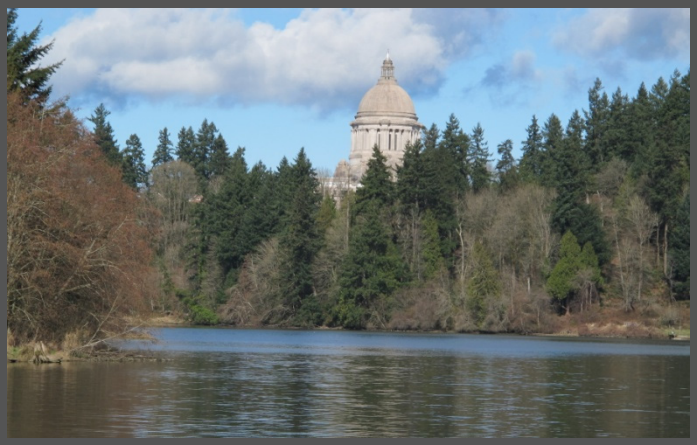
Capitol Lake Permitting Analysis

Permitting Recommendations Report



Prepared for

Washington State Department of Enterprise Services
210 11th Avenue SW
Olympia, Washington 98501

June 17, 2013

FINAL

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The interpretations and conclusions contained in this report are based in part on site characterization data collected by others. Floyd|Snider cannot assure the accuracy of this information.

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HERRERA

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List of Abbreviations/Acronyms

Acronym/ Abbreviation	Definition
ALEA	Aquatic Lands Enhancement Account
BA	Biological Assessment
CFS	Cubic feet per second
CLAMP	Capitol Lake Adaptive Management Plan
CLIPA	Capitol Lake Improvement and Protection Association

Acronym/ Abbreviation	Definition
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DAHP	Department of Archaeology and Historic Preservation
DES	Washington State Department of Enterprise Services
DMMP	Dredged Material Management Program
DNS	Determination of non-significance
DO	Dissolved oxygen
DS	Determination of significance
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESRP	Estuary and Salmon Restoration Program
FONSI	Finding of No Significant Impact
GA	Washington State Department of General Administration
HPA	Hydraulic Project Approval
JARPA	Joint Aquatic Resource Permits Application
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
MLLW	Mean Lower Low Water
MSL	Mean Sea Level
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated biphenyl
PCSRF	Pacific Coastal Salmon Recovery Fund
pg/g	Picograms per gram
PSNERP	Puget Sound Nearshore Ecosystem Restoration Project
RHA	Rivers and Harbors Act

Acronym/ Abbreviation	Definition
SEPA	State Environmental Policy Act
SMS	Sediment Management Standards
SPCCP	Spill Prevention, Control, and Countermeasures
SVOC	Semivolatile organic compound
SWPPP	Stormwater Pollution Prevention Plan
TCLP	Toxicity characteristic leaching procedure
TEQ	Toxicity equivalency quotients
TESC	Temporary Erosion Sediment Control
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile organic compound
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WQC	Water Quality Certification
WSDA	Washington State Department of Agriculture
WWRP	Washington Wildlife Recreation Program

1.0 Introduction

1.1 BACKGROUND AND OVERVIEW

Capitol Lake is a man-made water body located in Olympia, Washington. The lake is currently physically divided into four main areas, or basins, which include the North Basin, Middle Basin, South Basin, and Percival Cove (Figure 1.1). The Deschutes River flows into the lake's South Basin and water flows out of the lake into Budd Inlet at the 5th Avenue Dam located at the north end of the North Basin. Capitol Lake has been accumulating sediment from the Deschutes River since the lake was created in 1951. The Washington State Department of Enterprise Services (DES) manages the Capitol Lake basin. The Washington State Legislature provided DES with an appropriation for the 2011–2013 biennium for Capitol Lake "solely to begin the process of seeking necessary permits to dredge and spot dredge excess sediments as required under all of the proposed long-term management strategies." As part of this project, DES hired the Floyd|Snider consultant team, headed by Floyd|Snider with support from Axis Environmental and Herrera Environmental Consultants, to assist with the evaluation of permitting needs. This Permitting Recommendations Report is based on review of existing technical information and documentation for Capitol Lake. Included in this report is a Project Permitting Road Map (Appendix A). The Project Permitting Road Map is a large, illustrative diagram that provides a clear road map of the necessary permitting process for a dredge event within Capitol Lake, allowing for the visual identification of key milestones such as permit submittals and supporting design or analysis needs, permit sequence and relationships, critical paths, anticipated agency negotiation and approval steps, estimated time durations, and opportunities in the permitting process for public and stakeholder involvement. This Permitting Recommendations Report provides the supporting detail and assumptions behind the Project Permitting Road Map.

1.1.1 Project Description

In support of the development of an accurate and realistic Project Permitting Road Map, and consistent with the legislature project appropriation, a conceptual level scope of a maintenance dredge event within the lake was prepared. The maintenance dredging conceptual scope, which the Project Permitting Road Map is based on, was developed following the review of the existing technical documentation, studies, and data available for Capitol Lake that have identified areas of maximum sediment deposition and areas that would potentially provide maximum habitat enhancement benefit.

The maintenance dredging conceptual scope includes the potential dredging of accumulated sediment from two areas of the Capitol Lake basins (Figure 1.1), and the placement of the dredge sediments along the western shoreline of the North or Middle Basin, or within Percival Cove for habitat enhancement. The purpose of such a maintenance dredging project would be to accomplish the following: 1) perform maintenance to increase the sediment trapping efficiency of the Middle Basin sediment trap; 2) remove the accumulated sediment from the North Basin main channel; and 3) beneficially reuse dredged sediments to rehabilitate an area of aquatic habitat within Capitol Lake. Other possible disposal options for the dredge sediments, besides in-lake beneficial habitat enhancement, include transport and disposal at an uplands reuse location, and transport and disposal to an approved uplands landfill facility.

For this permit analysis, maintenance dredging within the Middle Basin is assumed to occur within the general vicinity of the Middle Basin sediment trap area; approximately 50,000 cubic

yards would be removed from this area. The Middle Basin sediment trap was created in 1979 (Entranco 1996). Maintenance dredging of this sediment trap last occurred in 1986, and since that time the efficiency of this sediment trap has decreased due to sediment accumulation. During the period of 1991 to 1996, it was estimated that 14 percent of the sediment that accumulated in Capitol Lake was deposited within the relatively small footprint of the Middle Basin sediment trap (Entranco 1997).

The conceptual dredge scope also includes sediment removal within the North Basin, in the area of the former main channel of the Deschutes River. For this permit analysis, it is assumed that approximately 50,000 cubic yards would be removed from this channel area. A 1997 sediment volume analysis showed that 20 percent of the sediment accumulated in the channels of the North Basin (Entranco 1997) and it has been suggested that much of the sediment reaching the North Basin could be collected by a new (or cleaned out) sediment trap in the North Basin (Moffatt & Nichol 2008).

Sediments dredged from Capitol Lake in the past have all been re-deposited within the basin. These dredged sediments were deposited in the southwest corner of the Middle Basin, creating a wetland and new wildlife habitat between 1979 and 1986 (Koenings 1988, Entranco 1996). For the conceptual dredge scope, it is assumed that dredge sediments would also be placed within the lake for habitat enhancement. During recent lake drawdown events, large mudflats within the Middle Basin have been exposed; however, mudflat exposure was not observed in the North Basin due to the relatively steep shoreline slope. An updated bathymetric survey was performed in 2013 throughout Capitol Lake that also indicates shoaling in the Middle Basin relative to a 2004 bathymetric survey (refer to Section 4.1). Based on these data, it is assumed that, within this conceptual scope, the dredged sediment removed from the Middle and North Basins would likely be placed alongside the western shoreline of the North Basin or within Percival Cove, rather than the western shoreline of the Middle Basin. Beneficial reuse of the dredged sediments within the lake increases the shallow water habitat, and does not preclude future management alternatives of the lake.

For decades, Capitol Lake has had water quality issues, including elevated fecal coliform levels, elevated water temperatures, elevated total phosphorus concentrations, and low dissolved oxygen (DO) concentrations. Following maintenance dredging, water quality within Capitol Lake is anticipated to be similar to existing conditions because water quality in the lake is primarily affected by watershed conditions (inflow from the Deschutes River and Percival Creek) and not by in-lake processes (Herrera 2009, Ecology 2012).

Efforts have been made to develop a long-term lake strategy for Capitol Lake since 1997. No long-term management decision regarding Capitol Lake has been made. However, in the meantime, DES continues to be responsible for managing the Capitol Lake basin. At this time, and as presented in the Project Permitting Road Map, the maintenance dredging event is scoped as a separate, independent action from the long-term management alternatives that have been evaluated for Capitol Lake, as summarized in Section 2.3. A threshold requirement of the conceptual maintenance dredge scope was that it could not preclude any of the studied long-term management alternatives. This means that the footprint and target dredge depth of the maintenance dredge areas are within the dredge footprints and dredge depths of the managed lake, estuary, and dual basin estuary alternatives.

1.2 STRUCTURE OF THE PERMITTING RECOMMENDATIONS REPORT

This Permitting Recommendations Report provides the supporting information and assumptions on which the Project Permitting Road Map is based. The Permitting Recommendations Report is organized as follows:

- **Section 2.0—Capitol Lake History.** Provides information on the history of Capitol Lake with specific focus on previous dredge events within the lake, the technical evaluations and long-term management alternatives considered as part of the Capitol Lake Adaptive Management Plan (CLAMP) process, and the associated regulatory history.
- **Section 3.0—Constructability Considerations.** Describes the site features that present constructability challenges, potential dredge methodologies based on these considerations, and the potential impact of dredge methodologies on the required permits and approvals.
- **Section 4.0—Data Gaps.** Discusses the technical data gaps that have been identified and that would need to be filled as part of the project planning and design, prior to the permitting process.
- **Section 5.0—Permitting Analysis Supporting Information.** Discusses the assumptions and basis for the permitting analysis and processes shown in the Project Permitting Road Map, based on the conceptual dredge scope and input from federal, state, and local permitting agencies.
- **Section 6.0—Funding Strategies and Partnership Opportunities.** Describes various opportunities for funding and partnering based on the conceptual dredge and beneficial reuse scope.
- **Section 7.0—References.** Presents the sources cited in this report.

2.0 Capitol Lake History

Capitol Lake was created in 1951 for the purpose of serving as a reflecting pool for the State Capitol Building. Prior to the creation of the lake, the lake area was a tidal estuary of the Deschutes River. Capitol Lake was formed with the construction of the dam and tidal gate along 5th Avenue, making it a reservoir for the Deschutes River and separating it from the tidal influence from Budd Inlet. The lake is currently physically divided into four main areas or basins, which include the North Basin, Middle Basin, South Basin, and Percival Cove (Figure 1.1). Since its formation, DES, formerly the Washington State Department of General Administration (GA), has been responsible for the management activities in and around Capitol Lake.

This section focuses on presenting the historical information that is relevant to the Capitol Lake conceptual maintenance dredging scope and previous environmental permitting processes, including a summary of the sedimentation history of the lake and the previous maintenance dredging events that have been performed within the lake. It also briefly describes the regulatory history of the lake and evaluations that have been conducted regarding the long-term management of Capitol Lake. These long-term management evaluations are a separate process from the current conceptual maintenance dredging scope.

2.1 INPUT OF SEDIMENT TO CAPITOL LAKE

Approximately 35,000 cubic yards of sediment are deposited annually into Capitol Lake from the Deschutes River (Entranco 1997). Based on this annual rate of input, more than 2 million cubic yards of sediment have entered and settled into Capitol Lake since it was created.

An evaluation of the sediment input and its distribution within Capitol Lake was performed by Entranco in 1997. For this evaluation, Entranco evaluated sediment inputs to the lake that occurred over a 13-year period, between 1983 and 1996. Over this time, approximately 420,000 cubic yards of sediment was deposited in Capitol Lake, with the North Basin accumulating approximately 24 percent of the total sediment volume, the Middle Basin accumulating approximately 62 percent, and the South Basin accumulating the remaining 14 percent. It was also determined that the sediment trap located within the southern portion of the Middle Basin accumulated approximately 18 percent of the total sediment input into Capitol Lake during this timeframe (refer to Section 2.2 for additional information on Capitol Lake sediment traps; Entranco 1997). Sediment accumulating in the North Basin during this period appeared to primarily collect in the old tidal channels present within this basin (Moffatt & Nichol 2008).

In 2006, the United States Geological Survey (USGS) evaluated elevation changes within Capitol Lake between 1949 (just prior to the formation of the lake) and 2004 to understand the average depth and volume changes that had occurred in Capitol Lake over that timeframe. Based on this analysis, the USGS reported that there was a 60 percent reduction in the volume of Capitol Lake, with most of this reduction occurring in the South and Middle Basins. The reductions in volume noted for the South and Middle Basins was approximately 97 percent and 69 percent, respectively. The North Basin saw an approximate 42 percent reduction over this same timeframe; however, the depth of the former tidal channel within the North Basin showed large decreases in elevation, ranging typically from 2 to 3 meters (George et al. 2006).

A bathymetric survey of Capitol Lake was recently performed and general changes in the lake elevations between 2004 and 2013 are described in Section 4.1.

2.2 PREVIOUS MAINTENANCE DREDGEING EVENTS

Due to the accumulation of sediment in Capitol Lake over time and growing concerns in the 1970s over the long-term health of the lake as a result of this accumulation, maintenance dredging was first performed in Capitol Lake in 1979 to help maintain the water depth of the lake. For this maintenance dredging effort a Final Environmental Impact Statement (EIS) was prepared and published in 1977 as part of the Capitol Lake Restoration and Recreation Plan. Maintenance dredging occurred in the South and Middle Basins of the lake, creating a deep sediment trap in each of these basins (approximately 12 feet in depth). Dredging in these areas resulted in the removal of approximately 250,000 cubic yards of sediment. Dredge spoils from this maintenance dredging event were deposited in the southwest corner of the Middle Basin, creating a wetland and habitat area in this portion of the basin (Koenings 1988).

In 1971, Washington State Department of Fish and Wildlife (WDFW) began rearing Chinook and Steelhead salmon in Percival Cove. According to WDFW records, dredging of Percival Cove also occurred on a regular basis between 1977 and 1984. In 1986, WDFW began using net-pen structures in the deepest part of Percival Cove (along the eastern boundary, adjacent to Deschutes Parkway) for rearing Chinook and Steelhead salmon.

Additional maintenance dredging in Capitol Lake was conducted in the Middle Basin sediment trap in 1986. Approximately 57,000 cubic yards of sediment was removed from the sediment trap and placed at the sediment dewatering facility at the Capitol Lake Interpretive Center (Entranco 1996). No other maintenance dredging has been performed in Capitol Lake since 1986.

2.3 MANAGEMENT OF CAPITOL LAKE AND THE EVALUATION OF LONG-TERM ALTERNATIVES

Over the past several decades, DES, in addition to multiple state and local agencies and citizen groups, has been working on how to address the continued sediment accumulation in Capitol Lake and evaluate how to manage the future of Capitol Lake over the long-term. A brief summary of these efforts is included below.

While the maintenance dredging was being performed in 1986, the City of Olympia, the City of Tumwater, Thurston County, the GA (now DES), and a member of the Governor's staff formed the Capitol Lake Restoration Committee with an agreement to develop a long-range action plan to clean and preserve Capitol Lake. This group released its Committee Report and Proposed Action Plan in 1988 and recommended that maintenance dredging within Capitol Lake occur on a planned and regular basis (Koenings 1988).

In 1991, the Washington State Legislature appropriated funding to update the 1977 Capitol Lake Restoration and Recreation Plan Final EIS. As a result, the GA published a Draft Supplemental EIS in October 1995 evaluating alternatives for long-term maintenance sediment removal and disposal in Capitol Lake. The Draft Supplemental EIS proposed dredging once every 2 years for a 10-year period throughout the Middle Basin and in a portion of Percival Cove, removing between 300,000 and 350,000 cubic yards. However, the proposed maintenance dredging effort in the Draft Supplemental EIS was scaled back significantly in its scope, including the areas where dredging would occur within the lake and the frequency and duration of the dredging events. The scope was reduced to make the proposed dredging effort more consistent with the original scope of the 1977 Final EIS, as this proposed effort was to be a supplement to the original EIS, as well as to address public, Tribal, and agency comments received on the 1995

Draft Supplemental EIS. An updated Draft Supplemental EIS (Revised Maintenance Sediment Removal Plan) was issued with a modified scope in 1996. The proposed action in the 1996 updated Draft Supplemental EIS called for maintenance dredging to occur only in the Middle Basin sediment trap area over a 5-year period, potentially including two dredging events and the removal of up to 140,000 cubic yards of sediment (Entranco 1996). No state funding was available to perform this proposed maintenance dredging in 1996 and the proposal was challenged because it did not adequately consider estuary restoration as an alternative in the EIS. After a series of discussions with stakeholders, GA withdrew the dredge proposal. However, at that time the GA determined to move forward with reviewing options for a long-term management approach for Capitol Lake, as was specified as part of the 1996 Draft Supplemental EIS (GA 1996).

The 1996 Draft Supplemental EIS called for the development of an updated Capitol Lake Management Plan that would include participation by other agencies, Tribal interests, and the public, and would address the policies, goals, and specific operation management and maintenance measures for Capitol Lake over the next 10 to 20 years (Entranco 1996). As a result, in 1997 the CLAMP Steering Committee was formed. The committee included broad participation by multiple state and local agencies, the Squaxin Island Tribe, and the Port of Olympia. The key question that was to be addressed by the CLAMP Steering Committee was: Should Capitol Lake be restored to a tidal estuary or continue to be maintained as a freshwater lake? (Entranco et al.1999). A final programmatic EIS for the CLAMP Steering Committee was developed in 1999 that evaluated five action alternatives and one no-action alternative. The action alternatives included an estuary alternative, a combined lake/estuary alternative (with a reflecting pool on the east side and an estuary on the west side of the North Basin), a managed lake alternative, and two lake/river wetland alternatives (the South and Middle Basins would become freshwater wetlands and the North Basin would be a managed lake in both alternatives, while one alternative also included a Middle Basin sediment trap and the other did not). This EIS contained the key aspects of the CLAMP and was to be used by the Steering Committee to guide development of the CLAMP (Entranco et al. 1999).

In 2002, a CLAMP 10-Year Plan for 2003–2013 was completed by the CLAMP Steering Committee. In this plan it was agreed to maintain Capitol Lake as a freshwater lake over the next 10 years. The plan outlined 14 objectives for adaptively managing the lake over this timeframe (GA 2002). One of these objectives included completing a Deschutes Estuary Feasibility Study to help determine if it would be feasible to restore a self-sustaining Deschutes Estuary as an alternative to the continued management and maintenance of Capitol Lake. This feasibility study and several technical studies to support the feasibility study were completed between 2006 and 2008 (Philip William & Associates et al. 2008).

Information from the Deschutes Estuary Feasibility Study, as well as additional technical information and studies on Capitol Lake, were collected and evaluated by the CLAMP Steering Committee and documented in the CLAMP Alternatives Analysis Report in 2009 (Herrera 2009). This alternative analysis report compared four long-term management alternatives, including a managed lake alternative, an estuary alterative, a dual-basin estuary alterative (includes a reflecting pool on the east side and an estuary on the west side of the North Basin), and a status quo lake alternative (allowing the lake to continue to fill with sediment). The analysis report stated that regardless of the management alternative selected, a long-term program for sediment management that involves dredging and disposal will be required. The long-term dredging frequency was estimated at every 10 years for the managed lake alternative and every 5 years for the estuary alternative (long-term dredging for the estuary alternative was expected to be performed at Budd Inlet marinas and at Port of Olympia facilities; Herrera 2009).

Additionally, as part of this process, a CLAMP Public Involvement Summary was prepared in 2009 as a companion to the Alternatives Analysis Report (GA 2009). The CLAMP Steering Committee used the Alternative Analysis Report to develop their recommendation regarding the long-term management of the Capitol Lake basin and in September 2009 issued their recommendation to the GA. The majority of the CLAMP Steering Committee, five of the members, recommended that the Deschutes Estuary be restored. Two of the CLAMP Steering Committee members recommended Capitol Lake remain a managed lake, and one member did not endorse any of the managed alternatives without an implementation plan, including funding of this plan, in place (CLAMP Steering Committee 2009). The committee members also called for development of a coordinated sediment management strategy for the Capitol Lake basin and the lower Budd Inlet, as well as a new governing structure for the combined basin and inlet that included all affected parties.

