



5.0 Short-Term Impacts & Mitigation

This chapter describes short-term (construction) impacts that could result from construction of the action alternatives. The construction duration would range from 4 to 8 years, depending on the alternative. Construction impacts are temporary in nature, even if the extended duration does not seem short term.

This EIS intentionally focuses on the most important elements and conclusions of the analysis and, in particular, the differences among the four project alternatives. See Attachments 5 through 18 for the full impact analysis, including additional tables, figures, and supporting discussion.

Many of the construction elements would occur under all action alternatives. In this way, they are more similar than different. For this reason, this chapter provides a summary of potential construction impacts for each environmental discipline that are common to all action alternatives, and then describes impacts that would be specific to each action alternative. Construction impacts were considered less than significant or significant for each resource based on objective criteria established in the discipline reports.

Under the No Action Alternative, the project would not be constructed; therefore, there are no construction impacts and the No Action Alternative is not evaluated in this chapter.

5.1 HYDRODYNAMICS & SEDIMENT TRANSPORT

Hydrodynamic and sediment transport changes that would result from the action alternatives would occur after construction. The long-term effects are addressed in Section 4.1, Hydrodynamics and Sediment Transport.

5.2 NAVIGATION

Construction of the action alternatives would not impact vessel navigation in West Bay because construction activities do not extend north of the 5th Avenue Dam, where commercial and recreational navigation occurs. There would be no construction impacts to navigation under the Managed Lake, Estuary, or Hybrid Alternatives. The long-term effects of sediment deposition and maintenance dredging are addressed in Section 4.2, Navigation.

5.3 WATER QUALITY

This section describes the potential impacts from project construction on water quality in the study area. The information presented in this section is summarized from the full analysis in the Water Quality Discipline Report (Attachment 7).

Key Findings: Water Quality Construction Impacts

Under any of the action alternatives, construction impacts on water quality would be largely related to the sediment disturbance from hydraulic dredging, habitat construction, and building recreational amenity structures. The sediment disturbance would occur over several successive years during the allowable in-water work window, which is expected to extend from June 1 through August 15 and November 15 through February 15 each year (together these months are considered one, annual work window in this EIS). Temporary water quality impacts from sediment and plant disturbance would include increased suspended sediment and turbidity, decreased dissolved oxygen, and release of nutrients and contaminants from the sediment to the water. With implementation of BMPs, short-term impacts on water quality can be confined within the allowable mixing zone and, therefore, would be less than significant. The No Action Alternative would not result in construction impacts on water quality because the project would not be built.

5.3.1 What methods were used to analyze construction impacts?

Potential construction impacts on water quality were evaluated by considering sediment disturbance typical for similar construction activities and information reported in the Sediment Quality Discipline Report (Attachment 15) on the quality of sediments in the Project Area. Information on sediment quality included concentrations of nutrients and contaminants in sediment layers that would be disturbed, as well as laboratory tests that predict the concentrations of metal contaminants that could occur during dredging (i.e., elutriate tests). Other potential construction water quality impacts,

such as leaks or spills of fuel or lubricants used by construction machinery, are routinely addressed by permit requirements and do not require site-specific evaluation in this EIS.

5.3.2 What are the construction impacts common to all action alternatives?

Project construction would last 4 to 8 years, depending on the alternative, and would entail multiple in-water work windows. This construction period for the Hybrid Alternative is the longest at 8 years and the Managed Lake Alternative is the shortest at 4 years. To meet federal, state, and local laws, the project would include BMPs and other permit conditions to avoid and minimize construction impacts on water quality.

