outer portions of the GP dock. In areas offshore of the Log Pond, the water depths are usable only for transit (i.e., vessels entering or leaving the Inner Whatcom Waterway), because no shoreline land areas or over-water infrastructure exists in these areas.

The land use restrictions associated with the historic federal channel boundaries are in conflict with both current and planned uses of the Inner Whatcom Waterway as a result the Port has initiated consultations with the Department of Natural Resources, the Corps, and other parties to update channel designations. The historically industrial, water-dependent uses of shoreline properties are undergoing a transition to mixed-use redevelopment. The area zoning has been updated to mixed-use, and the area is undergoing a Master Plan development effort (Appendix E). The Master Planning effort is grounded in the principles of the Waterfront Futures Group (Appendix B), a community-based planning process that identified land use priorities for the waterfront areas.

During 2005 the Port and DNR signed a Memorandum of Understanding (Appendix C) which included a proposal to update harbor area and Whatcom Waterway channel dimensions. The objective is to provide for a range of uses within the Inner Whatcom Waterway consistent with local land and navigation uses. The Inner Whatcom Waterway would be managed by local interests as a Multi-Purpose Waterway, providing a wider range of uses than those supported by the current federal channel designations.

In addition, in May 2006 the Port Commission, after public comment, issued Resolution 1230 (Appendix F) which requests that the U.S. Congress de-authorize the Inner Whatcom Waterway from head of the federal channel at the Roeder Avenue Bridge to Bellingham Shipping Terminal, in order to allow implementation of a Multi-Purpose Waterway, and to focus federal funding participation on the deep draft terminal areas of the Outer Whatcom Waterway. Language proposing the modifications to the federal channel has been drafted and included in congressional legislation that is expected to be finalized during 2006.

As shown in Figure 3-6 and Figure 3-7, the Locally-Managed Multi-Purpose Channel concept provides for shoreline public access. Navigation depths would be appropriate to the channel widths and shoreline infrastructure, and would range between 18 to 22 feet below MLLW. Portions of the waterway at the head of the channel (Unit 3-A) would likely be preserved as premium shallow-water habitat. Sideslopes in berth areas along the sides of the waterway would be enhanced to support navigation uses in the waterway, and also to develop additional shallow-water habitat areas, particularly in intertidal and shallow subtidal elevations. Navigation infrastructure would likely include floats and access gangways, rather than industrial wharves and bulkheads which decrease achievable habitat benefits.

Unit 2-B has been identified during Port marina planning as the preferred location for an access channel between the ASB and the Whatcom Waterway.

The use of Unit 2-B minimizes the potential disruption of nearshore habitat. Alternate access channel locations have been evaluated, but these locations result in greater disruption of existing nearshore habitat, and greater limitations on potential future habitat enhancements. The use of the Unit 2-B location for the access channel is partly contingent on navigation planning for the Inner Whatcom Waterway. If deep draft navigation uses are conducted within the Inner Waterway, this may result in navigation conflicts that would force use of an alternate channel location as shown in some of the older marina design concepts (refer to Figure 3-7 and Figure 1-3).

The RI/FS study and this Supplemental EIS analyze a range of uses and associated dredging patterns for the Inner Whatcom Waterway areas, including both heavy industrial uses dominated by the federal channel, and the current mixed-use requirements as articulated in the principles of the Waterfront Futures Group and local planning activities. Obtaining consistency between Waterway cleanup activities in the Inner Whatcom Waterway and area land use and navigation priorities is specifically evaluated as part of remedial alternatives analysis in the RI/FS and in this Supplemental EIS.

Log Pond (Unit 4)

As its name implies, the Log Pond was historically used as a log pond for lumber and pulp mill operations. These uses have been discontinued since the completion of the Log Pond Interim Remedial Action in 2000/2001.

The Log Pond has been designated for cleanup and habitat restoration uses. Some public access enhancements to upland shoreline areas are likely as part of future redevelopment of the former GP Mill site. These uses would likely include development of a shoreline promenade along portions of the Log Pond. No in-water navigation uses are contemplated for the Log Pond.

Areas Offshore of ASB (Unit 5)

The shoulder areas of the ASB were historically used for log rafting, prior to construction of the ASB. Future navigation use of these areas is considered limited by water depths and the lack of available upland adjacent to these areas.

The Port plans to develop an environmentally sustainable marina within the ASB. The marina has been included in the Port's Comprehensive Scheme of Harbor Improvements. However, navigation features within Unit 5 are not contemplated due to anticipated conflicts between such uses and habitat preservation and enhancement objectives. The priority uses within Unit 5 are those associated with habitat enhancement opportunities. The priority uses within Unit 5 are those associated with habitat enhancement opportunities. The potential location for development of a new premium nearshore habitat bench is shown in Figure 1-2.