Strong feelings are present in the community around the long-term management options. The Capitol Lake Improvement and Protection Association (CLIPA) is a non-profit organization consisting of public citizens and community organizations interested in preserving Capitol Lake. CLIPA prepared a white paper in 2010, which presented their position and plan for managing Capitol Lake over the long-term (CLIPA 2010). Additionally, another non-profit group interested in the long-term management of Capitol Lake called the Deschutes Estuary Restoration Team (DERT) formed in support of restoring Capitol Lake back into an estuary.

To date, no long-term management decision regarding Capitol Lake has been made by DES or the state, in part due to the uncertainty of plan funding. As stated earlier, the long-term management of the Capitol Lake basin is outside the scope of the conceptual maintenance dredging scope presented in this document. The history of the long-term management of Capitol Lake is included in this section to provide relevant background regarding the management and history of Capitol Lake.

Other notable events regarding the management of Capitol Lake over the years include the following:

- In 1985, the North Basin public swim area was permanently closed by the City of Olympia Parks, Recreation, and Cultural Services Department due to chronic water issues in Capitol Lake related to poor water quality and elevated coliform bacteria levels (GA 2002).
- In November 2009, the WDFW closed Capitol Lake to all public uses, including boating, due to the presence of the invasive New Zealand mudsnail (*Potamopyrgus antipodarum*) in the lake and in an effort to prevent the snail from spreading to other waters (WDFW 2009a). Additional information on invasive species present in Capitol Lake is included in Section 3.2.
- Portions of the Deschutes River, Capitol Lake, and Budd Inlet do not meet state and federal water quality standards and are on the Clean Water Act (CWA) Section 303(d) list for one or more of the following parameters: fecal coliform bacteria, temperature, DO, pH, or fine sediment. The Washington State Department of Ecology (Ecology) is conducting a Total Maximum Daily Load Study to determine the targets that enable water bodies to meet standards. The *Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Technical Report—Water Quality Study Findings* was published in June 2012 (Ecology 2012). The Water Quality Improvement Report that will establish numeric load and wasteload allocations is in

its final stages with the final release date yet to be determined. Upon completion, the full report will be submitted to USEPA.

3.0 Constructability Considerations

This section describes the existing conditions of the Capitol Lake basins and features that present constructability challenges for implementation of the conceptual maintenance dredging scope, information on the invasive species present in Capitol Lake and how the presence of these invasive species impact constructability and sediment disposal options, in-lake sediment reuse considerations, possible dredge methodologies based on these constructability challenges and considerations, and the potential impact of dredge methodologies on the required permits and approvals.

3.1 SUMMARY OF EXISTING CONDITIONS

As described in Section 2.0, Capitol Lake consists of four "basins", which are referred to as the North Basin, the Middle Basin, the South Basin, and Percival Cove (Figure 1.1). The upstream basin, or South Basin, is the smallest and is connected to the Middle Basin by a relatively narrow channel crossed by the Interstate 5 bridge (Appendix B, Photograph 1). The elongated Middle Basin extends from south to north nearly a mile from the Interstate 5 bridge to a railroad bridge and causeway. The Middle Basin connects to the North Basin through a narrow channel at this railroad bridge and causeway. The downstream North Basin is roughly circular, with the 5th Avenue Dam, spillway, and fish ladder at its northernmost point. Percival Cove is a shallow freshwater body that is mostly separated from Capitol Lake by a bridge and roadway berm, and is fed by Percival Creek from the north.

Capitol Lake is actually the submerged north-south trending estuary of the Deschutes River, with remnant channels as well as areas of extensive shallow water at typical lake water levels. The Deschutes River, flowing from south to north, discharges, on average, 500 to 1,000 cubic feet per second (CFS) of water into Capitol Lake during winter months, with peak flows approaching 2,000 CFS (USGS 2013). This river flow through Capitol Lake discharges at the north end of the lake through the 5th Avenue Dam into Budd Inlet. During high-flow periods the Deschutes River carries a substantial bed load of sand and silt into Capitol Lake. As described in Section 2.0, an estimated 35,000 cubic yards of sediment enters Capitol Lake from the Deschutes River on an annual basis.

The eastern banks of the South and Middle Basins are generally steep and heavily wooded with no development at lake level except for the powerhouse located at the north end of the Middle Basin. The State Capitol complex is at the top of the slope along the northeastern bank of the Middle Basin (Appendix B, Photograph 2). The western banks of the South and Middle Basins are lower than the eastern banks, and are adjacent to Deschutes Parkway, which consists of two paved lanes of traffic with parking, and a walking path that extends along the shoreline (Appendix B, Photograph 3). Deschutes Parkway extends across the mouth of Percival Cove via a causeway with a small fixed bridge. Percival Cove is fed by Percival Creek from the north and separated from Capitol Lake by a bridge and roadway berm (Appendix B, Photograph 4). Deschutes Parkway continues around the western banks of the North Basin as far as the dam at the north end of the lake, where the Deschutes Parkway merges into 5th Avenue (Appendix B, Photograph 5).

A well-groomed, compact gravel-surfaced walking path, part of Heritage Park, begins at Heritage Park in downtown Olympia, continues westward across the dam and extends at grade around the entire western shore of the North Basin of the lake to Marathon Park, where it then forks (Appendix B, Photograph 6). One branch of the path crosses the channel between the

Middle and North Basins on a bridge and causeway parallel to the railroad tracks and returns to Heritage Park (Appendix B, Photograph 7). The other branch, which is paved, continues along the western shoreline of the Middle and South Basins for several miles. The trail and Deschutes Parkway frequently are heavily used by the public.

In general, access to Capitol Lake for any type of scale of dredging work is very limited. Due to the significant development and the park enhancement work present at Heritage Park, it is assumed that this park would not be available for construction staging and equipment storage or to launch floating dredge equipment. Therefore, there are two parks, Marathon Park and Tumwater Historical Park, that are likely the only viable locations for construction staging and equipment storage, and to launch floating dredge equipment adjacent to Capitol Lake.

3.2 INVASIVE SPECIES

The presence of invasive species within Capitol Lake not only results in constructability considerations, but also restricts the disposal and reuse options for dredged sediment. There are currently 14 aquatic non-native and invasive species present in Capitol Lake (Table 1). Of these species, 5 are listed as priority invasive species among the 50 priority invasive species in Washington State (WISC 2013). These priority invasive species include the New Zealand mudsnail (*P. antipodarum)*, purple loosestrife (*Lythrum salicaria*), Eurasian watermilfoil (*Myriophyllum spicatum*), yellow flag iris (*Iris pseudacorus*), American bullfrog (*Lithobates catesbeianus*), and nutria (*Myocastor coypus*). Four species of aquatic plants in Capitol Lake are on the noxious weed list for Washington State (NWCB 2013) and regulated by the Noxious Weed Control Board and Washington State Department of Agriculture (WSDA; Table 1). The aquatic animals present in Capitol Lake and listed in Table 1 are on the aquatic invasive species list for Washington State and are regulated by WDFW (WDFW 2013). Unregulated, non-native aquatic species in Capitol Lake are also listed in Table 1.

Table 1. Aquatic Non-native and Invasive Species in Capitol Lake

Common Name	Scientific Name	Type	Designation[1]
Purple loosestrife	*Lythrum salicaria*	Emergent Plant	Priority invasive, Noxious B, Quarantine
Reed canarygrass	*Phalaris arundinacea*	Emergent Plant	Noxious C (outside Thurston County)
Fragrant water lily	*Nymphaea odorata*	Floating Leaved Plant	Noxious C
Eurasian watermilfoil	*Myriophyllum spicatum*	Submersed Plant	Priority invasive, Noxious B, Quarantine (outside Thurston County)
Yellow flag iris	*Iris pseudacorus*	Herbaceous Perennial Plant	Noxious C
New Zealand mudsnail	*Potamopyrgus antipodarum*	Benthic Invertebrate	Priority invasive, Prohibited
Big-ear radix snail	*Radix auricularia*	Benthic Invertebrate	Non-native
Asian clam	*Corbicula fluminea*	Benthic Invertebrate	Unlisted

Table 1. Aquatic Non-native and Invasive Species in Capitol Lake

Common Name	Scientific Name	Type	Designation[1]
American bullfrog	*Rana catesbeiana/ Lithobates catesbeianus*	Amphibian	Priority invasive, Prohibited
Nutria	*Myocastor coypu*	Mammal	Priority invasive, Prohibited
Common carp	*Cyprinus carpio carpio*	Fish	Regulated
Brown bullhead	*Ameiurus nebulosus*	Fish	Non-native
Smallmouth bass	*Micropterus dolomieu*	Fish	Non-native, PHS-3
Largemouth bass	*Micropterus salmoides*	Fish	Non-native, PHS-3
Yellow perch	*Perca flavescens*	Fish	Non-native

Note:

1 Species Designations:

Priority invasive = One of 50 priority invasive species in Washington State among more than 700 species evaluated (WISC 2013).

Noxious B = Class B noxious weed of limited distribution and designated for control in various regions where not yet widespread (NWCB 2013).

Noxious C = Class C noxious weed of widespread distribution and local control can be enforced if desired (NWCB 2013).

Quarantine = Noxious weed prohibited to transport, buy, sell, offer to sell, or distribute (NWCB 2013).

Prohibited = Prohibited aquatic animal species of high risk that may not be possessed, purchased, sold, propagated, transported, or released into state waters with transport exceptions approved by WDFW (WDFW 2013).

Regulated = Regulated aquatic animal species of moderate risk that may not be released into state waters (WDFW 2013).

Unlisted = Unlisted aquatic animal species not on Prohibited or Regulated lists but deemed highly threatening (WDFW 2013).

Non-native = Non-native aquatic animal species not on invasive species lists.

PHS-3 = Priority Habitat and Species list category 3: species of recreational, commercial, and/or Tribal importance that are vulnerable.

Background information on the New Zealand mudsnail and some of the other priority aquatic invasive species within Capitol Lake is presented below, along with information about how these aquatic invasive species may affect the disposal and reuse options for any dredged sediment within Capitol Lake or other off-site locations. Additional information on permitting requirements associated with the transport of sediment containing these aquatic invasive species off-site is provided in Section 5.12.

3.2.1 New Zealand Mudsnails

New Zealand mudsnails are of highest priority among the aquatic invasive species present in Capitol Lake because they are highly invasive and have yet to spread throughout the state like the other aquatic invasive species in Capitol Lake. New Zealand mudsnails are small (less than ¼ inch wide), reproduce rapidly by cloning (at a rate of approximately 230 per year), and can become very dense (over 100,000 snails per square meter). They tolerate a broad range of temperature, salinity, and water quality, and have no natural parasites or predators in the United States (WDFW 2013, NZMWG 2007). New Zealand mudsnails can live for 24 hours without water and can survive for up to 50 days on a damp surface.

New Zealand mudsnails were first observed in Capitol Lake in October 2009 (WDFW 2009a). WDFW is leading the state's response to this invasion and closed Capitol Lake to all public use in November 2009 to prevent spreading of the snails to other waters (WDFW 2009a). Capitol Lake was most recently monitored for New Zealand mudsnails in June 2011 when they were observed throughout the North and Middle Basins, but had yet to spread upstream into the Deschutes River and Percival Creek (Pleus 2012a, Deixis 2011a). Budd Inlet was also monitored in June 2011 for the presence of New Zealand mudsnails and none were observed at any of the Budd Inlet monitoring locations (Deixis 2011b).

WDFW has experimented with New Zealand mudsnail control in Capitol Lake, trying freezing in 2009 and saltwater backflushing in 2010, during lake drawdown conditions. The freeze testing indicated that exposure to freezing weather can be a highly effective means for controlling the New Zealand mudsnail and reducing the risk of their spread to other water bodies (Cheng and LeClair 2011). The saltwater backflush testing had more mixed results and it was observed that the New Zealand mudsnails' tolerance to salinity increased after the drawdown, likely due to acclimatization (Cheng and LeClair 2011). Additionally, in 2011 DES had laboratory toxicity testing performed with New Zealand mudsnails from Capitol Lake to evaluate the effectiveness of salts and disinfectants for treating New Zealand mudsnails at various concentrations and exposure periods. Bayluscide treatment of an irrigation canal in California for New Zealand mudsnails resulted in a 98 percent mortality in 8 hours at a concentration of approximately 1 milligram per liter (mg/L; McMillin and Trumbo 2009).

3.2.2 Invasive Aquatic Plants

Invasive plants known to be present in Capitol Lake include two Class B noxious weeds on the quarantine list (Eurasian watermilfoil and purple loosestrife) and two Class C noxious weeds (reed canarygrass, fragrant water lily, and yellow flag iris), shown on Table 1. However, Eurasian watermilfoil, reed canarygrass, and yellow flag iris are not considered noxious weeds in Thurston County due to their widespread distribution (Washington Administrative Code [WAC] 16-750). Class B noxious weeds on the quarantine list are prohibited to transport or distribute in Washington (NWCB 2013). Class C noxious weeds are designated for control in regions where they have not become widespread.

Eurasian watermilfoil was first observed in Capitol Lake in September 2001. It was present in the lake on every survey conducted by Thurston County (2001 and 2003) and by Ecology (2004 and 2006; Ecology 2013). During these surveys, it was observed in large patches and was co-dominant with other plant species. Efforts have been made to control the Eurasian watermilfoil within the lake using diver hand pulling, bottom barrier installation, and treatment with the aquatic herbicide Renovate®. The most recent post-treatment survey conducted in July 2012 observed no Eurasian watermilfoil present in the Middle and South Basins of the lake (EnviroScience 2012).

Purple loosestrife has been observed at various locations along the shoreline of Capitol Lake since at least the 1980s. Control efforts by the Thurston County Noxious Weed Board have eradicated many of the plants, but a substantial population is still present in the Middle and South Basins (Thurston County 2013).

Reed canarygrass was observed in dense monospecific patches in Capitol Lake during both surveys by Thurston County (2001 and 2003) and the 2006 survey by Ecology (Ecology 2013). Only a few fragrant water lily plants were observed by Ecology in Percival Cove in 2004 and in

the North Basin in 2006 (Ecology 2013). Neither of these Class C noxious weeds have been managed in Capitol Lake.

3.2.3 Other Non-native and Invasive Species

Other non-native aquatic invertebrate species in Capitol Lake include the big-ear radix snail and an Asian clam (Table 1). Both of these mollusks were first observed in Capitol Lake during an aquatic species inventory in 2003 (Herrera 2004). Although Capitol Lake provides ideal habitat for these non-native species, neither species has become a major component of the benthic fauna of the lake (Deixis 2011a). The transport of these two species of mollusks is currently not prohibited.

Non-native aquatic vertebrate species in Capitol Lake include the American bullfrog, nutria, and several warm water fish (Table 1). Information on the presence and abundance of these species has not been identified or compiled in this report because these species would not be present in dredged sediments or be a concern for the dredging, transportation, and disposal of Capitol Lake sediments.

3.2.4 Dredging Requirements Due to the Presence of Aquatic Invasive Species

Due to the presence of several aquatic invasive species within Capitol Lake, care must be taken during maintenance dredging operations to minimize the risk of transport of these species to other aquatic areas. It is likely that dredging will require additional engineering controls (e.g., turbidity curtains) for containment of the dredging areas, and possibly redundant containment at the lake outlet area, to reduce the transport of New Zealand mudsnails and purple loosestrife seeds to Budd Inlet. Additionally, dredging and transportation equipment will require thorough decontamination. Equipment to be used in the lake for dredging and previously used in other aquatic systems will require decontamination prior to use in the lake to prevent infestation by aquatic invasive species not present in the lake. All equipment used for dredging will require decontamination after its use in the lake. Equipment decontamination procedures will need to follow the invasive species management protocols recently developed by WDFW (WDFW 2011), or, upon approval by WDFW, will need to follow alternative procedures more recently developed by WDFW or others.

Additional requirements to minimize the risk of release of aquatic invasive species from Capitol Lake dredged material will be needed if this material is transported and disposed of off-site. Invasive species transport approvals from WDSA and WDFW would be required that specify the conditions needed to prevent the release of the specific aquatic invasive species present in the dredged material. For additional details on the approvals and the probable requirements associated with this approval process refer to Section 5.12.

3.2.5 Impact of the Presence of Aquatic Invasive Species on Sediment Reuse and Disposal

3.2.5.1 Open-water Disposal

In 2000, the Dredged Material Management Program (DMMP) agencies prohibited the disposal of hydraulically dredged sediments from Capitol Lake at any DMMP open-water dredged material disposal site in Puget Sound (Appendix B of Entranco 2000). However, at that time,

clamshell dredged sediments from Capitol Lake were authorized by the DMMP agencies for disposal on a one-time basis at the Commencement Bay disposal site (following additional characterization of the dredged material). It was determined by the DMMP agencies that the clamshell dredged sediment from Capitol Lake could not be disposed of at the Anderson/Ketron Islands dredged material disposal site due to the potential spread of purple loosestrife to the Nisqually River Delta and the Nisqually National Wildlife Refuge. This decision by the DMMP agencies in 2000, was based on the results of a 1996 study that showed that the purple loosestrife seeds were capable of floating in Budd Inlet water, remained viable in Budd Inlet water for 2 or 3 weeks, and germinated when transferred to lower salinity waters (WSU 1996).

Additionally, the DMMP agencies have recently determined that the disposal of Capitol Lake dredged material is prohibited at any of the DMMP open-water dredged material disposal sites due to the uncertainty and risk associated with the release of New Zealand mudsnails and other aquatic invasive species to Puget Sound (Fox 2012).

3.2.5.2 In-water Beneficial Reuse Within Capitol Lake

It is likely that the dredged materials from Capitol Lake would be permitted for beneficial reuse within Capitol Lake if proper controls are in place during disposal to prevent the release of New Zealand mudsnails and other aquatic invasive species from the lake and equipment used in the lake. The placement of dredged materials in nearshore areas of Capitol Lake, such as along the western shoreline of the lake in the North and Middle Basins or within Percival Cove, is not likely to increase populations or the extent of New Zealand mudsnails or other aquatic invasive species within the lake. However, if dredged material is determined to be acceptable for beneficial reuse within the lake for habitat enhancement, and depending on the level of Eurasian watermilfoil infestation within the conceptual dredge prism(s) and reuse location(s), physical removal of Eurasian watermilfoil plants from within the surface of the dredge prism or similar control efforts prior to dredging may be required to prevent the potential transfer of Eurasian watermilfoil from an area of high infestation to an area of low infestation. DES has been conducting diver hand removal of Eurasian watermilfoil and other non-chemical control efforts in Capitol Lake since 2007.

For additional information on in-lake beneficial reuse and habitat enhancement refer to Section 3.3.

3.2.5.3 In-water Beneficial Reuse Outside of Capitol Lake

The disposal of untreated sediment is anticipated to be prohibited at potential beneficial reuse sites in lower Budd Inlet or elsewhere in Puget Sound due to the uncertainty and risk associated with the release of aquatic invasive species from Capitol Lake dredged material. Treatment of New Zealand mudsnails in the lake or dredged materials may allow disposal at a beneficial reuse site in Puget Sound. However, due to the associated risks and costs associated with treating for the New Zealand mudsnails and addressing other aquatic invasive species, the disposal of treated material at an in-water beneficial reuse site in Puget Sound is not recommended for sediments dredged from Capitol Lake.

3.2.5.4 Upland Beneficial Reuse or Disposal

With proper invasive species controls and monitoring, it is likely that dredged materials from Capitol Lake may be permitted for beneficial reuse at an upland location. Treatment and control

of the New Zealand mudsnails in the dredged material would be required to prevent the release and insure death of all mudsnails at an upland location. Additionally, containment and monitoring would likely be required at an upland site to ensure that surface waters in the vicinity of the site do not become infested with New Zealand mudsnails or other aquatic invasive species from Capitol Lake.

3.3 IN-LAKE BENEFICIAL REUSE AND HABITAT ENHANCEMENT

Beneficial reuse of dredged materials from Capitol Lake may include nourishment of beaches located on the west shore of the lake along Deschutes Parkway, or placement within Percival Cove. In determining the potential benefits of habitat enhancement as a means of sediment disposal and reuse within Capitol Lake, several factors should be considered:

- Are sensitive species present that could benefit from beach nourishment and/or creation of emergent wetlands and the changes in habitat?
- Is there an opportunity to restore or improve the ecological functions of this site due to an existing alteration or impairment?
- Will the habitat enhancement improve conditions in a way that ultimately benefits the species that are present?
- Are there species that could be adversely affected by dredged material habitat enhancement, such as the Olympia mud minnow, and, if so, how should the habitat enhancement be designed to avoid and/or minimize adverse impact?