Each action alternative, would include the following primary construction elements that could affect water quality:

- Initial dredging in the North Basin, or North and Middle Basins
- Construction of habitat areas in the Middle Basin, or North and Middle Basins
- Construction of recreational amenities (boardwalks, dock, boat launch, and 5th Avenue Pedestrian Bridge)
- Repair or removal of the 5th Avenue Dam and 5th Avenue Bridge
- Construction staging and access throughout the Capitol Lake Basin (including vegetation clearing, temporary fill, and lowering of water levels)

5.3.2.1 Construction Impacts from Initial Hydraulic Dredging and Habitat Construction

Under all action alternatives, hydraulic dredging would be conducted in the Capitol Lake Basin over several successive years during the allowable in-water work window (i.e., from June 1 through August 15, and from November 15 through February 15). Dredging would occur 12 hours a day, 5 days a week. Hydraulic dredging would suspend the lake bottom sediments, nutrients, and metals present in the sediments, and remove aquatic plants rooted in the sediments. The suspended sediments would result in temporary and localized increased turbidity, decreased dissolved oxygen (due to increased BOD from suspended and dissolved organic matter), and the reintroduction of nutrients and metal contaminants to the water. The

What construction impacts were considered in the water quality analysis?

Construction impacts were analyzed based on their potential to produce temporary water quality effects, mostly from sediment disturbance. The analysis considered information on sediment quality in the Project Area and typical permit conditions that are used to reduce water quality effects within the immediate vicinity of dredging or other construction work.

areal extent and expected duration of initial dredging and habitat construction in the lake basin would vary by alternative (Table 5.3.1). No initial dredging would occur in Budd Inlet as part of any project alternative.

Each action alternative also includes the placement of dredged sediments into containment cells constructed to create habitat areas. The sediment–water slurry would be placed within temporary sheetpiles installed to contain the slurry and allow the sediment to settle. During the process of sediment placement and when the sheetpiles are removed, similar water quality impacts as described for dredging would occur, including sediment disruption and the resultant increase in turbidity and nutrients.

Table 5.3.1 Comparison of Construction Impacts from Initial Dredging

Dredging Action	Managed Lake Alternative	Estuary Alternative	Hybrid Alternative
Dredging Location	North Basin	North and Middle Basins	North and Middle Basins
Dredging Volume (cubic yards)	348,000	526,000	499,000
Months of Dredging (approximate)	12	15	15
In-Water Work Windows Required for Dredging	2	3	3
Habitat Area Formation from Dredge Spoils	Use all dredged sediments to cover ~35% of Middle Basin	Use 97% of dredged sediments to cover ~30% of Middle and North Basins + <5 acres at dam location	80% sediments used and less North Basin habitat built, otherwise like Estuary Alternative

All dredging and other in-water construction activities would be regulated under a water quality permit, which would define required BMPs, set allowable mixing zones for compliance with water quality standards, and specify monitoring requirements. For dredging activities in the lake basin, the mixing zone for rivers and streams would apply, which is 300 feet as described in the Water Quality Discipline Report (Attachment 7). Typically, a water quality permit would allow temporary exceedances of water quality criteria within the mixing zone during construction activities, and require compliance with all water quality criteria at and beyond the boundary of the mixing zone.

As described in the Water Quality Discipline Report (Attachment 7), a pilot study of hydraulic dredging impacts in Lake Lawrence in Thurston County was conducted in the 1990s. During that study, water quality measurements were taken from mid-depth in the water column approximately 5 feet from the dredge. Measurements were made during dredging and 1 hour after dredging ceased. Turbidity increased from 2.4 to 14 nephelometric turbidity units (NTU) during dredging, but decreased to 6 NTU within 1 hour. There was no measured impact on dissolved oxygen. These results suggest that the impacts of dredging and habitat construction would not visibly persist for more than a few hours after dredging operations have stopped each day, and that the plume of impact is likely to be well within the 300 feet that would be allowed by the permit. BMPs such as turbidity curtains could be implemented to further reduce impacts, if real-time turbidity monitoring indicates they are necessary to meet permit requirements.

Studies indicate that increases in turbidity would be confined within the permitted mixing zone, visible plumes of turbidity within the mixing zone would not persist for more than a few hours after construction, there would be no measurable impact on dissolved oxygen, sediment disturbance would not release dissolved phosphorus or induce algal blooms, and lead or other contaminants released from disturbed sediments are not expected to harm fish or other aquatic life.