The modification of this area to construct nearshore habitat benches along this portion of the shoreline was considered as part of the 2000 Comprehensive Strategy EIS, and has been incorporated into design concepts for the ASB marina.

Area Adjacent to BST (Unit 6)

Navigation uses in the Barge Dock area have historically included log rafting, barge traffic, and tug boat mooring. Some propeller wash effects may be significant in this area, depending assuming future barge and tug uses.

Two docks are located within this area including the barge dock and the former GP Chemical dock. The northern side of the Barge Dock area is bounded by the back side of the Bellingham Shipping Terminal wharf structure.

Some dredging activities have historically been performed in the Barge Dock area, including dredging for establishment of cargo terminal berth areas, as well as dredging to obtain fill material for use in development of a portion of the Bellingham Shipping Terminal. Regular maintenance dredging such as that considered for the Whatcom Waterway areas is not expected. As described above for the Outer Whatcom Waterway, the Bellingham Shipping Terminal is anticipated remain under industrial water-dependent use, including potential reuse by institutional users and cargo operations.

Starr Rock (Unit 7)

Historic navigation uses in the Starr Rock area were limited to Log rafting. These uses were discontinued in the 1970s with the development of Boulevard Park nearby. Future navigation uses in the Starr Rock area are not anticipated other than transit uses by recreational vessels. Deepwater navigation is restricted in this area due to the proximity of the natural shallow-water obstruction at Starr Rock, and by the lack of adjacent upland navigation support facilities.

ASB (Unit 8)

The ASB facility was constructed by Georgia Pacific for treatment of wastewater and stormwater. It also provides cooling water management for the Encogen energy production facility. These uses are expected to continue through June of 2008, consistent with Port-GP agreements. After that time these uses are likely to be discontinued.

The Bellingham Bay Comprehensive Strategy included a recommendation for removal of the ASB in order to establish intertidal and shallow sub-tidal habitat. However, no funding mechanisms have been identified to implement this type of project, and alternative uses of the ASB have formed the basis of recent land use planning efforts.

During 2004, the ASB was identified by the Port as the preferred site in Bellingham Bay for construction of a new marina facility (Makers, 2004). The preference for the site was based on several factors, including the ability to develop a marina with net gains in both habitat and public access opportunities. Preliminary design concepts for a marina incorporating public access and habitat enhancements were developed by the Port after consultation with resource agencies and project stakeholders. One of these design concepts is presented in the current Feasibility Study and in the Draft Supplemental EIS. The design concept incorporates development of intertidal and shallow sub-tidal habitat, consistent with the general intent of the Bellingham Bay Comprehensive Strategy recommendation. If completed according to that design concept, the ASB marina would reconnect the 28-acre ASB area to Bellingham Bay, and restore nearly 4,500 linear feet of salmonid migration corridors. The acreage of premium nearshore aquatic habitat developed as part of marina reuse would vary depending on final design and berm configurations, with potential habitat bench areas located on the inside and the outside of the berm.

Figures 3-4 and 3-7 and the illustrations contained in Appendix E illustrate some of the changes that have been contemplated for the ASB berm structure as part of marina reuse. These changes assume that Waterway cleanup activities remove the ASB sludges from the site. The clean berm materials can then be partially removed from the area for reuse in cleanup and habitat enhancement activities. The berms would be modified to reduce overall height and width consistent with marina breakwater requirements. Public access amenities may be included in the berm, potentially including a shoreline promenade, landscape features and other enhancements. Habitat enhancements may be included in the berm including nearshore habitat benches on either the inner or outer areas of the berm. Figures 1-2 and 3-7 and the illustrations in Appendix E show the marina design concepts in plan view. Marina facilities would be located in deepwater areas inside the ASB area. The final design will depend on optimization of navigation, public access and habitat uses and will be developed in future design and permitting for area reuse.

The Port updated its Comprehensive Scheme of Harbor Improvements in 2004 to reflect the future planned use of the ASB for marina development. The Port further developed a funding plan to conduct the cleanup of the ASB and the development of the marina project. The majority of the ASB was acquired by the Port as part of the 2005 GP property transaction. The City has supported the marina development concept as documented in the July 2006 Interlocal Agreement between the Port and the City (Appendix E). Development of a marina in the ASB, and the final design of any such marina, is subject to additional design and permitting evaluations.

The City also evaluated the ASB for potential future stormwater or wastewater treatment uses, but it determined that it is not well suited for these uses due to its location, elevation, and the operational characteristics of the current GP-owned outfall structure.

3.5 Air and Noise

An overview of air quality and noise issues and how they are regulated within the Whatcom Waterway site and vicinity is provided in Section 3.5.1 below. Specific considerations applicable to the different site areas are described in Section 3.5.2.