3.3.1 Opportunity to Improve Impaired Ecological Functions in Capitol Lake

Much of the western shoreline of Capitol Lake currently consists of a relatively steep bank that descends from Deschutes Parkway and is protected by armoring without a complex plant community. The negative ecological effects of shoreline armoring are widely recognized by biologists and resource managers in the northwest region (Shipman et al. 2010; WDFW 2009b; City of Seattle Not Dated). Shoreline armoring can alter sediment transport and erosion processes, alter wave energy and shoreline habitat structure, and lead to less suitable habitat for sensitive species. In addition, the western shoreline of Capitol Lake consists of a narrow vegetated buffer that reduces the potential for shade, inputs of organic matter, food production, and refuge from predators, which are all important factors for sensitive species growth and survival in nearshore lake environments. To the extent that beach nourishment can increase the amount of shallow water, nearshore habitat, and vegetation cover (that is, if the shallow water supports a broader band of riparian or wetland vegetation), it will likely improve habitat for sensitive fish.

Other considerations for habitat enhancement by beach nourishment include the chemical quality of the substrate material being placed, sediment size and composition, and whether there are nearby stream inputs that could accelerate erosion or sedimentation following the nourishment project. The presence of coarser grained sediments in the center of Capitol Lake than in comparison to sediments near the western shoreline of the lake suggests that nearshore habitat may benefit from increased sediment grain size. Chemical characterization of the dredged material will be necessary to evaluate if this dredged material is suitable for beneficial reuse within Capitol Lake. For additional details on the characterization of the dredged material refer to Section 4.2. Thus, disposal of dredged material for beach nourishment within the lake is

likely to provide an opportunity to improve nearshore and riparian habitat compared to existing conditions.

3.3.2 Beach Nourishment Benefits to Sensitive Species

There are a variety of potential beach nourishment designs that can be used to improve habitat for sensitive species. Concepts range from direct placement of sediment along the shoreline to reduce the slope and increase the long-term stability of the bank, to more complex arrangements of deepwater fill, islands, vegetated berms, and large woody debris or rocks to create a diverse habitat structure. One option for Capitol Lake is to create an emergent plant area using the dredged sediments for beneficial reuse. The shallow, nearshore region of the fill areas could be planted with native, freshwater emergent vegetation to improve the existing aquatic habitat.

3.3.3 Potential Beach Nourishment Locations within Capitol Lake

The west shore of the North Basin is an excellent location for beach nourishment. The nearshore areas of the Middle and South Basins may be too shallow for beach nourishment to substantially improve habitat conditions. For example, a large area of exposed sediments was observed in the Middle Basin during the 1.5-meter drawdown of the lake that occurred in February 2010. Additionally, recent sediment deposits in the southern portion of the Middle Basin are also apparent in an aerial photograph taken in September 2011. An updated bathymetric survey was performed in 2013 that also indicated shoaling in this area relative to a 2004 bathymetric survey (refer to Section 4.1). This current bathymetric data would be used to determine the best locations along the western shoreline of the Middle and North Basins or within Percival Cove for placement of the dredged material to improve habitat conditions.

Increasing the diversity of habitat along the armored west bank in Capitol Lake and creating conditions that are suitable or preferable to sensitive fish species represents an opportunity for a combined lake maintenance dredging and beach nourishment project to be self mitigating. Essentially, in order for a project to serve as mitigation it needs to either increase the suitability (improve habitat) for the species, or increase the geographic area or accessibility of suitable habitat. A properly designed beach nourishment project within Capitol Lake could be self-mitigating and not require compensatory mitigation.

3.3.4 Potential Beach Nourishment Locations within Percival Cove

Percival Cove is another potential location for beach nourishment. Dredged sediments could be used to create a complex wetland with diverse habitat structure within the existing open water area of Percival Cove. Preliminary analysis indicates that there may be sufficient open water habitat in Percival Cove to accommodate nearly all of the dredged sediments, and this nourishment site may provide more wetland area and functional value than the west shore of the North Basin. The updated bathymetric survey of Percival Cove (refer to Section 4.1) would be used to determine the volume of open water available for placement of the dredged material to create a diverse wetland habitat structure at this site.

3.4 POTENTIAL DREDGING METHODOLOGY AND EQUIPMENT

In general, there are two feasible methodologies of dredging sediment within Capitol Lake, either by "mechanical" or "hydraulic" dredging. The essential difference between the two methods is that a mechanical dredge picks up the sediment with a bucket (typically a clamshell or a backhoe bucket) and places it on a barge or scow for transportation to a disposal location, while a hydraulic dredge suctions the material off the lake bottom via a cutterhead and pumps the materials through a temporary pipeline to an on-site or off-site location. In short, a mechanical dredge produces dredge spoils with water content similar to the in-situ sediment, but contained on a barge, while a hydraulic dredge produces a sediment-water slurry with a relatively low solids content, but is capable of being transported a significant distance via the temporary pipeline.

Details and considerations regarding the dredging methodology, equipment, and physical controls necessary to perform the conceptual maintenance dredging within Capitol Lake are discussed in this section. Additionally, the constructability considerations and challenges associated with off-site disposal of the dredged material are also discussed.

3.4.1 Mechanical Dredge

If a mechanical dredge were used in Capitol Lake, it would consist of a cable crane or a hydraulic excavator (digging machine) placed on and working from a sectional barge. Sectional barges can be assembled together side to side and/or end to end. They can be designed and assembled in a variety of configurations to support nearly any size of dredge. Any portable barge units used in Capitol Lake will require a significant mobile crane to pick the individual modules off a transport trailer and set them into the water. Before dredging can commence, the configured barge has to be equipped with a digging machine. Additionally, this barge may also require anchors (and anchor winches) and/or spuds, which are vertical steel shafts that can be raised and lowered by the dredge operator and can extend to the lake bottom. A tug would also be required to help move the mechanical dredge around the lake during the project and to assist with the handling of the dredge anchors.

Mechanical dredging would also require at least one separate spoils barge that would be designed and assembled to carry the dredged sediment material from the dredge location to an upland trans-load location for either transport to an off-site disposal or reuse location or for staging before placement at an in-water reuse location within Capitol Lake. For any sediment disposal or reuse option, mechanical dredging within Capitol Lake requires a two-stage operation. This is because the dredged sediment requires additional handling for either on-site reuse or off-site reuse or disposal after the dredged material is picked up by the mechanical dredge and placed on a scow.

Typically, for the in-water placement of dredged material in water bodies or disposal locations with allowable water depth and access, the dredged sediments are placed at the reuse or disposal site by opening the bottom of a "bottom-dump" scow and allowing the material to drop out. However, this disposal or placement methodology is not feasible in Capitol Lake, not only because of sediment re-suspension concerns due to the shallow water depth, but also because these types of scows are quite large and could not be launched or operated within Capitol Lake.

Therefore, if mechanical dredging were implemented for the beneficial reuse of sediment in Capitol Lake, the dredged material would need to be placed onto a small portable, or "sectional," barge, and transported to the reuse location within the lake by a small tug. At the

reuse site, dredged material would be offloaded and placed with another machine similar to the dredge. Based on the conceptual dredging scope, which involves a substantial amount of dredging, it is likely that the mechanical dredging fleet would consist of one digging machine and one offloading machine, each on its own barge, and two spoils barges, one receiving dredged sediments and the other having dredged sediments continuously unloaded from it. A small tending tug would move the sediment barges back and forth between the digging and offloading machines.

If the dredge sediments are to be transferred to a truck or train rail car for transportation to an off-site disposal or reuse location, there might be substantial advantages to using a mechanical dredge. This is because upland transportation requires that the dredge material be very "dry" (i.e., no "free water") to meet legal and practical requirements for handling and transport. Refer to Section 3.4.5 for additional off-site disposal considerations associated with the transferring and handling of mechanically dredged sediment.

3.4.2 Hydraulic Dredge

Similar to the mechanical dredge equipment, hydraulic dredges are also available as transportable pontoon combinations that can be readily mobilized and launched at dredge locations. However, the main barge module containing the pump and power plant is typically significantly heavier than any individual sectional barge component and requires a heavier mobile crane for launch. The larger crane occupies a correspondingly larger footprint at the construction access and launch area as well as requiring more robust and suitable launch and ground conditions. A portable hydraulic dredge that would be adequate for the conceptual dredge scope would require multiple truckloads of equipment for the launch and assembly of the hydraulic dredge. For hydraulic dredging, a tug would also be required to help move the dredge around the lake and to assist with the handling of the dredge anchors.

A hydraulic dredge does not require a separate dredge spoils barge as is required with mechanical dredging, but it does require a discharge pipeline. Typically, hydraulic dredge pipelines consist of high-density polyethylene (HDPE) pipe in 40- or 50-foot segments that are welded together on-site. A hydraulic dredge, discharging its dredge material through a pipeline (with or without a booster pump to provide for further pipeline distances), effectively excavates and discharges its dredge slurry in one operation.

At a conceptual level, hydraulically dredged sediments from any of the lake basins could be piped and placed in any area of the lake, including Percival Cove, because the pipeline can be routed (while floating) through the over-water obstructions (e.g., causeway and bridge) or alternatively over dry land or through a casing driven under dry land if needed. If the distance between the dredge location and the discharge reuse location becomes too long for effective pumping by the dredge alone, a second in-line pump would be added to "boost" the pumping and transport of the dredge slurry. Depending on the dredged material reuse location, the hydraulic dredge may require a separate small barge to carry a booster pump and another small barge to carry the discharge end of the pipeline and direct it into the reuse location.

Refer to Section 3.4.5 for additional considerations for the transferring and handling of hydraulically dredged sediment for off-site transport.

3.4.3 Dredge Launching

Another consideration for Capitol Lake dredging and access is the water depth required for the launching of dredge equipment, regardless of the dredge methodology used. The sectional barges, before being equipped with the dredge equipment, require at least 1 foot of water to float. Depending on the configuration of the barge and digging machine, it is likely that a minimum of 2 to 3 feet of water will be required close to shore for launching. The recent Capitol Lake bathymetry data collected by TerraSond in March 2013 (Appendix C) show an adequate depth of water for launching portable barges or a portable hydraulic dredge close to the current shoreline in either basin. These data confirm that minor dredging by land equipment (crane or backhoe) will be required to deepen the water close to the beach prior to launching. Refer to Section 4.1 for additional information on the recent bathymetric survey. Equipment launching will be a key component of the project planning and design and project permitting.

Marathon Park and Tumwater Historical Park, are likely the only viable locations for construction staging and equipment storage, and to launch floating dredge equipment adjacent to Capitol Lake. These two locations are discussed below:

- **Marathon Park** is located at the southwestern corner of the North Basin and allows direct access to the North Basin as well as somewhat obstructed access to the Middle Basin. Access to the Middle Basin would require coordination with the railroad to launch and stage equipment. Of the potential access sites to the lake, this one offers several major advantages. There is ample room for equipment and material staging, while potentially maintaining some public access to the park during dredging operations. There is also practical access to both the North and Middle Basins, where dredging could occur as described in the conceptual scope, though the actual launching routes to these basins may require underwater improvement or some upland regrading (Appendix B, Photographs 8 and 9).
- **Tumwater Historical Park** offers marginal access to the South and Middle Basins. This park has limited waterfront, which is obstructed by overhead high-tension power lines and only gives access to the downstream end of the South Basin. Furthermore, access to the Middle Basin is by way of a winding and narrow channel that leads under Interstate 5's bridge complex, with very low overhead clearance. The recent bathymetry shows the waterway is very shallow and tortuous, from the potential launching site to and under the Interstate 5 bridge complex, so that movement of a barge of any sort into the Middle Basin would be extremely difficult, if not impossible. Therefore, it is unlikely that this park would be adequate in any dredging scenario due to these constraints.

3.4.4 Turbidity Physical Controls for Dredged Material Placement Within Capitol Lake

For in-water beneficial reuse of the dredged sediment within Capitol Lake, either a mechanical dredge—placing its dredge materials from a spoil barge—or a hydraulic dredge—discharging sediment slurry from its pipeline—will require turbidity controls in or around the reuse area. Potential turbidity control options include the use of silt curtains or Geotubes™. In addition to these controls at the reuse locations, it is possible that redundant containment at the lake outlet area may be necessary, in order to reduce the transport of New Zealand mudsnails and purple loosestrife seeds to Budd Inlet.

A silt curtain is a fabric curtain suspended at its top edge by floats and weighted down, usually by a length of chain, at its base. It may extend all the way from the surface of the water to the sediment bottom, or, especially in tidal waters, only part way to the bottom. It may be permeable and intended to act as a filter, allowing water to pass but retaining suspended sediment, or it may be impermeable and intended to function as a wall. The use of silt curtains is most effective at project locations with the following conditions:

- Very little tidal (or other) variation in depth of water
- Very little current, or, if there is current, it must run roughly parallel to the alignment of the curtain
- Very little wave action

For off-loading mechanically dredged material at an in-water location with a crane or excavator, the conditions in Capitol Lake are conducive to effective turbidity control using a silt curtain. For hydraulic dredged material placement at an in-water reuse location within Capitol Lake, a silt curtain or overlapping silt curtains could also be used for turbidity control, but this dredging methodology requires proper design to account for the volume of water discharged to the reuse area through the hydraulic dredge pipeline.

Alternatively for hydraulic dredging, Geotubes might be used to consolidate the dredge slurry and clarify the water. Geotubes are made of permeable filter fabric into which the hydraulic dredge slurry could be pumped for dewatering prior to placement of the sediment at an in-water reuse location. The suspended sediments in the slurry are retained by the fabric and the water passes through, often with low enough suspended solids for direct discharge to the receiving body. Geotubes have been effectively used in many hydraulic dredging projects. However, hydraulic dredging generates a large volume of sediment-water slurry, requiring substantial area or land for dewatering. The Geotubes could be placed in the uplands or along the lake shoreline with potential lake draw down and appropriate secondary containment. It is important to note that to effectively dewater dredge spoils, Geotubes must be placed above water level. The driving force for the passage of water through the tubes is not the dredge pump, but rather the weight of water contained within the tube. When immersed, that water is “weightless” and will not be forced through the filter fabric.

3.4.5 Off-site Reuse or Disposal Considerations

If it is decided to take the dredged material to an off-site reuse or disposal location, there are several constructability considerations and challenges that are encountered with the transferring and handling of wet dredged sediment. Many of these considerations and challenges include additional agency approvals and would need to be specified in the design and permitting package materials.

For mechanical dredging, some of the constructability considerations and challenges associated with off-site reuse and disposal include the following:

- The sediment composition of silty sands and sandy silts in Capitol Lake will result in a wetter dredged material, even with mechanical dredging.
- It is likely that the free and entrained water content will require reduction via the addition of drying agents or stabilizers, such as Portland cement or lime, which adds a corresponding percentage to the material disposal weight. However, the use of lime may also act to eradicate the New Zealand mudsnails and sterilize the purple

loosestrife seeds because hydration of the lime is exothermic and results in heating of the sediments and changes to the sediment chemistry.

- It is possible that, in addition to drying agents or stabilizers, salt or other additives may be required to be added to the dredged sediments for invasive species control, specifically for New Zealand mudsnails, which may require application of an approved molluscicide to achieve complete eradication.
- The purchase of drying agents or stabilizers will be a substantial cost and the storing and handling of this material on-site includes logistical planning and considerations.
- Drying agents and stabilizers are typically applied as fine-grained powders and require additional environmental controls.
- Both decanting sediment water and stormwater runoff will require capture and possible treatment (for turbidity or pH) for discharge.
- The rate and timing of production by the dredge and the rate of removal by the upland carrier are often different, therefore requiring temporary stockpiles of dredged material for efficient off-haul.
- The upland and shoreline space necessary is substantial for the drying agent mixing area, any water treatment, and temporary stockpiles. The added space necessary for turning around trucks, loading them, and cleaning them before they return to the public streets is also significant.
- Marathon Park likely provides adequate area for the operations and equipment needed for uplands reuse or disposal, but that use would likely consume the park to the extent that there would be no public access during construction. There would also be substantial efforts needed to restore the park following the completion of dredging.
- There is an active rail line across the causeway and bridge that separate the North and Middle Basins, as well as a short segment of abandoned rail line parallel to the Deschutes Parkway. However, rail transport of sediment from the lake is not feasible. To effectively load rail cars requires not only a loading area, but also a spur and siding to store empty and loaded cars and a means to shuffle cars between the loading area and the siding. Such space does not exist at the site and it is unlikely that sufficient space could be provided.

If a hydraulic dredge was used for dredging sediments that were to be taken off-site for reuse or disposal, then Geotubes or a slurry dewatering area could be used to dewater the sediments prior to removal. Either of these dewatering methods would likely require at least a similar amount of uplands space relative to that of the mechanical dredging described above. The dewatered slurry sediments or dewatered Geotubes could be loaded on trucks and transported to an off-site location, similar to mechanical dredging. Many of the same challenges related to transporting dredged materials off-site that are listed above for mechanical dredging would also apply to the off-site transport of material that was hydraulically dredged.

3.5 DREDGE METHODOLOGY CONCLUSIONS AND PERMITTING SUMMARY

Either a mechanical or hydraulic dredge, as well as any ancillary equipment, can be mobilized into the lake basins through Marathon Park and the adjacent railroad right-of-way. Either type of dredge could be used to conduct the conceptual scope of dredging. However, any type of

dredge event within the lake basins will have substantial constructability challenges and considerations because of the access constraints, shallow water depth, and obstructions over and near the lake basins. The determination of whether the dredged sediment will be transloaded to an off-site upland reuse or disposal location or reused within the lake (and even the location within the lake chosen for beneficial reuse), has a profound effect on the method of dredging selected.

If, as presented in the conceptual dredging scope, the Middle Basin sediment trap is the priority dredging area and a beneficial reuse in the northern end of the Middle Basin along the western shoreline is planned, then a hydraulic dredge could readily dig from the sediment trap in the south and pump the dredge slurry less than a mile to this northwestern area. A mechanical dredge likewise could load material onto barges within the sediment trap and offload them in the same beneficial reuse area. The difference between the resulting construction using these two technologies is that the mechanical dredge, offloading with a relatively small crane or backhoe, could not fill to a depth much less than 2 feet of water. But the discharge from the hydraulic dredge can, if desired, fill to, or even above, the surface of the water.

A mechanical dredge, and its spoil barges, cannot pass under three out of four of the bridges on Capitol Lake. Therefore, if dredging is conducted in the North Basin with a mechanical dredge, the sediment must be reused within the North Basin or transferred to the uplands within the North Basin for reuse in another area of Capitol Lake or off-site transport. Similarly, if dredging is conducted in the Middle Basin with a mechanical dredge, it must be reused within the Middle Basin (not including Percival Cove) or transferred to the uplands for reuse in another area of Capitol Lake or off-site transport at a trans-load location within the Middle Basin.

The bridge and pipeway over the entrance of Percival Cove into Capitol Lake are extremely low and impassable for a dredge or barge. If Percival Cove is determined to be the preferred location for habitat enhancement, then the use of a hydraulic dredge would be the only practical dredge methodology for the placement of the sediment in the cove. Assuming sediment would be placed in the southern expanse of the cove, silt curtains could be set up across the northern end of the cove, providing adequate turbidity and water quality control for the water of the North Basin.

Another component that has to be considered for the placement of dredged material along the shorelines of the North or Middle Basin via mechanical dredging is sufficient water depth for a loaded dredged sediment barge. The recent bathymetric survey indicates that access in the North Basin would be adequate. However, access is limited within the Middle Basin, so dredge and reuse design would evaluate the potential water depth that can be gained by raising lake levels, and the anticipated required water clearance relative to location and extent of the habitat enhancement.

A hydraulic dredge might require a booster pump to reach all areas of the North Basin from the sediment trap in the Middle Basin, but otherwise would be practical for the purpose.

Use of Marathon Park as a trans-load facility to dry dredge spoil and load it onto trucks appears to be feasible. Both hydraulic and mechanical dredges could be used for this purpose.