Regarding the potential for construction activities to increase phosphorus available for algae growth, sample analyses found that less than 1% of the sediment phosphorus is dissolved and therefore readily available. Hydraulic suction dredging of nearshore, PCB-contaminated surface sediments in 2019 did not result in a significant increase in algal growth even though dredging resulted in increased lake total phosphorous concentrations. These results suggest that dredging and other sediment disturbance from construction would not induce excessive algae growth in the lake.

Sediment suspension may result in temporary water quality impacts due to elevated concentrations of dissolved lead within the boundary of the mixing zone. However, the laboratory test overestimates the release of dissolved lead that would occur during construction because the test is performed at a much lower pH (i.e., more acidic condition for metals extraction) than is found in Capitol Lake. Because of the higher pH and greater dilution compared to the sediment tests, dredging in Capitol Lake is not likely to result in

Sampling Results

Sampling results in the lake basin showed that sediment quality is generally good, with low chemical concentrations that meet Sediment Management Standards (SMS) criteria.

significant impact on water quality from dissolved lead. Fish and other wildlife would avoid the dredging area, which also reduces the potential for impact.

Considering the above information, water quality limits can be met with the effective implementation of permit requirements and BMPs, and water quality would experience less than significant impacts during initial dredging and habitat construction, with no measurable effects outside the mixing zone.

5.3.2.2 Impacts of Constructing Recreational Amenities

Construction of the 5th Avenue Pedestrian Bridge would take 4 to 5 months to complete and would occur in stages, so the area of disturbance in any particular year would be limited to the extent that could be completed within the in-water work window. Construction of the boardwalks would occur over 4 to 6 months and would be staged from land or water. The dock and boat launch would be completed within one in-water work window.

Construction of these structures would produce minor, temporary, and localized increases in turbidity and sedimentation. These types of temporary impacts would be reduced by implementing BMPs specified in the water quality permit. If concrete is used, it would be subject to typical permit requirements to eliminate high pH concerns. Because sediment disturbance during construction of the boardwalks, dock, and boat launch would be much less than during dredging and habitat construction, and because BMPs would be required and monitored during construction activities, impacts on water quality would be less than significant during construction of recreational amenities.

Permit monitoring requirements would be implemented to determine BMP effectiveness and compliance with water quality standards and permit limits.

5.3.3 What are the construction impacts under the Managed Lake Alternative?

In addition to the water quality impacts common to all action alternatives, construction impacts on water quality from the Managed Lake Alternative would be associated with overhaul/repairs of the 5th Avenue Dam. This additional construction would last 6 months and include work on the control house, spillway, and earthen dam. Because dam repair activities would occur at the

northernmost part of the basin with water movement toward Budd Inlet, and assuming effective implementation of construction site BMPs and adherence to permit limits, water quality impacts in Capitol Lake are expected to be less than significant.

Construction activities from dam maintenance and repair would alter dam operations and water releases that affect the hydrodynamics of Budd Inlet. These alterations could temporarily reduce dissolved oxygen in Budd Inlet if inflow from the lake is reduced. However, repair times would be relatively short (4 weeks) and periodic, with at least one gate open to allow for continual water release. Placement of the buttressing berm armored with aggregate and riprap along the shoreline and in-water on the seaward side of the dam would temporarily increase turbidity when the material is placed. However, water quality impacts from both of these activities are expected to be minor due to required construction site BMPs. All in-water work would occur within the allowable work period.

Construction at the dam could also have adverse impacts on water quality from site runoff. Additionally, placement of the buttressing berm armored with aggregate and riprap along the shoreline and in-water on the seaward side of the dam would temporarily increase turbidity. However, these impacts would be minor due to required construction site BMPs. Permit monitoring requirements would demonstrate BMP effectiveness and compliance with water quality standards and permit limits.

Considering the short duration of in-water work, requirements for BMPs, and water quality monitoring to demonstrate BMP effectiveness, construction activities for the 5th Avenue Dam would have less than significant impacts on Budd Inlet water quality.