3.5.1 Overview of Key Issues

Air Quality

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

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

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

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

Existing Air Conditions

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

The GP pulp and paper mill was the primary industrial source of air pollutants in the study area. Emissions from the mill have decreased substantially since closure of the pulp and chemical operations. Other nearby industrial sources of air pollutants include the Intalco Aluminum plant, the Conoco Phillips oil refinery and the BP oil refinery. Sulfur dioxide emissions are monitored at all of these industrial facilities. Within NWAPA's jurisdiction, most of the industrial emissions of SO_2 come from petroleum refining and aluminum production operations. Ambient SO_2 levels in the Bellingham Bay area have been within the allowable standards set forth by EPA.

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

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

Noise

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

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

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

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

- **Class C:** Industrial, agricultural, storage and distribution facilities.

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

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

Existing Noise Conditions

Land uses around Bellingham Bay are a mixture of open space, residential communities, and marine/industrial operations. Noise in the study area is caused by airplanes, vehicular traffic, ferries, trains and commercial/industrial activities. Sensitive noise receptors (Class A land uses) include residential communities along the north side of the Bay and in the South Hill and Fairhaven neighborhoods on the south side of the bay. Several parks along the bay are also considered sensitive receptors, including Maritime Heritage Center Park and Boulevard Park. The planned development of additional parks and open space areas will increase the number of sensitive noise receptors along the Bay.

3.5.2 Air and Noise Issues by Site Area

Air quality and noise impacts will be associated with cleanup construction activities. However, these impacts will be mitigated through the use of appropriate equipment and work hours, to be specified during project design and permitting. Project air quality and noise issues vary less by project area than do other environmental factors evaluated in this EIS. However, potential variation of noise considerations by project area includes the following:

- **Outer Whatcom Waterway (Unit 1):** No sensitive noise receptors are currently located adjacent to Unit 1.

- **Inner Whatcom Waterway (Units 2 and 3):** Sensitive noise receptors located near the Inner Whatcom Waterway currently include Maritime Heritage Park. As the redevelopment of the New Whatcom area proceeds, additional Class A or Class B areas may be established. This could impact project noise control requirements.

- **Log Pond (Unit 4):** No sensitive noise receptors are currently located adjacent to Unit 4. As the redevelopment of the New Whatcom area proceeds, additional Class A or Class B areas may be established, including mixed use redevelopment of portions of the former GP mill site. This could impact project noise control requirements.

- **Areas Offshore of ASB (Unit 5):** No sensitive noise receptors are currently located adjacent to Unit 5. As the redevelopment of the New Whatcom area is proceeds, additional Class A or Class B areas may be established, including potentially new park areas along the perimeter of the ASB. This could impact project noise control requirements.

- **Areas Adjacent to BST (Unit 6):** No sensitive noise receptors are currently located adjacent to Unit 6. As the redevelopment of the New Whatcom area is proceeds, additional Class A or Class B areas may be established, including potentially new mixed-use development and/or park areas along the perimeter of the RG Haley and Cornwall Avenue Landfill sites. This could impact project noise control requirements.

- **Starr Rock (Unit 7):** Boulevard Park is considered a sensitive noise receptor and is located near Unit 7.

- **ASB (Unit 8):** No sensitive noise receptors are currently located adjacent to Unit 8.

3.6 Cultural Resources

Cultural and historical resource review will be addressed during subsequent design and permitting reviews for the project. However, an overview of previous studies and their findings is provided in Section 3.6.1 below. The findings relevant to each of the Site Units are described in Section 3.6.2.

3.6.1 Overview of Key Issues

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

Previous Cultural Resource Studies

During the 2000 FEIS development, a review of existing literature was conducted to provide an overview of cultural resources in the project area. This review was conducted to determine the probability for hunter-fisher-gatherer and historic archaeological resources, and historic structures within or adjacent to the project area that are listed in the National Register of Historic Places (NRHP), or are eligible for listing in the NRHP. The review included consultation with state and county agencies responsible for maintaining inventories of archaeological sites, including shipwrecks and historic structures, to locate recorded sites and structures within or adjacent to the project area, and to determine their evaluation status. Background ethnographic and historic information was acquired through review of ethnographies, local histories, previous cultural resource studies, historic maps, and geologic and soil surveys.

Cultural resource investigations in and near the project area vicinity have included overviews, field surveys, and testing projects (Bellingham Bay Demonstration Pilot Project, Whatcom County Cultural Resources Overview Report, LAAS, 1999). An additional review of archaeological and cultural resources was completed during remediation of the Holly Street Landfill site in 2004, including on-site archaeological monitoring during all excavation work at that site.

Twenty-four hunter-fisher-gatherer archaeological sites along the shore of Bellingham Bay have been identified during previous cultural resource studies and archaeological investigations in the project area vicinity.