Both dredge methodologies will require the construction of a temporary construction staging, equipment, and launch area within Marathon Park for the conceptual maintenance dredging scope. Therefore, the following approvals or permits will likely be required for either method:

- National Pollutant Discharge Elimination System (NPDES) Construction General Stormwater Permit from Ecology
- Shoreline Development Permits from the City of Olympia, and possibly the City of Tumwater
- Uplands restoration plans and approvals from the Cities of Olympia and Tumwater to restore the park areas following completion of the dredge project
- Potential noise analyses and noise variances

The transport of equipment and materials into and out of the Middle Basin from Marathon Park will also require coordination with the railroad regarding the timing of launching into and removal from the lake and additional safety controls during dredging operations due to the presence of the railway with either of the dredging methodologies. Additionally, as part of the permitting process with either dredge methodology, the off-site transport and reuse or disposal at an uplands location will require additional traffic haul route and traffic analysis supporting documentation, and WSDA and WDFW approvals for the transport of sediment containing invasive species.

Given the constructability challenges and considerations associated with a dredge effort within Capitol Lake, and the limited availability of dredge equipment suitable to meet the lake's specific requirements, the experience and ingenuity of the dredge contractor will be critical. Therefore, following the identification of a preferred dredged sediment reuse or disposal option as part of the National Environmental Policy Act (NEPA) permitting process, the design specifications, permits and approvals, and bid package should be prepared such that the documents satisfy all environmental requirements and permit conditions, meet project objectives, and provide DES with predictable outcomes around the project objectives and cost, but limit the operating and equipment constraints on the contractor to allow the benefit of their experience. The permits and approvals required for a dredge event within Capitol Lake are described in detail in Section 5.0.

4.0 Data Gaps

Technical data gaps have been identified that are required or are likely to be required to be filled as part of the planning, design, and implementation of the Capitol Lake conceptual maintenance dredging effort.

One of these data gaps includes conducting an updated bathymetric survey of Capitol Lake to accomplish the following: 1) determine the potential volume of material to be dredged within the two conceptual maintenance dredge areas; 2) determine where the dredged material could potentially be placed within Capitol Lake and/or Percival Cove for on-site beneficial reuse and habitat enhancement; and 3) provide water depth information relative to construction access and equipment launching.

Another data gap includes the characterization of the sediment within the conceptual dredged areas to assist in the evaluation of beneficial reuse or disposal options. Dredged material elutriate testing can also be a requirement for dredging projects depending on sediment chemical quality and site conditions, and is identified as a potential data gap that may be required to assess the potential impacts of the maintenance dredging on water quality.

Additional information is also required to fill data gaps regarding the invasive New Zealand mudsnail, including an updated survey of the New Zealand mudsnail coverage within Capitol Lake and its connected freshwaters, and possibly a control study to determine what treatment of the dredged material may be necessary if transport of the dredged material off-site is required.

Finally, there is the potential that dredge elutriate testing may be necessary to determine if the dredged material will likely have an adverse affect on the lake's water quality. This section describes each of these data gaps in further detail and provides proposed scopes and the estimated costs for filling each of these data gaps.

4.1 BATHYMETRIC SURVEY

Prior to the development of this maintenance dredging conceptual scope, the most recent bathymetric data available for Capitol Lake were from a survey completed by USGS in 2004 (Eshleman et al. 2006). Due to the continued input of an estimated 35,000 cubic yards of sediment annually from the Deschutes River into Capitol Lake and the amount of time that has passed since the last bathymetric survey data were collected, the updated bathymetry of Capitol Lake was immediately identified as a data gap that was necessary to be filled. DES elected to conduct an updated bathymetric survey of Capitol Lake in March 2013 to fill this data gap. The 2013 bathymetric data provide updated information on the amount of material that could potentially be dredged from the conceptual maintenance dredging areas and conceptual information on where and how much of this dredged material could be beneficially reused for habitat restoration in different areas of Capitol Lake and/or Percival Cove. Additionally, the bathymetric data provide information related to construction access and equipment launching for performing any dredging work.

The most recent bathymetric survey was performed on the North, Middle, and South Basins of Capitol Lake, as well as on Percival Cove. TerraSond conducted a singlebeam bathymetric survey between March 12 and 15, 2013. The bathymetric survey report prepared by TerraSond is provided in Appendix C, and includes the results of the survey along with information on the

survey coverage, the survey control and equipment used, and how the survey data were collected and processed. The 2013 bathymetry is shown on Figure 4.1.

A comparison of the 2013 bathymetric data to the 2004 bathymetric data was performed by Floyd|Snider to understand generally where filling has occurred in Capitol Lake over the past 9 years. The 2004 bathymetry, as reported by the USGS, is shown on Figure 4.2. The 2004 bathymetry is reported in meters Local Mean Sea Level (MSL) vertical datum, whereas the 2013 bathymetric data are reported in feet North American Vertical Datum of 1988 (NAVD 88). The 2004 MSL elevations were converted to feet NAVD 88 for this comparison of the 2004 and 2013 bathymetric survey data as described below (1 meter MSL is equal to 7.57 feet NAVD 88).[1]

Based on the annual input, over this timeframe approximately 315,000 cubic yards of sediment has entered Capitol Lake. Based on a general comparison, limited by the survey information from the previous 2004 USGS bathymetry survey, it is estimated that as much as 50 percent of this sediment may have accumulated in the North Basin. In 2004, a shallower area or mound was noted in the middle of the North Basin with two deeper channels appearing on either side of this area; however, the 2013 bathymetry shows that the surrounding channels, as well as the deeper portions of the North Basin, have experienced shoaling, making this mound much less pronounced. The other 50 percent of the sediment input over the past 9 years could be accounted for within the Middle Basin and part of the South Basin, with additional accumulation noted in the Middle Basin sediment trap area, as well as on the shallower shelves surrounding the former Deschutes River channel through this basin. It appears that generally over 2 feet of sediment has accumulated on the shallower shelf areas in the Middle Basin. Again, it should be noted that only a general comparison could be performed when estimating the loading to each of the basins due to the limitations of the available data from the 2004 bathymetric survey (only a contour map was available).

For the permit analysis, it is assumed that a total of approximately 100,000 cubic yards would be removed from Capitol Lake, with approximately 50,000 cubic yards from the Middle Basin sediment trap area and another 50,000 cubic yards from the North Basin main channel area. Based on the 2013 bathymetry, these sediment volumes could easily be removed from these two areas and not preclude any of the previously studied long-term lake management alternatives. The total dredge volume could remain the same or be increased based on the objectives of the dredging project to be performed. The dredging volume to be removed could also be determined based on the volume needed to create a habitat enhancement area within the lake.

4.2 DREDGED MATERIAL CHARACTERIZATION

Characterization of the material to be dredged as part of the conceptual Capitol Lake maintenance dredging effort is necessary to evaluate if this dredged material is suitable for beneficial reuse along the western shoreline of Capitol Lake or in Percival Cove. If this dredged material is determined not to be suitable for beneficial reuse within the lake, then sediment characterization data can be used to evaluate if this material can be used for upland reuse or to

[1] Using arbitrary elevations of 10 meters and 10 feet relative to Mean Lower Low Water (MLLW), National Oceanic and Atmospheric Administration (NOAA) VDatum Software was used to create conversions from MLLW to MSL and NAVD 88. To allow for the calculation of conversions between datum, the software requires an over-water marine location be specified as the point where the conversion applies. This is because the software is intended for use in aquatic/marine environments that typically reference vertical locations with respect to tidal datum. However, a conversion factor that is calculated for marine region can be used (with judgment) for terrestrial or freshwater lake locations that are nearby. A reference location was selected in nearby Budd Inlet to enable these conversions.

characterize this material for upland disposal. While previous characterization efforts have been performed on Capitol Lake sediments, the samples collected were often not collected within the current conceptual maintenance dredging areas, or if they were collected in these areas, then the samples were generally not collected to the necessary depths or with adequate spatial coverage for the conceptual dredged prisms. Additionally, the sediment characterization analytical data are generally either outdated (beyond typical recency guidelines) or do not include all of the required chemical analyses. For these reasons, sediment characterization of the material to be dredged is identified as a key data gap.

This section briefly summarizes the previous sediment characterization efforts performed to date within Capitol Lake and then provides a proposed scope with the level of effort and costs necessary to perform a current characterization of the sediment within the conceptual maintenance dredging areas.

It is anticipated that the sediment characterization data would be compared to Ecology's Freshwater Sediment Chemical Criteria from the revised Sediment Management Standards (SMS; Chapter 173-204 WAC, effective September 1, 2013).

4.2.1 Previous Sediment Characterizations

There have been multiple sediment characterization events within Capitol Lake over the past 38 years. The analytical data from these events have been compared to various regulatory criteria over time, but have not previously been compared to the current SMS Freshwater Sediment Chemical Criteria. The brief summary below of these sediment characterization events provides a comparison to these Freshwater Sediment Chemical Criteria to give an understanding of the general quality of the sediments within Capitol Lake.

The most extensive sediment characterization event within Capitol Lake occurred in 1975. During this event, 11 sediment samples, collected from 6 cores from the Middle and North Basins, were analyzed for total metals, polychlorinated biphenyls (PCBs), total chlorinated hydrocarbons, oil and grease, and conventional parameters (CH2M Hill 1976). In 1 of the 11 samples, mercury exceeded the Freshwater Sediment Chemical Criteria.[2] Mercury in this sample was detected at a concentration of 1.03 milligrams per kilogram (mg/kg), exceeding the mercury sediment cleanup objective of 0.66 mg/kg and the mercury cleanup screening level of 0.8 mg/kg by less than a factor of 2. No other analytes tested in these sediments exceeded the Freshwater Sediment Chemical Criteria.

In 2000, sediment characterization was performed within the Middle Basin sediment trap area, one of the conceptual maintenance dredging areas. Sediment samples covering both the surface and subsurface (0 to 2.5 feet deep) were collected from four sampling locations and analyzed for total metals, toxicity characteristic leaching procedure (TCLP) metals, total petroleum hydrocarbons, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), pesticides, PCBs, and conventional parameters (Herrera 2000). All metals were detected at concentrations less than the SMS Freshwater Sediment Chemical Criteria. There were no detections of total petroleum hydrocarbons, VOCs, pesticides, or PCBs in these

[2] The SMS Freshwater Sediment Chemical Criteria include both sediment cleanup objectives and cleanup screening levels. The freshwater sediment cleanup objectives are identified as the levels or concentrations where there are no adverse effects to the benthic community. The cleanup screening levels are identified as the levels or concentrations where there are minor adverse effects to the benthic community.

samples. A few SVOCs were detected in the samples; however, the concentrations were less than the SMS Freshwater Sediment Chemical Criteria.

An additional sediment characterization event was conducted in 2002 to assess the quality of the lake sediments adjacent to an outfall near the eastern shoreline of the North Basin (Thurston County Environmental Health Division 2003). Three sediment samples were analyzed for SVOCs and lead, with all detected concentrations less than the SMS Freshwater Sediment Chemical Criteria.

The most recent sediment characterization in Capitol Lake occurred in 2007 as part of a larger study to determine the nature and extent of dioxins/furans in Budd Inlet sediments (SAIC 2008). Two sediment samples from Capitol Lake were analyzed for dioxins/furans and conventional parameters, and one of these samples, from the North Basin, was also analyzed for metals, SVOCs, and PCBs. Dioxin/furan toxicity equivalency quotients (TEQs) calculated for the two samples were 2.0 picograms per gram (pg/g) and 3.9 pg/g. While there is no SMS Freshwater Sediment Chemical Criterion for dioxin/furan TEQ, for comparative purposes, the dioxin/furan TEQs detected in the Capitol Lake sediment samples were less than the DMMP open-water Disposal Site Management Objective of 4 pg/g TEQ. The dioxin/furan DMMP Site Management Objective is based on the sediment background concentrations as collected from the U.S. Environmental Protection Agency (USEPA) Ocean Survey Vessel Bold Survey for Puget Sound (USEPA 2008, DMMP 2009). There were no exceedances of the SMS Freshwater Sediment Chemical Criteria for the metals, SVOCs, and PCB detected in the North Basin sediment sample.

4.2.1.1 Percival Cove Previous Sediment Characterization

The removal of sediment from Percival Cove is not included within the scope of the conceptual maintenance dredging, but the summary of the previous sediment characterization event is provided below for completeness.

Starting in 1971, WDFW used Percival Cove for Chinook and Steelhead salmon rearing under a lease agreement with the former GA, the project area owner. Fish production activities were most intensive during the first 15 years (1971 through 1986). WDFW has not operated fish rearing net-pens in Percival Cove since 2007 and plans no further activities there. As was specified in a condition of the 2002 lease renewal with the GA, WDFW was required to conduct a sediment study to determine what impact, if any, its operations have had upon conditions within Percival Cove (GeoEngineers 2009).

In March of 2009, on behalf of WDFW, GeoEngineers collected a total of 10 surface sediment samples and 2 sediment cores from within Percival Cove. Of the samples, 10 were analyzed for conventionals (total organic carbon, total solids, and grain size), PCBs, and phthalates. Eight of the samples were analyzed for porewater ammonia, total sulfides, and Microtox bioassay testing. Three phthalates, bis(2-ethylhexyl) phthalate (DEHP), butyl benzyl phthalate, and diethyl phthalate, were detected in nine of the surface sediment samples at relatively low concentrations. PCBs and porewater sulfides were not detected in samples obtained from the study area. Analyses of sediment samples obtained from Percival Cove did not identify chemical or biological effects resulting from former net-pen operations.

4.2.2 Potential Dredged Material Characterization

To adequately characterize the conceptual dredged material, it is recommended that sediment sampling and chemical analysis be performed on sediment from both of the conceptual maintenance dredge areas. The suggested sampling scheme and chemical analyses to be performed in these two dredge areas is included below, along with the associated estimated costs to perform this work.

Based on the footprints of the two conceptual maintenance dredge areas, it is recommended that four sediment cores be collected in the North Basin dredge area and that three sediment cores be collected in the Middle Basin dredge area. Sediment cores in the North Basin maintenance dredge area would be collected to a depth of approximately 3 feet below the mudline, which is generally the conceptual dredging depth in this area. From each of the North Basin cores, one sediment sample would be collected from the core sample interval for chemical analysis. The Middle Basin sediment cores would be collected to depths of approximately 7 feet, the estimated dredging depth in this maintenance dredge area. Sediment samples would be collected from two depth intervals in each Middle Basin core for chemical analysis. For the purpose of estimating the costs to collect these sediment cores, it was assumed that the cores would be collected using the MudMole™ sediment coring system and that core collection and processing would occur over a 2-day period.

Sediment samples collected from the conceptual dredge areas would be analyzed to determine sediment suitability for beneficial reuse and upland disposal. To make this determination, it is recommended that each sediment sample be chemically analyzed for total metals, SVOCs, PCBs, pesticides, butyltins, petroleum hydrocarbons, dioxins/furans, and TCLP metals. This list of analytes would allow comparison of the sediment data to the SMS Freshwater Sediment Chemical Criteria, for determining the acceptability of in-water reuse within Capitol Lake, as well as the Washington State Model Toxics Control Act (MTCA) cleanup levels to determine if the sediments are suitable for upland reuse. The TCLP metals testing acts to simulate leaching through a landfill and identify metal concentrations that would be unsuitable for uplands landfill disposal. Additionally, conventional analyses should be performed on the sediment samples, including grain size, total solids, total organic carbon, ammonia, and total sulfides.

The total estimated cost to perform this sediment characterization work is approximately $129,000. A general breakdown of the total estimated cost is provided below in Table 2.

Table 2. Dredge Material Characterization Estimated Costs

Task	Estimated Cost
Field Sampling Preparation	$18,000
Sediment Sample Collection/Processing	$55,000
Sediment Sample Analysis	$34,000
Data Validation and Reporting	$16,000
Agency Coordination and Characterization Permitting	$3,000
Task Management	$3,000
Total Estimated Cost:	**$129,000**

4.3 NEW ZEALAND MUDSNAIL SURVEY AND CONTROL STUDY

A New Zealand mudsnail survey was performed in Capitol Lake in June 2011. During this survey the New Zealand mudsnail was observed throughout the North and Middle Basins, but was not observed in the South Basin or at one survey location in Percival Cove. An updated survey of the coverage of the New Zealand mudsnail in Capitol Lake and its connected freshwaters is needed as part of the conceptual maintenance dredging planning and permitting processes to determine if the New Zealand mudsnail is present in the areas where in-lake placement of the dredged material may occur for beneficial reuse of the sediment or in potential areas of the lake that may be used for staging, transport, or handling of the dredged material.

A consideration of the dredge and beneficial use design would be to avoid dredging sediment from an area of high invasive species infestation and then using that sediment for habitat enhancement in an area of low infestation. Depending on the timing of the project relative to DES's existing annual Eurasian watermilfoil control efforts and surveys, it is possible that a Eurasian watermilfoil survey may also be needed at additional cost.

Placement of any dredged material containing the New Zealand mudsnail into areas of the lake or Percival Cove that do not currently contain this snail should be avoided. Updated New Zealand mudsnail survey information is needed whether the dredged material is placed in Capitol Lake or Percival Cove or taken off-site for upland beneficial reuse or disposal in a landfill. Additionally, this updated survey will also be conducted upstream of the lake in connected freshwaters (Deschutes River and Percival Creek) to help provide information for the future planning of New Zealand mudsnail control or eradication efforts within Capitol Lake, separate from the conceptual dredge scope.

If it is determined that the conceptual dredge material will be transported off-site, then additional information regarding the effectiveness of control methods for the treatment of the New Zealand mudsnail in the dredged material to be transported off-site will be needed. This control study would only evaluate the effectiveness on the dredged material to be transported off-site and would not include an evaluation of the potential effectiveness of methods for New Zealand mudsnail control or eradication in Capitol Lake or its connected waters.

Included below is a brief summary of the proposed scopes and costs associated with performing an updated New Zealand mudsnail survey and a New Zealand mudsnail control study.

If it is assumed that the dredged material will likely be beneficially reused on-site, in Capitol Lake or Percival Cove, then only an updated New Zealand mudsnail survey would be necessary. For this updated survey, it is recommended that surface sediment grab samples be collected at approximately 12 locations within or in the vicinity of Capitol Lake to determine the presence or absence of the New Zealand mudsnail. A brief report would be prepared to present the survey data. The total estimated cost to perform only the updated survey is approximately $16,000. A general breakdown of the total estimated cost is provided in Table 3.

Table 3. New Zealand Mudsnail Survey Estimated Costs

Task	Estimated Cost
Sampling and Analysis Plan	$3,000
Sediment Sample Collection	$4,000
Mudsnail Sample Analysis	$1,000
Data Analysis and Reporting	$6,000
Task Management and Meetings	$2,000
Total Estimated Cost:	**$16,000**

If it is determined that the dredged material will be taken off-site, then both an updated survey and a control study would be needed based on input from WDFW and WSDA. The field work for both of these efforts would be performed concurrently. It is recommended that surface sediment grab samples be collected at approximately 12 locations within or in the vicinity of Capitol Lake to determine the presence or absence of the New Zealand mudsnail. Additionally, it is recommended that surface sediment grab samples be collected at three sampling locations within each of the two conceptual dredging areas, collecting five replicates at each of these sampling locations, to determine the presence or absence of the New Zealand mudsnail and to collect the sediment needed to perform the control study laboratory testing. For the control study laboratory testing, it is assumed that each of the five replicates collected from the six proposed dredge area sediment sampling locations would undergo six different types of treatment. Immediately following the treatment testing, each of the replicates would be enumerated for the number of live and dead snails. Based on the outcome of the control study, a report would be prepared that provided the recommended methods to control the New Zealand mudsnails in the dredged materials. This report would also include the results of the updated New Zealand mudsnail survey and would form the basis of the transportation control approach required as part of the WDFW and WSDA invasive species transport letters of approval processes.

The total estimated cost to perform both the updated survey and control study is approximately $50,000. A general breakdown of the total estimated cost is provided below in Table 4.

Table 4. New Zealand Mudsnail Survey and Control Study Estimated Costs

Task	Estimated Cost
Sampling and Analysis Plan	$12,000
Sediment Sample Collection	$5,000
Laboratory Treatment Testing	$7,000
Mudsnail Sample Analysis	$6,000
Data Analysis and Reporting	$15,000
Task Management and Meetings	$5,000
Total Estimated Cost:	**$50,000**

4.4 DREDGED MATERIAL ELUTRIATE TESTING

The dredged material elutriate test is a laboratory analysis that is performed to assess the potential impacts of dredging on water quality. This test is typically requested by regulatory agencies in dredging locations where metals are the primary chemicals of concern and the location is influenced by river flow and/or tides. While Capitol Lake sediments are not subject to these transport influences, the dredged material elutriate test may still be required as part of the conceptual maintenance dredging effort; however, the need for this testing will be largely based on the sediment characterization results and the implementation of physical best management practices during the dredging to control suspended sediment and to minimize any adverse effects to water quality during dredging.