5.3.4 What are the construction impacts under the Estuary Alternative?

In addition to the water quality impacts common to all action alternatives, construction impacts on water quality from the Estuary Alternative are primarily associated with the removal of the 5th Avenue Dam.

Following the completion of initial dredging and construction of habitat areas, the 5th Avenue Dam would be removed, allowing the Capitol Lake Basin to become partially filled with marine water and creating an estuary within this basin. Therefore, the applicable water quality criteria for this geographic area would transition to those that

apply to inner Budd Inlet. By design, the dam removal would create a dramatic shift in water quality as the basin transitions from freshwater to saltwater. The change in hydrodynamics and flushing patterns would redistribute and transport existing sediments, which would increase turbidity in the lake basin until an equilibrium is restored. The Capitol Lake Basin would experience **significant impacts** on water quality during this transition period due to dramatic shifts in environmental conditions and a temporary increase in turbidity exceeding water quality criteria. The transition to an estuary in the basin would result in tidal fluctuations that influence water quality, changes in water chemistry (e.g., increased salinity, decreased dissolved oxygen), the loss of aquatic plants that remain after dredging and habitat construction, changes in planktonic (i.e., algae and invertebrates suspended in the water) and benthic invertebrate communities, and other impacts on aquatic life. Water quality impacts during construction and the transition from freshwater to saltwater would last several days to a few weeks before a new equilibrium is established.

Removal of the 5th Avenue Dam would alter discharge patterns, which would impact the hydrodynamics and water quality of Budd Inlet. Impacts from dam demolition would be contained within a sealed cofferdam to prevent the spread of sediment beyond the mixing zone established by the water quality permit. When the cofferdam is removed and estuary waters first enter the lake, a substantial amount of disturbed sediment, organic matter, and nutrients from the lake basin would be transported into Budd Inlet. Budd Inlet would experience a **significant impact** on water quality and would not meet water quality criteria during and immediately following dam removal due to: (1) increased sediment that may be transported outside the established mixing zone, (2) increased TOC load to Budd Inlet that contributes to oxygen depletion, and (3) increased nutrient availability for algal uptake. These temporary impacts would diminish after sediments from the lake basin are flushed out of the system, which may take several days to a few weeks.

Other construction activities would include a new 5th Avenue Bridge and Deschutes Parkway realignment, slope stabilization along Deschutes Parkway, stormwater outfall replacement along Deschutes Parkway and the Arc of Statehood, and culvert replacement at the Interpretive Center. These construction activities would produce minor, temporary, and localized increases in turbidity and sedimentation. These types of temporary impacts would be

reduced by implementing BMPs specified in the water quality permit. If concrete is used, it would be subject to typical permit requirements to eliminate high pH concerns. These disturbances would have less impact than dredging and habitat construction, and because BMPs would be required and monitored during construction activities, impacts on water quality would be less than significant.

5.3.5 What are the construction impacts under the Hybrid Alternative?

Construction impacts of the Hybrid Alternative on water quality would generally be as described above for the Estuary Alternative and impacts common to all action alternatives. However, the Hybrid Alternative would also include impacts associated with construction of a barrier wall and pedestrian concrete walkway on top of the wall that would separate the estuary from a smaller reflecting pool.

As described for the Estuary Alternative, the change in hydrodynamics and flushing patterns would result in redistribution and transport of existing sediments, which would increase turbidity in the lake basin until equilibrium is restored. The Capitol Lake Basin would experience **significant impacts** on water quality during this transition period due to the shift from freshwater to saltwater conditions and a temporary increase in turbidity.

Construction of the reflecting pool barrier wall would have a similar level of impacts as those described for impacts common to all alternatives for construction of habitat areas and recreational amenities. Construction of the barrier wall would require similar permits and BMPs, resulting in less than significant impacts to water quality.