Tribal Consultation

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

The Lummi Nation and Nooksack Tribe were contacted as part of the development of the 2000 FEIS and asked for information pertinent to the project area. Harlan James, a member of the Lummi Nation, stated that Bellingham Bay was good fish habitat and that “fish are culture and culture is fish.” He emphasized that the entire west side of Bellingham Bay and the mouth of the river are culturally important to the tribe. Other parts of Bellingham Bay were taken from the Lummi Nation through their exclusion from the reservation. Mr. James specifically noted that a Lummi canoe landing area in the Old Town district near the mouth of Whatcom Creek has been filled but that it is culturally important to the Lummi people. He also stated that they fished the entire Bay and that Lummi elders remember octopi, sole, and other fish in Bellingham Bay that are no longer available. These marine resources were different than those outside Bellingham Bay. Mr. James concluded that the entire Bay was of cultural significance to the Lummi Nation.

Hunter-Fisher-Gatherer Archaeological Sites

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

Historic development in the project area has most likely adversely affected hunter-fisher-gatherer shell midden deposits and lithic sites. A possibility does exist, however, that submerged sites or intact subsurface deposits could be present under fill deposits at the mouth of Whatcom Creek. Other areas of the Bay also have a lower probability of occurrence, limited to potential submerged prehistoric sites at the paleoshorelines of the major drainages covered by sea level rise in the last 8,000 years. Intact deposits are not expected in areas subject to previous dredging and fill activity.

Of the 24 hunter-fisher-gatherer archaeological sites identified within the project area, only one has been evaluated for significance (45WH111). The site is on the southern tip of the Lummi Peninsula at Portage Point and was tested by Grabert and Griffin (1983) as part of mitigation measures related to the construction of 31 miles of sewer pipeline through the Lummi Reservation. The site contained archaeological deposits that could provide information important to regional prehistory. Grabert (1983) recommended that the site be nominated for inclusion in the National Register of Historic Places. This area would not be affected by any of the project alternatives.

Historic Archaeological Sites

Historic archaeological resources may be present in the project area primarily within the area surrounding former Citizen's Dock. Archaeological deposits associated with early industry in the Bellingham area such as the Roeder-Peabody Mill site, located at the mouth of Whatcom Creek may be present under fill deposits. Other mid-19th century and later structures of interest within the project area include the Sehome Dock (the Bellingham Bay Coal Company's Wharf); Colony Wharf (Fairhaven Land Company's Wharf); Geltrec Improvement Company's Wharf and Saw Mill. Because Bellingham went through a period of "wharfing out" just before the Constitutional convention in the late 1880's, there may be other structures built along the shoreline in addition to those listed above.

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

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

Historic Structures

A review of the National Register of Historic Places Register, the Washington Heritage Register, and the Whatcom County Historic Property Register indicated that no historic structures that would be affected by the proposed project are recorded within the project area. However, the citizens Dock area is potentially relevant to the project alternatives.

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

3.6.2 Archaeological or Historical Resource Issues by Site Area

Most of the work activities potentially associated with cleanup of the Whatcom Waterway site would occur in previously-dredged and/or recently deposited sediments where the potential for encountering significant, in-tact archaeological or historical resources is considered to be low. Considerations by site area are described below.

Outer Whatcom Waterway (Unit 1)

The Outer Whatcom Waterway area consists of historically dredged sediments that are not expected to contain archaeological resources.

Inner Whatcom Waterway (Units 2 and 3)

The majority of the Inner Whatcom Waterway area consists of historically dredged sediments that are not expected to contain archaeological resources. However, in the very head of the Whatcom Waterway (Unit 3-A) near the Roeder Avenue Bridge there is some potential for archaeological and/or historical resources to be contained within project sediments. Additional evaluation by an archaeological consultant could be warranted in these areas. Citizens Dock was a historic structure located in this area, but it was removed by the City for safety concerns.

Log Pond (Unit 4)

The Log Pond area consists of previously dredged, filled and capped areas. The probability for encountering significant archaeological or historical resources is considered remote.

Areas Offshore of ASB (Unit 5)

The ASB shoulder is located offshore of any historic structures or shorelines. The probability for encountering significant archaeological or historical resources in this area is considered remote.

Area Adjacent to BST (Unit 6)

Portions of the Barge Dock area have historically been dredged, and the BST area was filled and armored for navigation improvements. The probability for encountering significant archaeological or historical resources in this area is considered remote.

Starr Rock (Unit 7)

The Starr Rock Area consists of relatively deep-water offshore areas. The area was used during the 1960s as a dredge material disposal site. The probability for encountering significant archaeological or historical resources is considered remote in this area.

ASB (Unit 8)

The ASB Interior was previously dredged by Georgia Pacific at the time the ASB was created. The probability for encountering significant archaeological or historical resources is considered remote.