Chemical analyses performed on the elutriate collected from the laboratory tests are compared to the Washington State surface water quality standards for the protection of aquatic life (WAC 173-201A) in order to determine if the dredged material will likely have an adverse affect on the lake's water quality.

This section briefly summarizes the previous dredged material elutriate testing performed on Capitol Lake sediment and then provides a proposed scope with an estimated level of effort and cost necessary to perform dredged material elutriate tests within the conceptual maintenance dredging areas, if determined to be needed.

4.4.1 Previous Dredged Material Elutriate Testing

In 2000, elutriate testing was performed on Capitol Lake sediments collected within the Middle Basin sediment trap area. The elutriate testing was performed on sediment samples including both the surface and subsurface (0 to 2.5 feet deep) collected from four sampling locations within the sediment trap area combined with surface water collected at one of the sampling stations. The elutriate from each sample was analyzed for selected metals (arsenic, cadmium, copper, lead, mercury, and zinc) to determine if surface water quality standards would be exceeded for these metals during dredging operations (Herrera 2000). The lake surface water was also analyzed to determine background concentrations of these metals. Test results showed that acute toxicity surface water quality standards for these metals were not exceeded in any of the elutriate samples. Mercury, detected in three of the four samples, was the only analyte to exceed the chronic toxicity surface water quality standards. Detected mercury concentrations in the elutriate samples ranged from 0.2 to 24 micrograms per liter (µg/L), whereas the chronic water quality criteria for mercury is 0.012 µg/L.

4.4.2 Potential Dredged Material Elutriate Testing

If an assessment of the potential impacts of the conceptual Capitol Lake maintenance dredging on the lake's water quality is required, then it is recommended that dredged material elutriate testing be performed on sediment collected from both of the conceptual maintenance dredge areas. Dredged material elutriate testing can be performed on sediment collected as part of the dredged material sediment characterization effort, described above in Section 4.2. Lake surface water within both of these dredged areas would also need to be collected during this sediment sampling field work for use in the elutriate testing and to analyze for background surface water concentrations within the lake.

It is estimated that one sediment sample from each of the conceptual maintenance dredge areas would be collected for elutriate testing as well as one surface water sample from each of these areas.

Based on the previous elutriate and sediment chemical testing results, it is recommended that the elutriate collected from each of the sediment samples tested, along with the surface water samples, be chemically analyzed for metals. Additionally, an analysis of water hardness should be performed on the elutriate sample and surface water samples, as the surface water quality standards for metals are hardness dependent.

Costs for the collection and processing of the sediment samples and water samples necessary to perform the dredged material elutriate testing are already generally included in the dredged material sediment characterization field effort (refer to Section 4.2), assuming that these sampling efforts are performed concurrently. The total estimated cost to perform the dredged material elutriate testing and analysis, plus data validation and reporting is approximately $5,000. A general breakdown of this estimated cost is provided below in Table 5.

Table 5. Dredge Material Elutriate Testing Estimated Costs

Task	Estimated Cost
Sample Analysis	$1,000
Data Validation and Reporting	$4,000
Total Estimated Cost:	**$5,000**

5.0 Permitting Analysis and Road Map Supporting Information

This section provides a description of the permits that would be required for a dredge event to occur within Capitol Lake, as well as the supporting information and assumptions for acquisition of these permits and coordination with the agencies, which form the basis for the Project Permitting Road Map presentation. Additionally, a cost estimate is provided for project permitting based on the conceptual dredge scope of work.

The Project Permitting Road Map is provided in Appendix A. The Project Permitting Road Map is a large, illustrative diagram that provides a road map of the necessary permitting processes, allowing for the visual identification of key milestones such as permit submittals and supporting design or analysis needs, permit sequence and relationships, critical paths, anticipated agency coordination and approval steps, estimated time durations, and points in the process for public and stakeholder comment periods and input.

The Project Permitting Road Map presents the permitting processes and steps that are anticipated to be "likely" based on the conceptual dredge scope of work as presented on the Project Permitting Road Map and described in detail in Section 1.0. The Project Permitting Road Map also presents additional or alternative permitting processes that are anticipated to be "unlikely" given the conceptual scope of work, and, if triggered, would result in impacts to the overall permitting schedule critical paths.

The Draft Project Permitting Road Map was vetted with federal, state, and local agency representatives at a permit planning meeting and additional individual meetings prior to the finalization of the Project Permitting Road Map for inclusion into this report. The Project Permitting Road Map was also presented to any interested stakeholders at a meeting held on April 17, 2013.

Under the likely permitting process steps, and as shown on the Project Permitting Road Map, the Project Planning and Design phase includes the completion of key data gaps, as discussed in Section 4.0, the completion of 60 percent design, the preparation of the Joint Aquatic Resource Permits Application (JARPA) and other permit applications, and pre-application submittal meetings with the agencies, cities, and Tribe(s). The Project Planning and Design phase is anticipated to have a 9- to 12-month duration. The permit application submittal, agency review, and permit issuance phase is anticipated to have an 18- to 24-month duration. This duration does not include potential appeal periods. These durations are assumed based on permitting process for dredging projects with a similar scope of work to that of the conceptual scope of work.

The following permits and approvals are expected to be required based on the dredge scope and are presented on the Project Permitting Road Map:

<u>Environmental Review</u>

- NEPA; U.S. Army Corps of Engineers (USACE)
- State Environmental Policy Act (SEPA); DES

Federal, State, and Local Permits and Approvals

- CWA Section 404 Rivers and Harbors Act (RHA) Section 10 Individual Permit; USACE
- National Historic Preservation Act (NHPA) Section 106 Compliance; USACE and Department of Archaeology and Historic Preservation (DAHP)
- Endangered Species Act (ESA) Section 7 Consultation; U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS)
- CWA Section 401 Water Quality Certification; Ecology
- Coastal Zone Management Act (CZMA) Consistency; Ecology
- Hydraulic Project Approval; WDFW
- Design Review and DES Capitol Lake lease agreement coordination; Washington Department of Natural Resources (WDNR)
- Shoreline Development Permits; City of Olympia and City of Tumwater
- Shoreline Conditional Use Permit; City of Olympia
- NPDES Construction Stormwater General Permit; Ecology

Potential Other Local Permits and Approvals:

- Aquatic Invasive Species Transport Letters of Approval; WDFW and WSDA
- Noise variances; City of Olympia and City of Tumwater
- Railroad coordination for equipment launching

Following the completion of approximately 60 percent project design, pre-application submittal meetings will be coordinated with the federal, state, and local permitting agencies. Pre-application submittal meetings allow the project proponent, DES, to clearly describe the project, the anticipated timeline, the expected impacts and any proposed mitigation, and measures to avoid and mitigate environmental impacts. These meetings also allow the permitting agencies to ask questions and express expectations and concerns prior to application submittal. This will help to streamline the permit application package submittal and review process and can minimize potential agency confusion or misunderstanding.

As shown on the Project Permitting Road Map, the JARPA is an application form that consolidates up to 14 permit application forms for federal, state, and local permits. JARPA is used to apply for a WDFW Hydraulic Project Approval (HPA) and also for Water Quality Certifications or Modifications from Ecology, Aquatic Resource Use Authorizations from WDNR, USACE permits, and Shoreline Management Act Permits from participating local city or county agencies.

5.1 NATOINAL ENVIRONMENTAL POLICY ACT

Process: For projects receiving federal funding or that require federal permits, compliance with NEPA is required. NEPA review is undertaken to analyze and provide public review of a project's effects on the built and natural environment before decisions are made and before

actions are taken. Under the NEPA umbrella, the provisions of statutes relating to historic preservation (Section 106), the ESA, and other federal compliance statutes are reviewed.

An Environmental Assessment (EA) is prepared to assist in making a determination as to whether the effects of a project are significant when those effects are uncertain. After an EA is prepared and the impacts of the project are found to be insignificant, the USACE would issue a Finding of No Significant Impact (FONSI). If the impacts of a project are determined to be significant, an EIS is required. An EIS often evaluates several alternatives. Projects requiring an EIS (far less than 1 percent of USACE projects) average about 3 years to process. Once the EIS and public process are complete, the lead federal agency will issue a Record of Decision (ROD) on the selected alternative.

Project Assumptions: It is assumed that the federal nexus for a dredge event in Capitol Lake would be the issuance of a USACE permit. Therefore, the USACE would be the federal lead responsible for NEPA and other federal compliance. Based on discussions with USACE, the conceptual dredge scope of work, and experience with similar dredge projects, it is assumed that the USACE would likely prepare an EA and that a resulting FONSI would be issued.

Public Involvement: Following the submittal of the JARPA and the USACE permit completeness review and determination on the permit type, the USACE issues a Public Notice to individuals, local governments, resource agencies, and interested groups, with an associated public comment period, typically 30 days in length. The USACE evaluates public comments and the possible effects of the project. Based on the extent of comments received, the permit application may be revised and resubmitted prior to the USACE preparation of the EA.

Fees: NEPA review is completed concurrently with the USACE permit process with a permit fee of $100 for NEPA review, federal compliance, and permitting.

Predecessors and Timeline: NEPA EAs and FONSIs issuance can take between 12 and 18 months.

5.2 STATE ENVIRONMENTAL POLICY ACT

Process: SEPA is a State of Washington law that is intended to ensure that project proponents consider the effects of the project on the natural and human environment prior to taking action. SEPA compliance is required for any state or local agency actions. The SEPA process includes the development of a SEPA checklist to evaluate possible effects of a project on the environment. After reviewing the checklist and mitigation measures, the SEPA lead agency determines whether the project would still have likely significant adverse environmental impacts. The SEPA lead agency then issues a threshold determination: either a determination of non-significance (DNS) or a determination of significance (DS). If a DS were issued, the SEPA lead agency would start the scoping process for an EIS.

Project Assumptions: DES has been delegated lead SEPA authority by statute to assess project effects and make a threshold determination. Based on the conceptual scope of work and the assumption that the dredged material would be beneficially reused within the lake for habitat enhancement, and consistent with typical maintenance dredging projects, it is assumed that the likely SEPA process would include a DNS. However, if a larger basin-wide dredge project is proposed, preparation of an EIS may be required. The EIS would include an evaluation of alternatives to the proposed project and measures that would eliminate or reduce the likely environmental impacts of the project. The EIS process associated with a larger project scope is

presented on the Project Permitting Road Map, but as unlikely process steps based on the current conceptual scope of work.

Although the NEPA and SEPA compliance processes can occur in parallel, it is assumed that the SEPA compliance and review process would be completed prior to the submittal of the JARPA and initiation of the other federal, state, and local permitting processes.

Public Involvement: If a DNS is issued for a dredge event in Capitol Lake, the SEPA checklist and threshold determination would be published in a paper of record and sent to interested parties, agencies, and Tribes for a 14-day public comment period.

Fee: There is no fee associated with DES completing a threshold determination for SEPA compliance.

Predecessors and Timelines: SEPA is generally one of the first steps toward the evaluation and permitting of a project. A SEPA checklist and threshold determination would require the design to be advanced to a level where impacts can be assessed, mitigation can be proposed, and any necessary scientific studies specific to the proposed mitigation can be completed.

5.3 CLEAN WATER ACTION SECTION 404/RIVERS AND HARBORS ACT SECTION 10 PERMIT

Process: Section 404 of the CWA requires approval prior to discharging dredged or fill material into the waters of the United States. Section 10 of the RHA is the statutory authority for the USACE to issue permits for work in, over, or under a navigable waterway.

The process is initiated when DES submits the JARPA package along with supporting documentation including the Biological Assessment (BA), Cultural Resources Assessment, and 404(b)(1) analysis. DES can attend a pre-application meeting to discuss the project and the USACE process, and answer preliminary questions the USACE may have on the project proposal.

Project Assumptions: A dredge event in Capitol Lake will require the USACE authorization of the project activities via a standard Individual Permit. The JARPA should contain a strong purpose and need for the project. Additionally, the JARPA and 404(b)(1) alternatives analysis will consider project alternatives including on- and off-site alternatives to the proposed fill. The application will also provide anticipated environmental effects and a discussion of methods to avoid, minimize, and mitigate for environmental impacts.

Public Involvement: A Standard Individual Permit will have a 30-day public notice to the USACE mailing list of interested individuals, groups, local governments, and resource agencies.

Predecessors and Timelines: While the USACE has a goal of processing Individual Permits in 120 days, actual processing time for Individual Permits may take 9 to 24 months. The time frame is dependent on the complexity of the impacts on aquatic resources, endangered species, archaeological or Tribal concerns, and agency staff workload. A predecessor of the 404 permit being issued is Ecology's determination or issuance of the 401 Water Quality Certification (WQC), CZMA consistency, the USACE's completed EA, and conclusion of the ESA and Section 106 processes.

Fee: The cost for the Section 404 permit is based on the scope and type of project, but the cost for a standard individual permit is $100.

5.4 NATIONAL HISTORIC PRESERVATION ACT SECTION 106 COMPLIANCE

Process: Section 106 of the NHPA requires federal agencies to assess the potential impacts a project may have on cultural and historic resources. Issuance of a USACE permit is considered a federal undertaking, triggering the Section 106 process. The process includes identifying historic and cultural resources, determining the effect of the project on those resources, and determining measures to avoid, minimize, and mitigate any identified impacts if necessary.

Project Assumptions: It is assumed that the USACE would act as the lead federal agency responsible for coordination with DAHP, interested parties, and Tribes. DES would manage preparation of a Cultural Resources Assessment, which would be submitted to the USACE for review and to initiate Section 106 consultation.

The dredge project conceptual scope of work would dredge sediment that has been recently deposited from the Deschutes River watershed and would not impact any historically significant structures. Based on agency discussions of this conceptual scope of work, it is assumed likely that a Determination of No Effects on historic properties would be made.

Public Involvement: Public involvement is provided as part of the USACE project application, and through USACE consultation with interested parties and Tribes.

Fees: There is no fee for the Section 106 Review process.

Predecessors and Timeline: The Section 106 process is required to be completed prior to the NEPA and Individual Permit process and the USACE's preparation of a project EA. The process is completed within the USACE Individual Permit issuance timeline.

5.5 ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

Process: Section 7(a)(2) of the ESA requires that each federal agency ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Before a federal action is taken, the lead federal agency must review the potential project effects on threatened and endangered species. Two federal agencies are responsible for evaluating the effect of a project on listed species: the NMFS, also referred to as NOAA Fisheries, and the USFWS. These agencies are collectively known as the Services.

The project proponent prepares a BA describing the effects of the action on listed species. After initial review and coordination with the applicant, the USACE sends the BA to the Services with a request to initiate consultation. If a project may have an effect on listed species but the effect is found to be discountable, insignificant, or completely beneficial, then the lead federal agency may determine the project "may affect, but is not likely to adversely affect" listed species. In this case, informal consultation with the Services is required. The Services will respond with a Letter of Concurrence that the project will not result in take or harm to a listed species. If a project is found to adversely affect a listed species, then the Services will issue a Biological Opinion granting the applicant Incidental Take Authorization for the work. This is referred to as formal consultation.

Project Assumptions: A dredge project within Capitol Lake would require federal permits, such as USACE permits. It is assumed that the USACE would be the lead federal agency for consultation with the Services. Based on the dredge project conceptual scope of work and measures to avoid and minimize effects on any listed species that could be present, it is assumed that compliance with Section 7 would be conducted under an Informal Consultation process with the Services.

Public Involvement: There is no formal public involvement during the Section 7 consultation process. However, public involvement is provided as part of the USACE project application.

Fee: There is no fee for the Section 7 consultation process and affects determination.

Predecessors and Timeline: A Letter of Concurrence is generally issued within 90 days or less once it is determined that the information in the BA is complete. If a project is found to adversely affect a listed species, then the Services will issue a Biological Opinion that can take 6 to 8 months to complete, although the statutory timeframe for completion of ESA consultation is 135 days. The Section 7 process is required to be completed prior to the NEPA and Section 404 permit process and the USACE's preparation of a project EA.

5.6 CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION

Process: Projects that include the discharge of dredge or fill material into water, or excavation in water, or require a Section 404 permit from the USACE, such as a dredge event in Capitol Lake, require a Section 401 WQC from Ecology. The Section 401 WQC will cover the construction and operation of the dredge project, and will include permit conditions that ensure project compliance with water quality standards and other requirements of state law.

Project Assumptions: As part of the 401 WQC process, Ecology requires the review and approval of applicable environmental compliance plans. A dredge project in Capitol Lake would require the following environmental compliance plans be submitted to Ecology:

- Water Quality Monitoring and Protection Plan
- Spill Prevention, Control, and Countermeasures Plan (SPCCP)
- Mitigation and Restoration Plan

Public Involvement: Opportunities for public involvement are provided by the Public Notice and public comment period for both Section 401 WQC and CZMA compliance that is initiated by the USACE as part of the NEPA process.

Fee: There is no fee for the Ecology Section 401 WQC.

Predecessors and Timelines: The SEPA review process must be completed prior to the 401 WQC decision by Ecology. Additionally, the local City Shoreline permitting processes must be complete from the City and Hearing Examiner and sent to Ecology for review and approval prior to the Ecology 401 WQC decision. Ecology has up to 1 year from the USACE Public Notice to certify, deny, or waive the project.

5.7 COASTAL ZONE MANAGEMENT ACT CONSISTENCY

Process: In Washington State the federal CZMA is implemented by Ecology's Shorelands and Environmental Assistance Program. Thurston County is included in the State's coastal zone, and therefore CZMA compliance is applicable to the conceptual scope of work and dredge project.

Projects that require federal approvals, certifications, or permits, such as a dredge event within Capitol Lake, trigger a federal consistency review. Therefore, the project applicant (DES) reviews the proposed project for compliance with six state laws: the Shoreline Management Act (including local government shoreline master programs), SEPA, the CWA, the Clean Air Act, the Energy Facility Site Evaluation Council, and the Ocean Resource Management Act. DES then prepares a "federal consistency certification." The certification describes the project and whether or not the project impacts coastal resources.

Project Assumptions: Because a dredge project would also require USACE permits, DES would submit the CZMA federal consistency certification and application to Ecology. Following the issuances of the local Shoreline Development Permits, and the Ecology 401 WQC, Ecology will make the CZMA consistency determination and forward the approval on to the USACE prior to completion of the NEPA permitting process and the USACE's issuance of the Section 404 permit.

Public Involvement: Opportunities for public involvement are provided as part of the City of Olympia and City of Tumwater shoreline permitting processes, and a Public Notice and public comment period for both CZMA compliance and the Section 401 WQC are initiated by the USACE as part of the NEPA process.

Fee: There is no fee for the Ecology CZMA consistency determination.

Predecessors and Timeline: Ecology has 6 months from the receipt of the certification and application to approve or deny it. If no determination is made within 6 months, the project is approved and presumed consistent.

5.8 HYDRAULIC PROJECT APPROVAL

Process: A HPA must be obtained from WDFW for projects that use, obstruct, divert, or change the natural flow or bed of state waters, which includes dredging. The conditions of a HPA, such as allowable in-water work windows and construction methodologies and best management practices, are designed to protect fish and shellfish, and their habitat. The HPA process is initiated by submitting the JARPA to WDFW. HPA applications are assigned to a WDFW Area Habitat Biologist who is responsible for issuing the HPA.

Project Assumptions: A HPA from WDFW would be required for a dredge event to occur within Capitol Lake. The allowable in-water work window, in which the dredge event could occur, will be determined with the Area Habitat Biologist based on the times when spawning and incubating salmonids and other protected or sensitive species are least likely to be within Capitol Lake, or least likely to be adversely impacted by the proposed project actions.

Public Involvement: There is no public review period for receipt of an HPA.

Fee: The fee for most HPA applications is $150.

Predecessors and Timeline: The SEPA review process must be completed prior to WDFW review of the project JARPA and issuance of the HPA. Per the State Hydraulic Code, 45 days are allowed for WDFW to act on the project proposal and application.

5.9 DEPARTMENT OF NATURAL RESOURCES LEASE AGREEMENT COORDINATION

DES currently has an aquatic land lease agreement with WDNR for portions of Capitol Lake. As part of the lease agreement DES will coordinate with WDNR regarding the proposed dredge project. WDNR will review the JARPA and proposed project, and provide feedback on the potential stewardship and design and disposal or reuse elements. Following DES and WDNR coordination and agreement on the proposed project components, WDNR will develop an instrument and any necessary changes or amendments to the lease agreement that identifies roles and responsibilities for the project.

5.10 SHORELINE DEVELOPMENT AND CONDITIONAL USE PERMITS

Process: Local jurisdiction land use and zoning designations specify categories of allowed and conditional uses that may be authorized within the limits of their jurisdiction. If a use is not expressly allowed in a specific zone, conditional uses may be authorized if the proposal is compatible with other land uses in the area.

The Shoreline Management Act is a state regulation administered by local jurisdictions. Uses in the shoreline are governed by the underlying zoning as well as the shoreline designation. Like zoning, local jurisdictions specify allowed, conditional, and prohibited uses of the shoreline. Conditional uses may be permitted if the proposed use is consistent with the shoreline policy goals of that zone and is compatible with other shoreline uses. Once the local jurisdiction has made a determination, Shoreline Conditional Use Permits are sent to Ecology, which has 30 days to concur with (or reverse) the decision.

Project Assumptions: The conceptual dredge scope includes project areas located in both the City of Olympia and the City of Tumwater. The dredge and habitat enhancement activities, as well as the construction equipment staging and launch areas, will require city shoreline development permits, and potentially shoreline conditional use approvals. As part of the City of Olympia's permitting process, a Landscape Permit and associated Landscape Plan may also be needed for the use of Marathon Park, or other areas for construction staging and launching, and park restoration following project completion. An Important Habitats and Species Management Plan will also be needed as part of the shoreline management permitting process. Both of the city permit processes initiate with the submittal of the JARPA.

Public Involvement: Both the City of Olympia's and the City of Tumwater's processes include opportunities for public involvement and comment related to the dredge, habitat enhancement, and construction staging and launching activities under the city's permitting processes. As part of the City of Tumwater permitting process, a pre-application conference or meeting would be held with the Development Review Committee (DRC), and is an open meeting to the public. Following public comment and the determinations by both cities that the permit applications are complete, the city processes join together for a joint hearing. After a favorable examination and city response, the project permit application is sent to Ecology for approval.

Fee: The applicable fees for the City Shoreline permitting processes vary based on the project scope of work, including construction staging and launching areas that would be determined during design.

Predecessors and Timeline: Local permits cannot be issued until the SEPA process is complete.

5.11 CLEAN WATER ACT SECTION 402 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM CONSTRUCTION STORMWATER GENERAL PERMIT

Process: The Construction Stormwater General Permit (CSWGP) is required by federal law under the CWA and NPDES. The permit requires construction site operators to install and maintain erosion and sediment control measures to prevent stormwater from washing soil, nutrients, chemicals, and other harmful pollutants into receiving water bodies. The CSWGP is required if clearing, grading, or excavating activities disturb an area of 1 acre or more and will discharge stormwater to surface waters of the state or a conveyance system that drains to surface waters of the state.

The permitting process is initiated when the applicant submits an application for coverage on or before the first newspaper publication date of the Public Notice. The application includes certification that the Public Notice and SEPA requirements have been met. As a result of the Public Notice, if public comments are received by Ecology, they will be addressed prior to permit coverage issuance. Additionally, a Stormwater Pollution Prevention Plan (SWPPP) must be prepared prior to starting construction, but does not need to be included with the permit application. Additionally, a stormwater management plan and/or Temporary Erosion Sediment Control (TESC) Plan would be submitted to Ecology. The permit application must be submitted to Ecology at least 60 days prior to the start of any proposed stormwater discharges.

Project Assumptions: Lake dredging will require the construction of a temporary construction staging, equipment storage, and launch area within Marathon Park and possibly Tumwater Historical Park. Therefore, it is likely that a CSWGP from Ecology will be required.

Public Involvement: There is a 30-day public notice for the CSWGP.

Fee: The NDPES CSWGP fees range from approximately $500 to $2,000 depending on the number of disturbed acres.

Predecessors and Timelines: The SEPA review process must be completed before NPDES CSWGP coverage can be issued.

5.12 AQUATIC INVASIVE SPECIES TRANSPORT APPROVALS AND REQUIREMENTS

If dredged sediments are transported off-site for off-site upland reuse or disposal, the agency approvals, coordination processes, and transportation control efforts will be required as described in the following section.

5.12.1 Aquatic Invasive Animal Species

Based on input from WDFW, the transportation and disposal of materials containing live aquatic invasive animal species, including the New Zealand mudsnail, require an invasive species

approval from WDFW specifying conditions to prevent the release of the specific aquatic invasive species present in the materials (Pleus 2012b). There is no cost for this approval.

A New Zealand mudsnail control plan will need to be developed to meet the requirements of an aquatic invasive species transport approval issued by WDFW. It is possible that this will include post-dredge sediment treatment to kill the New Zealand mudsnails in the dredged materials before they can be transported to an upland disposal site or an upland beneficial reuse location. This control plan would likely require treatment of the dredged materials using Bayluscide® (niclosamide) or another chemical to obtain 100 percent mortality, as determined by sampling and enumeration of live New Zealand mudsnails in the treated materials. This could potentially be conducted during the addition of the drying or stabilizing agent to the dredged sediment.

It is also possible that treatment of the dredged material for the New Zealand mudsnail may not be required in the approval if complete containment of the dredged material during transport can be adequately designed to prevent potential escape to and infestation of other waters by the New Zealand mudsnail and other aquatic invasive species. Material containment would need to be more rigorous for New Zealand mudsnails compared to the other aquatic invasive species due to snail mobility.

Regardless of whether the dredged materials are treated or not prior to transport, monitoring of waters along the transportation route may be required before and after material transportation to verify that those waters have not become infested with New Zealand mudsnails or other aquatic invasive species present in Capitol Lake. The control plan may also need to include engineering controls and monitoring of the upland beneficial reuse or disposal site to ensure no New Zealand mudsnails survive or disperse from the site.

5.12.2 Aquatic Invasive Plant Species

Purple loosestrife is currently prohibited for transportation or distribution in Washington State because it is a Class B noxious weed on the quarantine list in accordance with noxious weed regulations (WAC 16-750; NWCB 2013). Historically, the WSDA issued noxious weed transport permits, but has more recently determined that the regulation does not authorize issuance of such permits (Jones 2008). It is possible that WSDA may decide to issue a transport permit or incorporate requirements to address purple loosestrife in another approval or permit for maintenance dredging of Capitol Lake.

If the transport of purple loosestrife is permitted, then a noxious weed control plan for the transport and upland disposal of dredged materials containing live purple loosestrife seeds would likely need to be developed. Requirements for the control and monitoring of purple loosestrife during and following transportation that may be included in the control plan include the following (Entranco 2000):

- A dredged material dewatering plan and transportation route.
- Covering of dredged materials in trucks or railcars. Proper covering may allow exclusion of inspection requirements for waterbodies along the transportation route (see below).
- Inspection of each stream crossing and roadside ditch containing wetland vegetation along the transportation route for the presence of purple loosestrife, including one inspection at the time of transport and following transport.

- Covering of dredged material at an upland beneficial reuse or disposal site with a soil layer and no disturbance of the disposed materials for a specified period, as well as post-placement monitoring of the upland beneficial reuse or disposal site for a specified duration to ensure no plant growth at the site.

Based on agency discussions, it is assumed that other non-native and invasive aquatic plant species would not require management or monitoring as permit conditions.

5.13 OTHER POTENTIAL LOCAL PERMITS AND APPROVALS

5.13.1 Noise Variances

The City of Olympia and City of Tumwater noise regulations under the respective municipal codes provide permitted sound level thresholds and associated applicable hours. In general, industrial construction work within the permitted noise levels is allowed during day-time hours Monday through Saturday. However, based on the allowable in-water work window in which the dredge project could be conducted, as determined by WDFW and identified in the HPA, it may be necessary to request noise variances from the cities to work during night or weekend hours in order to complete the project within the work window.

To minimize negative noise-associated affects to residences adjacent to the lake and/or behavior of nocturnal animals (e.g., the Little Brown Bat [*Myotis lucifugus*]), the preference would be to conduct the dredge work during day-time hours. However, the dredge production rate, and therefore the project duration, will be based on the volume of material to be dredged, the construction of the habitat enhancement area or transloading for off-site disposal, the dredge equipment selected for the project, and the additional best management practices implemented as environmental controls. In general, the sediment dredging does not generate higher levels of construction-related noise, such as those that would be generated by pile driving.

If noise variances are determined to be necessary to complete the dredge project within an allowable in-water work window, estimates of the anticipated noise levels to be generated and noise variance applications would be submitted to the City of Olympia and the City of Tumwater. Following review and coordination with the cities, and possible public input, it is assumed noise variances could be granted.

5.13.2 Railroad Coordination and Approval

Regardless of the dredge methodology used for sediment dredging within Capitol Lake, if dredging is to be conducted within the North or Middle Basin it is very likely that Marathon Park will need to be used as a construction staging and equipment launch area. If dredging is conducted within the Middle Basin, as presented in the conceptual dredge project scope, coordination with the railroad regarding the timing of equipment launching and additional safety controls for the launching of equipment from Marathon Park will be required. The dredge equipment would be launched into the Middle Basin by a crane that would need to extend over the railroad. The construction equipment offset distance required by the railroad as well as the timing of the crane use and launching would require railroad approval. These coordination and approval processes can vary substantially project by project; therefore, an explicit coordination duration is not identified in the Project Permitting Road Map, but it is assumed that it would

occur in parallel to the other permitting processes and may be one of the last approvals to be secured.

5.14 PERMITTING COST ESTIMATE

A cost estimate was prepared for acquisition of the necessary agency permits and approvals, and the associated agency coordination based on the conceptual scope of work as described in Section 1.0. The cost estimate is based on the likely permitting process steps for each of the permit or approval processes as identified on the Project Permitting Road Map and described above. The cost includes development of a detailed permitting schedule; preparation of permitting applications and supporting documentation, such as the BA, the 404 (b)1 Alternative Analysis, Impact Analysis and mitigation determination, Habitat Enhancement Plan, Cultural Resources Report, and the City of Olympia's required Important Habitats and Species Management Plan; preparation and attendance at multiple pre-application submittal federal, state, and local agency meetings; agency coordination during the permit application review process; revisions to permit applications and materials based on public and agency comments; and public involvement support around public meetings and/or notices.

The permitting cost estimate does not include any design costs or data gap completion costs. The estimated costs to fill identified data gaps are discussed in Section 4.0.

The estimated range of permitting costs that is presented in the total estimated costs in Table 6 is based on a contingency of approximately 15 percent to account for the variability at this conceptual project level.

Table 6. Permitting Estimated Costs

Task	Estimated Cost
Permit Planning and Application Material Preparation[1]	$85,000–125,000
Permit Application Submittals, Agency Coordination, and Public Involvement Support	$40,000–75,000
Total Estimated Cost Range:	**$125,000–200,000**

Note:
1 This task includes coordination with the design team and providing environmental support to the design team.

In addition to the costs associated with the permitting processes as identified above, there are environmental and permit-related efforts associated with design team coordination, environmental compliance plan preparation, and environmental commitments or conditions following permit issuance. On some projects these efforts and associated costs are incurred by the design team and/or contractor subconsultants. Therefore, these costs are presented separately from the permitting cost estimate. The design plan review cost presented in Table 7 assumes environmental reviews of the design plans are conducted for each of the major design phases: 30, 60, 90, and 100 percent design completion. Environmental compliance plans that are assumed to be necessary for permit issuance and submittal to Ecology include the 401 WQC Water Quality Monitoring and Protection Plan and SPCCP, and the NPDES CSWQP SWPPP and TESC Plans.

Costs are also presented for environmental commitment list support. This cost assumes that following issuance of all necessary permits and approvals, all environmental commitments and

permit conditions are compiled by permit and/or activity to assist DES with the preparation of the contractor bid package and contractor requirements, and to assist DES in tracking contractor environmental compliance during construction. This activity also acts to ensure that the conductor(s) understands all of the necessary permit conditions.

Table 7. Design and Permit Environmental Commitment Support Estimated Costs

Task	Estimated Cost
Environmental Design Plan Review	$11,000–13,000
Environmental Compliance Plan Preparation	$33,000–37,000
Environmental Commitment List Support	$8,000–10,000
Total Estimated Cost Range:	**$52,000–60,000**

6.0 Funding Strategies and Partnership Opportunities

This section summarizes possible funding strategies and potential partnership opportunities that may be relevant and applicable based on the conceptual beneficial reuse of dredged sediments to rehabilitate an area of aquatic habitat within Capitol Lake. There are several promising federal and state grants for habitat restoration projects that may be applicable to the conceptual Capitol Lake habitat enhancement work. However, the applicability of these grant or funding programs is highly dependent upon the design and ecological benefits of the dredged material habitat enhancement. These grants are briefly described below, including details on the timing and potential monitory amounts for each grant based on current program information.

6.1 U.S. FISH AND WILDLIFE SERVICE COASTAL PROGRAM

The USFWS's Coastal Program is a voluntary, incentive-based program that provides technical and financial assistance to coastal communities and landowners to restore and protect fish and wildlife habitat on public and private lands. The focus of the Coastal Program is priority coastal habitats, including coral reefs, shorelines, marshes, wetlands, uplands, and rivers and streams. Each Coastal Program project is developed strategically in a one-on-one partnership between a local USFSW biologist and the grant recipient. The USFWS biological expertise and field presence help ensure that the program's projects are cost-effective and targeted to benefit important fish and wildlife resources. For this program, the USFSW partners with other federal programs, state agencies, Tribal and local governments, non-governmental organizations, businesses, industries, land trust and non-profit groups, and private landowners.

The Coastal Program process is initiated by calling or sending a letter to the local USFSW Coastal Program coordinator. For additional information on the USFWS Coastal Program, and contact information, refer to the following website: http://www.fws.gov/coastal/. The next closing date for applications is September 28, 2013, the end of the Federal fiscal year. USFSW contributions on previous restoration projects through the Coastal Program have ranged between approximately $16,000 and $30,000 (http://www.fws.gov/coastal/docs/Coastal_Program_Accomplishments_2010.pdf).

6.2 U.S. FISH AND WILDLIFE SERVICE SPORT FISH RESTORATION PROGRAM

The USFWS's Sport Fish Restoration Program provides grants for projects that restore, conserve, manage, and enhance sport fish, as well as projects that enhance the public's understanding of water resources and aquatic life. Grant funding for this program is available to state governments.

Applicants can apply for grants by contacting their regional Wildlife and Sport Fish Restoration Program (WSFRP) Office. Washington State is part of the Pacific Region – Region 1. Sport Fish Restoration Program grants are distributed on an annual basis. The next deadline for grant applications is August 31, 2013. Grant recipients can receive federal funding for up to 75 percent of their project costs. For 2013, Washington State received over $7 million in grant money for Sport Fish Restoration work. For additional information on this program, refer to the following website: http://wsfrprograms.fws.gov/Subpages/GrantPrograms/SFR/SFR.htm.

6.3 PACIFIC COASTAL SALMON RECOVERY FUND

The Pacific Coastal Salmon Recovery Fund (PCSRF) was established to protect, restore, and conserve Pacific salmon and steelhead populations and their habitats. NOAA Fisheries manages the PCSRF program and provides competitive funding to states and Tribes to implement habitat restoration and recovery projects in the Pacific Coast region. This fund was designed to supplement existing state and Tribal programs to promote the development of federal-state-Tribal-local partnerships in salmon recovery and conservation.

An announcement regarding the PCSRF grants is published early each calendar year, outlining requirements and timing for the funding process. In 2013, up to $65 million was available for PCSRF projects. There are no restrictions on minimum funding requests for projects, but the maximum amount that can be requested by an applicant is $25 million. State applicants are required to provide a minimum of 33 percent in matching resources for their project. For additional details on the PCSRF, refer to the following website: http://www.nwr.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/pacific_coastal_salmon_recovery_fund.html.

6.4 AQUATIC LANDS ENHANCEMENT ACCOUNT

The Washington State Recreation and Conservation Office's Aquatic Lands Enhancement Account (ALEA) grants are used for the acquisition, improvement, or protection of aquatic lands for public purposes. One of this program's primary goals is re-establishing the natural, self-sustaining ecological functions of the waterfront. Examples of typical ALEA projects include restoring shoreline for salmon habitat, removing bulkheads to restore natural beach functions, restoring an estuary, replacing a waterfront boardwalk, and developing a waterfront park. Eligible applicants include local and state agencies and Tribes.

The Recreation and Conservation Office's Funding Board accepts applications for ALEA projects every 2 years, in even-numbered years. The next closing date for applications is May 1, 2014. For restoration or improvement projects the grant is capped at $500,000. Grant recipients must provide a minimum 50 percent in matching resources for their project. For additional details on the ALEA grant, refer to the following website: http://www.rco.wa.gov/grants/alea.shtml.

6.5 SALMON RECOVERY FUNDING GOARD SALMON RECOVERY GRANTS

The Washington State Salmon Recovery Funding Board awards salmon recovery grants to projects that protect existing, high quality habitats for salmon and that restore degraded habitat to increase overall habitat health and biological productivity. The projects may include the actual habitat used by salmon and the land and water that support ecosystem function and processes important to salmon. The grants are available to local and state agencies, special purpose districts, Tribes, private landowners, non-profit organizations, and regional fisheries enhancement groups.

Grant proposals are submitted to a local lead entity that convenes technical and citizen committees to evaluate and prioritize the projects. The local lead entity for the Capitol Lake project would be the Thurston Conservation District. The proposal must demonstrate how the proposed project addresses the goals and actions defined in the lead entity strategies or regional recovery plans. The lead entity submits a ranked list of projects from its area to the

Salmon Recovery Funding Board for consideration. Grant applications are accepted annually. Application materials are submitted as early in the year as possible to fit the lead entity's schedule for review. There is no cap on grant funding. Grant recipients must provide 15 percent in matching resources for their project. For additional information on the Washington State Salmon Recovery Grants, refer to the following website: http://www.rco.wa.gov/grants/salmon.shtml.

6.6 WASHINGTON WILDLIFE RECREATION PROGRAM

The Washington Wildlife Recreation Program (WWRP) provides funding for a broad range of land protection and outdoor recreation, including park acquisition and development, habitat conservation, farmland preservation, and construction of outdoor recreation facilities. The grants are evaluated in 11 categories, including critical habitat, farmland preservation, local parks, natural areas, riparian protection, state lands development and renovation, state lands restoration and enhancement, state parks, trails, urban wildlife habitat, and water access. Habitat creation and enhancement is included under critical habitat, riparian protection, state lands restoration and enhancement, and urban wildlife habitat projects. Eligible grant applicants include local and state agencies, Tribes, special purpose districts, salmon recovery lead entities, and non-profit organizations.

The Washington State Recreation and Conservation Funding Board accepts applications for WWRP grants every 2 years, in even-numbered years. The next closing date for applications is May 1, 2014. WWRP grant caps vary depending on the type of project being proposed. There is no grant cap for critical habitat, riparian protection, and urban wildlife habitat projects. For state lands restoration and enhancement projects, there is a grant cap of $1 million for a single site. State agencies are not required to provide matching resources for their projects. For additional details on the WWRP, refer to the following website: http://www.rco.wa.gov/grants/wwrp.shtml#.

6.7 ESTUARY AND SALMON RESTORATION PROGRAM

The Estuary and Salmon Restoration Program (ESRP) provides grant funding and technical assistance for shoreline restoration and protection projects in Puget Sound. This program is managed by WDFW in partnership with the Washington State Recreation and Conservation Office. The ESRP is focused on strategic ecosystem restoration and advances projects that best meet the objectives of regional recovery efforts, including the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) and the Puget Sound Action Agenda. Based on these objectives, selected projects typically focus on restoring physical ecological processes. In 2011 the restoration of the Deschutes Estuary was put forth as a possible project for consideration under the PSNERP program in a USACE study of potential estuary and nearshore restoration projects in Puget Sound. However, the Deschutes Estuary restoration project was ultimately removed from consideration later on in the selection process. The smaller conceptual dredge project may not be applicable for federal funding under this particular program, but this program is included here as a potential source of funding.

New ESRP project proposals are solicited through a Request for Proposals and evaluated by a multi-disciplinary technical review team composed of members from multiple agencies and organizations throughout Puget Sound. New project proposals are typically requested in the late summer or early fall of even years. The next opportunity for submitting an ESRP project proposal would be late summer or early fall of 2014. ESRP does not have a cap on the amount of funds that can be requested. Grant recipients must provide 33 percent in matching resources

for their project and some of this match must be non-state funds. Previous grant awards have ranged from $50,000 to $2.6 million. For additional information on the ESRP, refer to the following website: http://www.pugetsoundnearshore.org/esrp/index.html.

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Capitol Lake Permitting Analysis

Permitting Recommendations Report

Figures

FINAL

Fifth Avenue Dam

Heritage Park

North Basin

Marathon Park

Capitol Building

Capitol Lake

Percival Creek

Deschutes Parkway

Percival Cove

Middle Basin

CITY OF OLYMPIA
CITY OF TUMWATER

Project Location

WASHINGTON

Interstate 5

South Basin

Tumwater Historical Park

Deschutes River

N

0 300 600 1,200 Feet

1 inch = 600 feet

Legend

Approximate Extent of Conceptual Maintenance Dredging Areas

Notes:
- Orthoimage provided by USDA NAIP, dated 2011.
- Vertical datum is NAVD 88.

Abbreviations:
- NAIP = National Agriculture Imagery Program
- NAVD 88 = North American Vertical Datum of 1988
- USDA = U.S. Department of Agriculture

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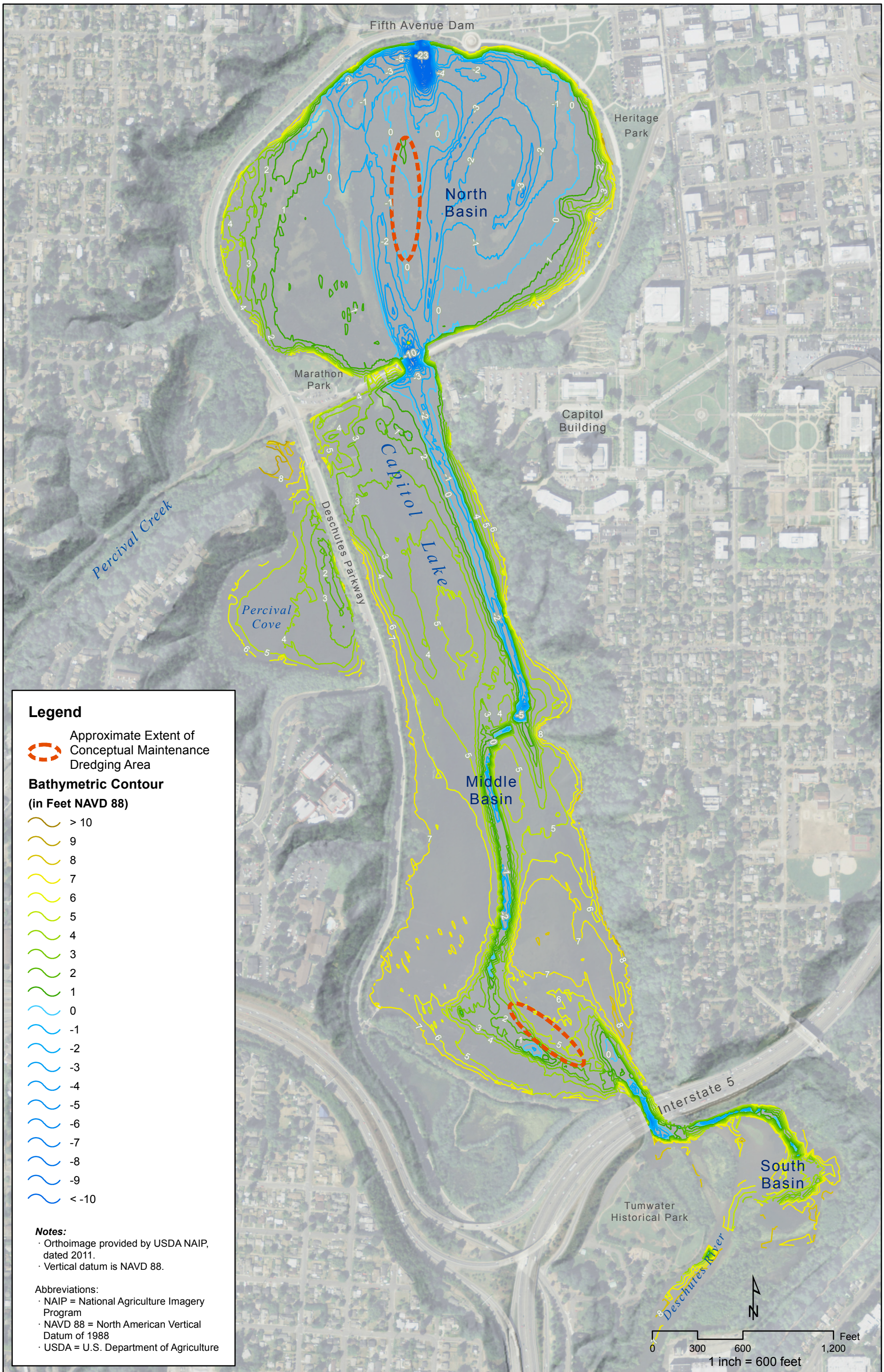
Capitol Lake Permitting Analysis
Olympia and Tumwater, Washington

Figure 1.1
Capitol Lake Conceptual Maintenance Dredging Areas

I:\GIS\Projects\DES_Capitol_Lake\GIS\MXD\Figure 1.1 (Capitol Lake Conceptual Maintenance Dredging Areas).mxd
5/13/2013



Legend

Approximate Extent of Conceptual Maintenance Dredging Area

Bathymetric Contour
(in Feet NAVD 88)

- > 10
- 9
- 8
- 7
- 6
- 5
- 4
- 3
- 2
- 1
- 0
- -1
- -2
- -3
- -4
- -5
- -6
- -7
- -8
- -9
- < -10

Notes:

- Orthoimage provided by USDA NAIP, dated 2011.
- Vertical datum is NAVD 88.

Abbreviations:

- NAIP = National Agriculture Imagery Program
- NAVD 88 = North American Vertical Datum of 1988
- USDA = U.S. Department of Agriculture

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Olympia and Tumwater, Washington

Figure 4.1
Capitol Lake 2013 Bathymetry

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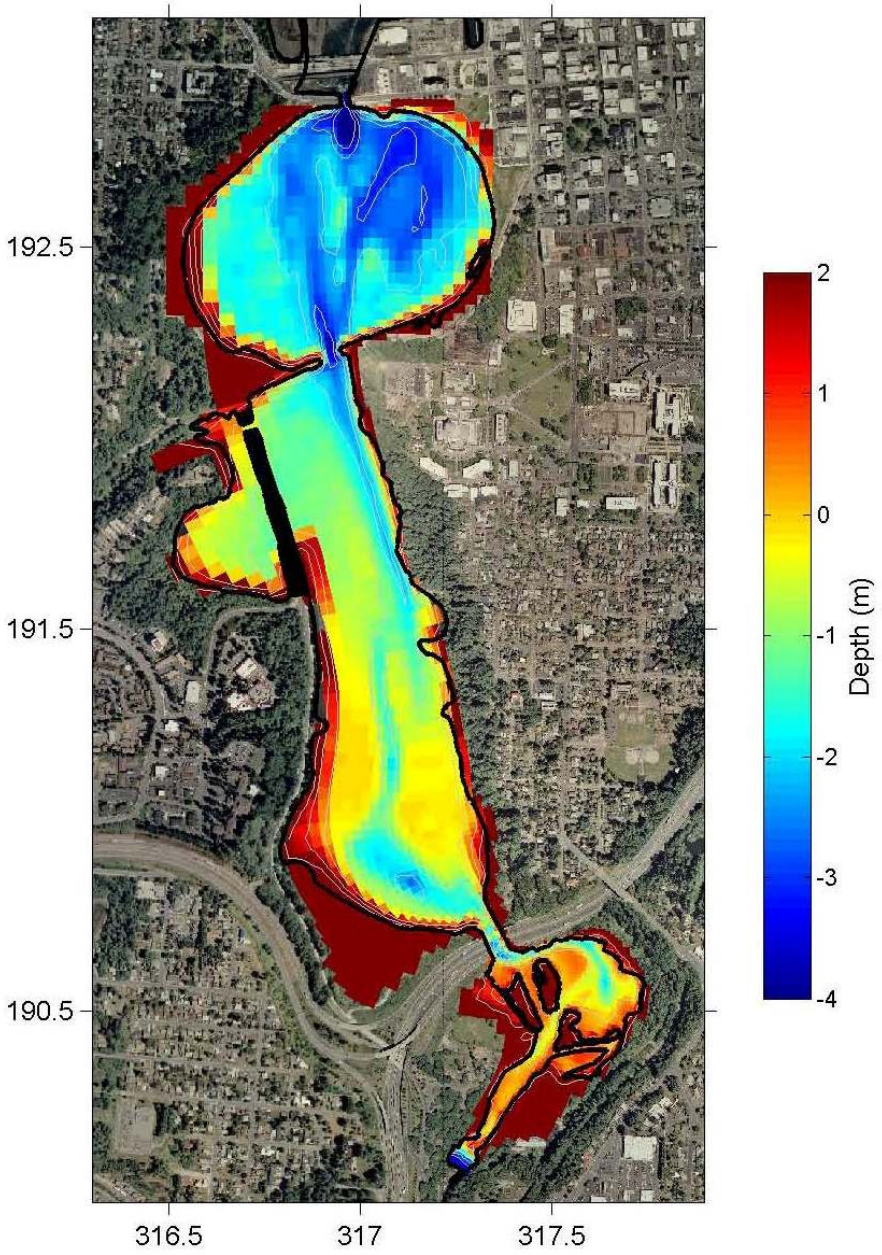
5/13/2013



Bathymetry of Capitol Lake in 2004/2005. The axes are in Washington State Plane South (km) and bathymetry contours are in 1 m increments from -4 to 2 m MSL. Blues are deeper water and reds are shallow. A bathymetric survey of the North and Middle Basins was performed by USGS in 2004. Supplemental bathymetric data were collected from Percival Cove and the South Basin by the Washington State Department of Ecology in the spring of 2005.

Note: Image courtesy of U.S. Geological Survey (USGS).

Capitol Lake Permitting Analysis

Permitting Recommendations Report

Appendix A
Project Permitting Road Map
(provided on CD)

FINAL

Planning and Preliminary Design Phase

(9 to 12 months)

Application Submittal, Agency Review, and Permit Issuance

(18 to 24 months—Likely Process Steps)

Final Design

Preparation of *Cultural Resources Report*

Preparation of *Important Habitats and Species Management Plan*

Preparation of JARPA

- Application
- 404(b)(1) Alternative Analysis
- Biological Assessment (BA) Impact Analysis
- Habitat Enhancement Plan

Preparation of SEPA Checklist

Key Data Gaps Filled

- Bathymetric Survey
- New Zealand Mudsnail (Invasive Species) Survey
- Sediment Chemical Characterization

Design

At least 60% Design of Dredge and Beneficial Reuse or Disposal

Pre-application Submittal Agencies, Cities, and Tribe Meetings

NHPA Section 106—Cultural and Historical Resources

◆ –Submittal of Cultural Resources Report to USACE (as Lead Federal Agency) for DAHP Concurrence

USACE Coordination with DAHP, Interested Parties, and Tribes for Determination of Effects

Determination of No Effects

DAHP Concurrence/ Notice of Effect

◆ Receive MOA if Needed

ESA Section 7 Consultation

◆ –Submit BA to USACE for USFWS/ NOAA Review

Section 7 Consultation with Services for Effects Determination

Not Likely to Adversely Affect Determination

◆ Letter of Concurrence

Likely to Adversely Affect Determination

◆ Receive Biological Services Opinion(s) Section 7 Consultation Complete

Section 106 and ESA Consultation Process Completion; Predecessor to 404 Permit Process and USACE EA

JARPA

–CWA Section 404/10 (USACE)
–CWA 401 WQC (Ecology)
–Hydraulic Project Approval (HPA; WDFW)
–WDNR Design Coordination per Lease Agreement
–Coastal Zone Management Act (Ecology)
–Shoreline Substantial Development (City of Olympia and City of Tumwater)
–Critical Areas Ordinance
–Shoreline Conditional Use Permit (City of Olympia)

◆ –Submit JARPA (with supporting documentation [e.g., BA, 404(b)(1) Alt Analysis], Habitat Enhancement Plan)

Note: Submitted and Processed in Joint Application

Shoreline; Critical Areas

City of Olympia Shoreline Conditional Use Permit Shoreline Development Permit

◆ Submit JARPA and Critical Areas Required *Important Habitats and Species Management Plan*

Public Notification of Action

Possible Public Meeting

City Application Completeness Determination

Joint Hearing Examiner Application Review

Examiner/ City Favorable Response

Project Sent to Ecology for Review (45 days)

◆ Ecology Project Approval

City of Tumwater Shoreline Development Permit

Pre-application Conference (Required Open Meeting)

◆ Submit JARPA

Tumwater Development Review Committee (DRC) Application Review (28 days)

Application Deemed Complete

WDFW Application Completeness Review

Potential Updates to Permit Package to WDFW

◆ WDFW Issues HPA Permit

WDNR Application and Design Review

WDNR Coordination and Feedback on Potential Stewardship and Design/Disposal Elements per Lease Agreement

◆ WDNR and DES Lease Agreement or Equivalent Instrument Finalization

Note: Assumed that the project scope is not a change in land use and therefore, a WDNR Aquatic Land Use Authorization is not required, but that per the lease agreement, WDNR approval of the design is required.

CZMA: Ecology Application Completeness Review

401: Ecology Application Completeness Review

Public Notices and Comment Period for 401 WQC/ CZMA (USACE Initiates; 30 days)

Address Comments and, if Needed, Revise Permit Package

◆ Ecology Issues 401 WQC

Ecology Approves Shoreline Permits and 401 WQC Issued

◆ CZMA Consistency Determination; Ecology Issues Approval and Forwards to USACE

NEPA

–DES Proposes Action to USACE as Lead Federal Agency via JARPA Submittal
–USACE Tribal Trust Responsibility

Section 106 | **Section 7**

USACE (as Lead Federal Agency) Initiates Process

Possible Public Comment Period (varies)

No Likely Significant Impacts

◆ USACE Issues Findings of No Significant Impact (FONSI)

USACE Issues Decision After Ecology Issues 401 WQC

◆ USACE Issues Individual 404 Permit NEPA Process Complete

If Needed, Submit Updated Permit Package

USACE Prepares Environmental Assessment (EA) and Makes Determination of Impacts

Likely Significant Impacts

USACE Permit Completeness Review

USACE Issues Public Notice and Public Comment Period (30 days)

Address Comments and Revise Permit Package

USACE Issues Notice of Intent (NOI)

◆ Draft EIS Issued

Public Comment Period (45 days)

USACE Reviews Comments and Final EIS Issued (30 days)

◆ USACE Issues ROD

USACE Issues Decision After Ecology Issues 401 WQC

◆ USACE Issues Individual 404 Permit NEPA Process Compete

SEPA

–DES as Lead State Agency
–Complete an Environmental Checklist

DES Reviews Checklist and Makes Threshold Determination

Public Comment Period

◆ Agency Issues Determination of Non-significance (DNS)

Agency Considers Comments

DNS Retained

Agency Withdraws DNS

◆ Agency Issues Determination of Significance/Scoping Notice for Public Comment and Begins Preparation of an EIS

Agency Issues Draft EIS for Public Comment

Agency Issues Final EIS

◆ SEPA Review Process Complete; Agencies Can Make Permit Decisions

Notice of Action

–Ecology 401 WQC
–City Shoreline Permits
–WDFW HPA
–Invasive Species Permits
–NPDES Permit
–Local Permits

NPDES CSWG Permit

–Permit coverage will be needed if construction staging and/or handling and transportation of dredged sediments requires the disturbance of one or more areas of land and discharges of stormwater to surface waters of the State.
–Prepare NOI Permit application for Permit Coverage

◆ –Submit NOI to Ecology

Public Comment Period (45 days)

◆ Ecology Issues NOI Approval (30 days); NPDES CSWG Permit Coverage

Aquatic Invasive Species Transport Letters of Approval

–WSDA and WDFW approvals will be required for transport of sediment containing invasive species if dredged sediment is not beneficially reused within the lake.

Note: Assumed unlikely due to potential beneficial reuse of sediments within the lake.

◆ Submit Letter to WDFW Describing the Controls for Transporting Live Exotic Animal Species

Coordination with WDFW during the Review of Project Transportation Controls

◆ WDFW Issues Aquatic Invasive Species Approval Letter

◆ Submit Letter/Application to WSDA Describing Transportation Controls

Coordination with WSDA during the Review of Project Transportation Controls

◆ WSDA Issues Aquatic Invasive Species Sediment Transport Approval Letter

Other Local Permits/Approvals: Noise Variances

–Noise variances may be needed based on proposed work schedule.
–Noise regulations under the City of Olympia and City of Tumwater Municipal Codes would be applicable.

Note: Assumed unlikely due to preference of daytime work schedule.

Possible Public Hearing

◆ Submittal of Noise Variance Application to City of Olympia

City Review and Coordination

◆ Noise Variance Issued

Noise Variance Denied; Work within Noise Ordinance Hours

◆ Proposal of Project and Noise Variance Need to City of Tumwater

City Review and Coordination with the Community Development Department

◆ Noise Variance Issued

Noise Variance Denied; Work within Noise Ordinance Hours

Other Local Permits/Approvals: Railroad Coordination

–For dredging within the Middle Basin, coordination with the railroad regarding the timing of equipment launching and additional safety controls for launching of equipment from Marathon Park will be required.

This permit road map is based on the following conceptual project scope of work:

- North Basin main channel accumulated sediment removal (approx. 50,000 CY)
- Middle Basin sediment trap maintenance removal to increase sediment trapping efficiency (approx. 50,000 CY)
- Beneficial reuse of dredged sediment for habitat enhancement along the North or Middle Basins' western shoreline, or Percival Cove

Note: Approximate dredge volumes based on the most recent lake bathymetric survey data (2004).

ID	Task Number	9-12 months	18-24 months
1	Design/Funding		
2	Prepare SEPA Checklist		
3	Prepare JARPA, Biological Assessment, Cultural Resources Report, and Other Permit Information		
4	DES Issues SEPA Determination	★	
5	Submit JARPA/Permit Applications	★	
6	WDFW HPA		
7	WDNR Design Coordination		
8	Ecology 401 WQC		
9	SSDP/Local Permits Issued/Ecology Review		
10	CZMA Consistency Determination (Ecology)		
11	USACE Permit Process (NEPA, ESA, Section 106)		
12	NPDES CSWG Permit		
13	Permitting Complete		★

Notes:
Approximate durations, as shown, are based on statutory timeframes and the assumption that permit applications are determined to be complete following initial submittal.

★ = Milestone

Capitol Lake

Project Permitting Road Map

Legend

◆ Process Milestone

Green Point for Public Input

Critical Path

Likely Process Steps

Unlikely, Contingent Process—if triggered would affect overall timeline and critical path

Note:
Judicial appeals and the administrative appeal processes are not included in the Road Map and, if they occur, would affect the overall timeline and critical path of the permitting process as shown.

Washington State Department of Enterprise Services

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June 2013

Capitol Lake Permitting Analysis

Permitting Recommendations Report

Appendix B
Capitol Lake Photographs Related to Constructability

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Photograph 1. The Interstate 5 bridge, seen here from the Middle Basin, crosses the narrow channel between the Middle and South Basins.

Photograph 2. The Middle Basin is approximately a mile from south to north. The eastern banks are steep to and wooded, with no access to the shoreline. Private residential properties and the State Capital campus line the top of the eastern slope.

Photograph 3. The Deschutes Parkway and a landscaped walking/riding path extend along the full length of the western banks of the lake basins. There are no feasible and practical construction access points along the parkway except at Marathon Park.

Photograph 4. The bridge and pipeways over the mouth of Percival Cove restrict access to the cove to anything larger than a canoe or small boat. In the background the railroad crossing overhead warning lights and the facilities at Marathon Park can be seen. The park and the adjacent railroad right-of-way constitute the only feasible access to the North and Middle Basins.

Photograph 5. The north bank of the North Basin includes the dam and spillway structure that creates the lake. The eastern half of the North Basin is Downtown Olympia's Heritage Park.

Photograph 6. The walking path and ornamental bulkhead around the North Basin from the dam around to downtown Olympia and Heritage Park could provide access to the North Basin from public streets, but the entire area is a well-developed and heavily-used urban park.

Photograph 7. The railroad causeway and bridge, and the parallel footpath and footbridge that leads to Heritage Park, effectively separate the North and Middle Basins (here seen from the north side). No dredge or barge can pass through this barrier.

Photograph 8. This area, just south of Marathon Park, on the railroad right-of-way would allow mobilization into the Middle Basin for a heavy lift crane to launch dredge equipment. If sediments had to be offloaded from the Middle Basin for upland disposal or reuse, they could be craned ashore here, treated as necessary, and loaded from Marathon Park (refer to Section 3.4.5 for Off-site Reuse or Disposal Considerations).

Photograph 9. The access from Deschutes Parkway into the railroad site (adjacent to Marathon Park) for transloading is undeveloped but firm and unobstructed and includes a modest amount of laydown space, which is sufficient to accommodate a heavy lift crane and associated equipment.

Capitol Lake Permitting Analysis

Permitting Recommendations Report

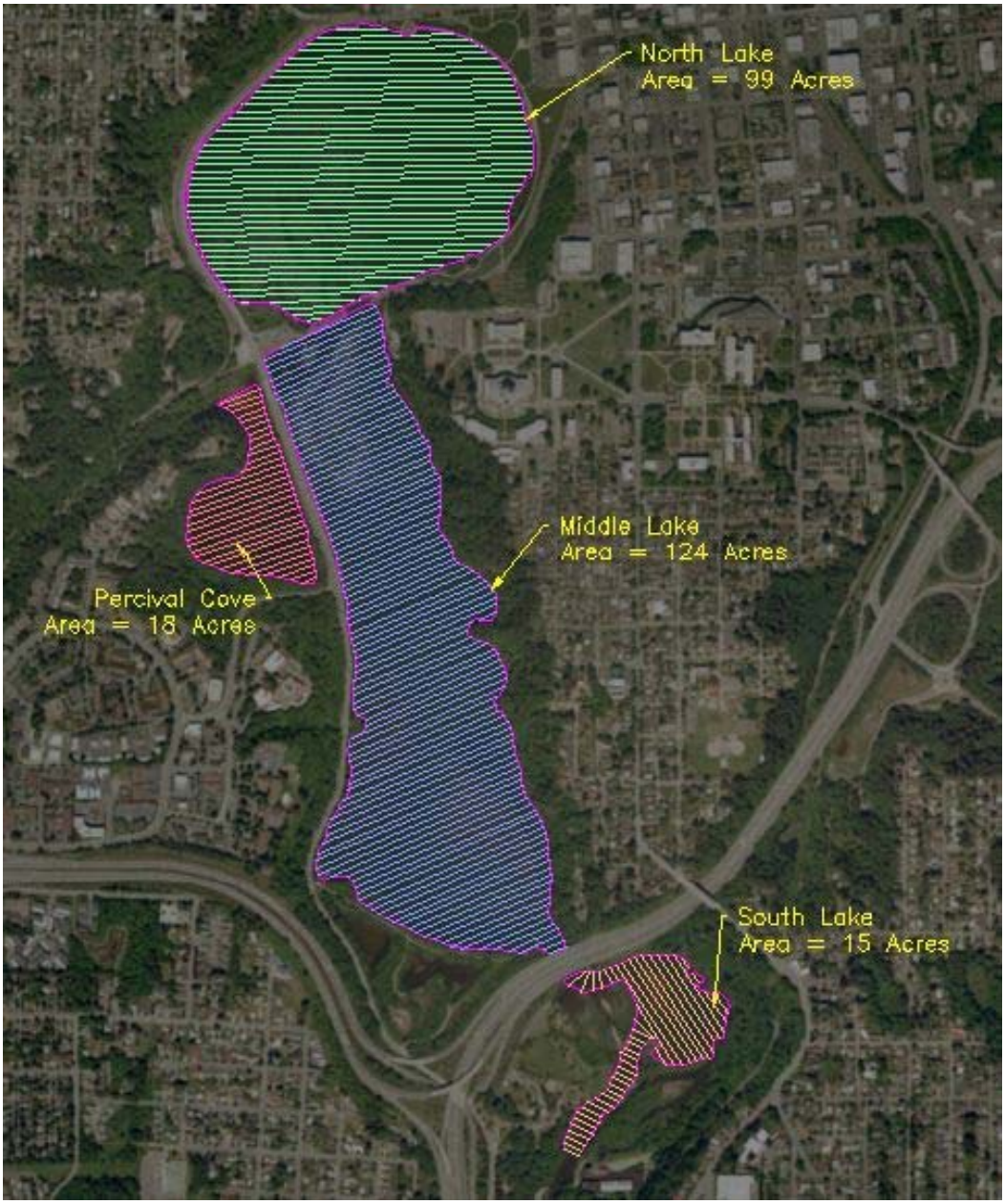
Appendix C
TerraSond Bathymetric Survey Report

FINAL

801 NW 42nd Street, Suite 215
Seattle, WA 98107
p: (206) 420-8340 f: (206) 420-8305

Project Summary

TerraSond, Limited performed a singlebeam hydrographic survey on the Capitol Lakes in Olympia, WA. The field survey took place March 12th – 15th, 2013. The survey was timed for early spring to avoid the majority of vegetation growth. The survey area is shown below.



TERRASOND
PRECISION GEOSPATIAL SOLUTIONS®

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Seattle, WA 98107
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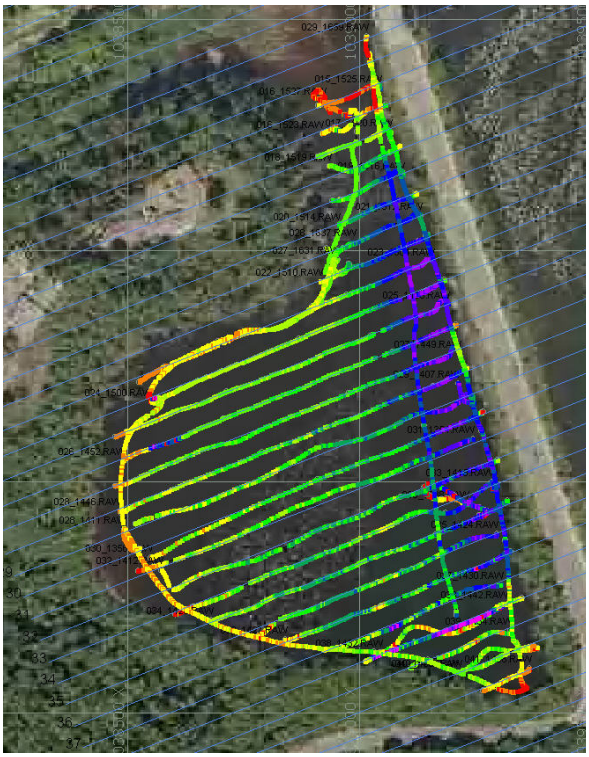
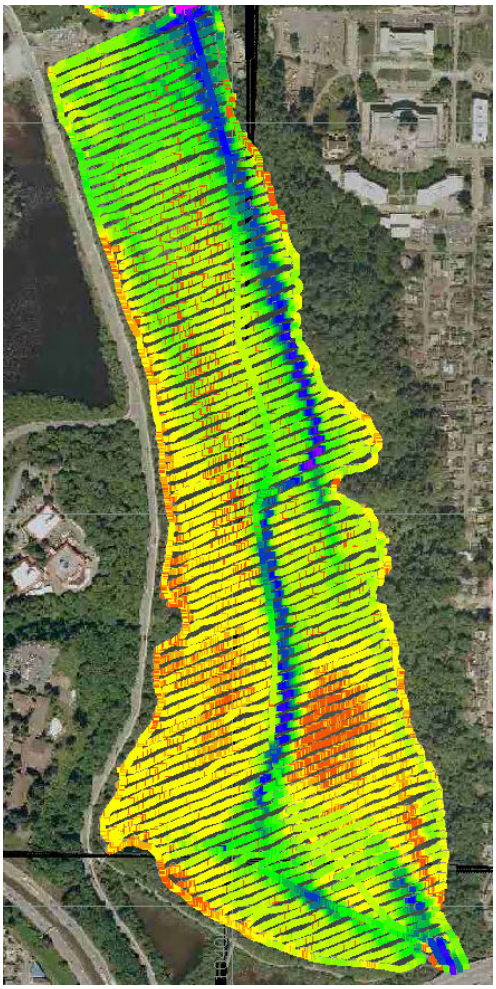
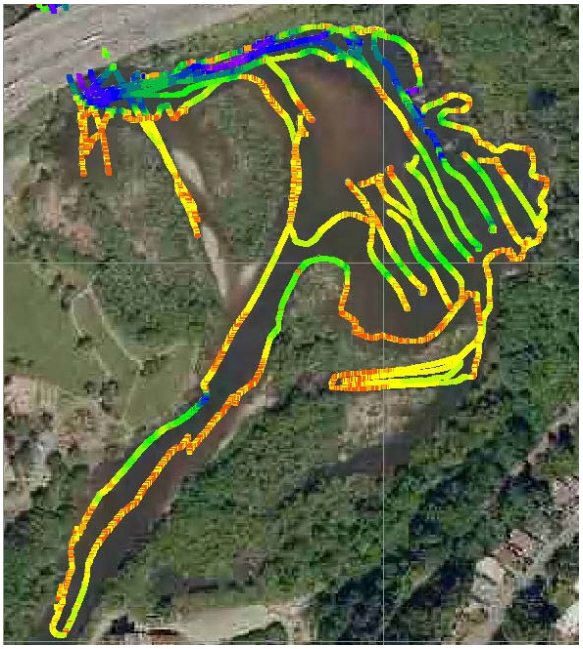
Data coverage for each basin is shown below.



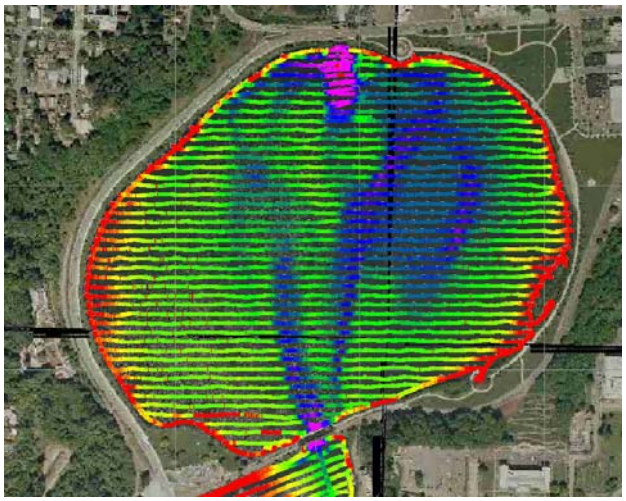
Percival Cove



Middle Capitol Lake



South Capitol Lake & River



North Capitol Lake

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Survey Control

Thurston County project control was used for this project.

GPS base point used for the survey was "Capitol Lake" shown right. RTK GPS checks were made to control point "Capitol Lake-1". Coordinates and checks are shown below in Table 1. Coordinates are NAD83 in Washington State Plane South Zone and US Survey Feet. Elevations are NAVD88.

Table 1 – Control Checks

Station	Northing	Easting	Elevation
Capitol Lake	630067.291	1039075.457	18.12
Capitol Lake-1	628559.689	1039535.355	17.52
Check shot CL-1	Δ -0.007	Δ -0.005	Δ -0.001

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Survey Equipment

Table 2 - Survey Equipment

Component	Model	Description
Singlebeam Echosounder	Odom CVM	Portable, 200khz single beam, 4 degree beamwidth.
RTK Base Station	Trimble R8	Dual frequency, low-latency base GPS receivers.
Acquisition Software	HYPACK 2012	Hydrographic data acquisition and navigation software.
Processing Software	HYPACK 2012	Hydrographic data cleaning and processing software.

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Vessel

Two boats were used to perform the survey. The primary vessel used in the survey was the *R/V It Sea*, TerraSond's 15 foot, jet driven, specially modified SeaDoo survey platform. The transducer is mounted inside the engine compartment on the hull near the rear of the vessel which maintains the smooth bottom thus allowing the *It Sea* to survey extremely shallow water. The GPS antenna is co-located on the tower above the transducer. Real Time Kinematic (RTK) GPS was used for vessel positioning.

Launch access was limited in Percival Cove so a 12 foot John boat was used to collect survey data. The ODOM CVM Echosounder and a laptop running HYPACK 2012 were used. A pole with the transducer and a GPS antenna was mounted to the John boat.

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Pre-Survey Checks

Prior to and during data collection, a series of quality assurance checks were conducted to verify the sounding accuracies. The checks that were conducted included:

1. Control Check (Described in Survey Control Section)
2. Bar Check

Bar Check

A bar check was performed at the beginning of each day to ensure accurate readings and calibration of the echosounder.

Latency Check

A latency check was conducted prior to the survey to resolve the timing latency between the echosounder and the GPS. The latency was found to be 0 seconds for the GPS and was held constant throughout the entire project.

Data Acquisition Procedures

Data acquisition was collected using Hypack 2012. Primary survey lines were run perpendicular to the thread of the old streambed as near as possible. Cross lines were run down through the primary lines at separate timeframes to quality check the survey measurements. Lines were also run around the perimeter of each area.

Percival Cove was surveyed first, followed by South, Middle and North Lakes. Water levels were raised approximately 1 foot to overcome shallow depths near the southern end of the project. The variation in water levels is shown in the table below.

Table 3 – Daily Water Level Observations

Date	Water Level (in feet)
March 12, 2013	8.44
March 13, 2013	8.51
March 14, 2013	9.26
March 15, 2013	9.28

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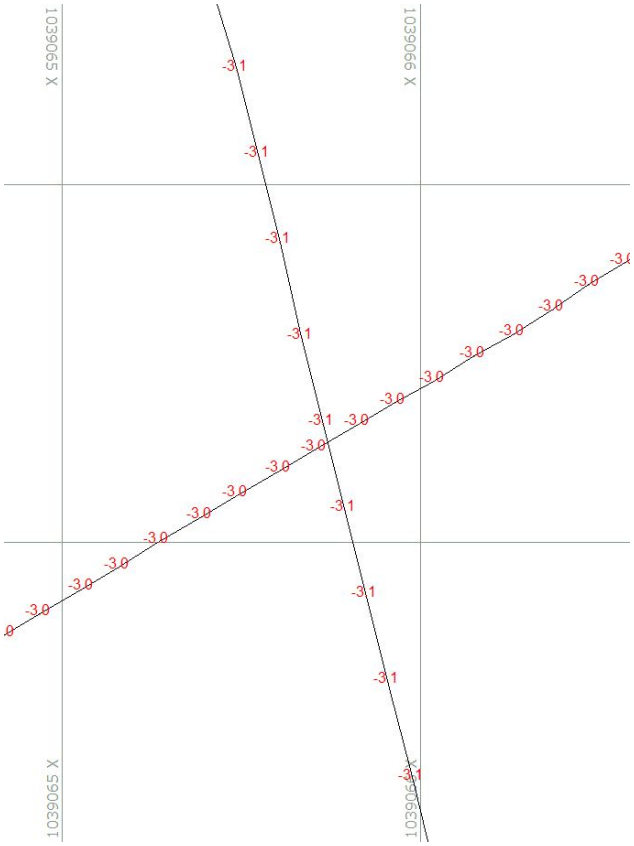
Processing Procedure

Singlebeam sonar data was processed using Hypack 2012, the same software it was collected in. It provides very simple and efficient editing tools as part of processing. The general Hypack workflow is composed of the following steps:

1. Data Import. Raw singlebeam data is imported into the Hypack Singlebeam editor.
2. Sensor editing. Vessel vertical offsets and latency values are input into the vessel configuration.
3. Data editing. Erroneous data was examined and removed or corrected.
4. Sorting. Once all data was reviewed and accepted it was sorted to use soundings at a 1 foot and 10 foot interval to reduce density. The 10 foot sort was used for creating contours in the final drawing.

To ensure the quality of the collected soundings, a visual comparison of depths throughout the survey extents was made between lines that intersected. On average, depths between lines were within a tenth of a foot.



An example of the visual comparison done for intersecting lines to check the quality of depth soundings.

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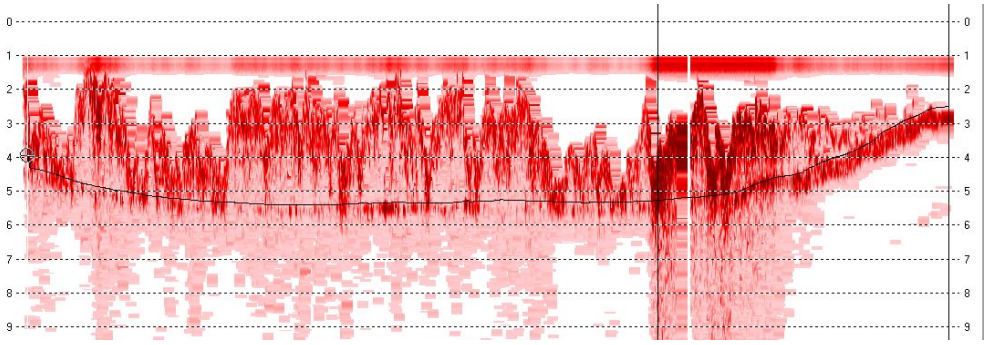
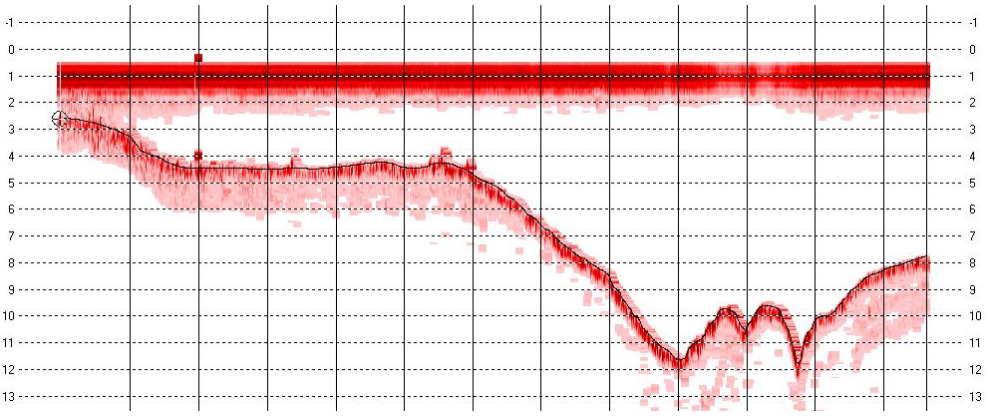
Results

Singlebeam Bathymetry

The singlebeam data quality in areas without vegetation was good. However, in areas of high vegetation, such as Percival Cove, the echosounder had a difficult time tracking the bottom. The image below illustrates a good example of the amount of vegetation encountered. Although the echosounder was tracking the closest return from the tops of the plants, a trace of the actual bottom was apparent below, and the processor was able to manually digitize the bottom and correct the depths.



The vegetation in Percival Cove. The black line is the manually digitized bottom.



A clean trace without vegetation from Middle Capitol Lake. No manual digitizing required.

Decontamination of Equipment

The boat was moored in middle Capitol Lake overnight. Upon completion of the survey of North Capitol Lake the boat was pulled from the water at Marathon Park. It was inspected for invasive species, of which none where found. The keel of the boat was brushed and sprayed with Formula 409 Cleaner.

The boat was then trailered to a carwash and washed down and sprayed again with Formula 409 Cleaner. The boat is currently housed at TerraSond's office in Ballard, if inspection is required.

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Deliverables

The deliverables provided for this project include:

- ASCII X,Y,Z point files of bathymetric points.
  - 1 foot point sort data file
  - 10 foot point sort data file (used for creating contours in ACAD)
  - Point file with RTK GPS ground topo of shallow area in Percival Cove.
- Sun-illuminated imagery of data in GEOTIF format (TIF/TFW).
- ACAD Civil 3d PDF drawing
- Project report summarizing data collection and processing procedures.

ASCII X,Y,Z points

The point files are of the signlebeam data. Each survey line was sorted to reduce the spacing of the point data at both a 1 foot point spacing and a 10 foot point spacing. The format for all point files are Easting, Nothing, Elevation and comma delimited.

File Name	Resolution	Number of Points
CapitolLakes_WASP83S_ENZ_1ft.xyz	1 FT spacing	183,406
CapitolLakes_WASP83S_ENZ_10ft.xyz	10 FT spacing	20,909
PercivalCove_GPS_Topo.xyz	Random	94