As described for the Estuary Alternative, water quality impacts in Budd Inlet would have a **significant impact** during and immediately following dam removal due to increased sediment that may be transported outside the established mixing zone, increased TOC loading to Budd Inlet that would contribute to oxygen depletion, and increased nutrient availability for algal uptake. These impacts would diminish after disturbed sediments from the lake basin are flushed out over several days to a few weeks.

As with the Estuary Alternative, other construction activities include a new 5th Avenue Bridge and Deschutes Parkway realignment, slope stabilization along Deschutes Parkway, stormwater outfall replacement along the Deschutes Parkway and the Arc of Statehood,

and culvert replacement at the Interpretive Center. These construction activities would produce minor, temporary, and localized increases in turbidity and sedimentation. These types of temporary impacts would be reduced by implementing BMPs specified in the water quality permit. If concrete is used, it would be subject to typical permit requirements to eliminate high pH concerns. These disturbances will have less impact than dredging and habitat construction, and because BMPs would be required and monitored during construction activities, impacts on water quality would be less than significant.

5.3.6 What avoidance, minimization, and mitigation measures would be implemented for the project?

During construction of any action alternative, standard overwater and in-water construction and demolition BMPs would be implemented in accordance with permit requirements for in-water work. Compliance with regulations, permit conditions, plans, and authorizations would avoid and minimize potential construction impacts on water quality. These anticipated requirements and other mitigation measures that could be recommended or required are described in this section.

5.3.6.1 Measures Common to All Alternatives

A WQMPP would be prepared, approved by the regulatory agencies, and implemented throughout construction. The WQMPP would measure the performance of the BMPs implemented to maintain water quality standards, identify potential exceedances of water quality permit limits, and outline contingency measures to be implemented if water quality standards are exceeded. The plan would include real-time monitoring of turbidity within the established mixing zone of 300 feet from the dredging and material placement areas during construction. The WQMPP would also include inspection of spill control equipment and actions required by the water quality permit.

BMPs would be implemented, in accordance with the WQMPP and project permits, to avoid and minimize potential construction impacts on water quality, including those related to turbidity management and spill prevention. The BMPs are nondiscretionary actions that are needed to maintain water quality standards throughout the work. Standard BMPs may include:

- Using hydraulic dredge rather than bucket dredge
- Limiting dredged material overflow

- Slowing dredge rate
- Using turbidity curtains
- Implementing temporary erosion and sediment control measures and measures included in a stormwater management and pollution prevention plan
- Implementing Spill Prevention and Control Plan requirements
- Using containment measures during demolition and construction activities
- Using cofferdams to isolate work areas from open water

To reduce potential dissolved oxygen impacts to Budd Inlet during dredging, an additional mitigation strategy could be to modify dam operations to restrict lake outflow during dredging and increase lake outflow at night. This strategy would be most important to implement during the June 1 to August 15 period of allowable in-water work when river flows are low and bottom water dissolved oxygen concentrations are lowest in Budd Inlet. Dredging activities during the winter months (November 15 to February 15) when dissolved oxygen concentrations are higher would not need to be constrained.

Dam repair or removal is also a part of all action alternatives. To reduce potential dissolved oxygen impacts to Budd Inlet, an additional mitigation strategy could be to modify dam operations to restrict lake outflow during construction activities (daytime) and increase lake outflow at night. This strategy would be easiest and most important to implement during the summer months (June through August) when river flows are low and bottom water dissolved oxygen concentrations are lowest in Budd Inlet.

5.3.6.2 *Managed Lake Alternative*

No additional mitigation would be needed to address construction impacts to water quality from the Managed Lake Alternative.

5.3.6.3 *Estuary Alternative*

No additional mitigation would be needed to address construction impacts to water quality from the Estuary Alternative.

5.3.6.4 Hybrid Alternative

No additional mitigation would be needed to address construction impacts to water quality from the Hybrid Alternative.

5.3.7 What are the significant unavoidable adverse impacts to water quality?

Under the Estuary and Hybrid Alternatives, in the few weeks after construction is complete and the existing lake basin is opened to tidal waters, a transition period would result in redistribution and transport of existing sediments. This is expected to increase turbidity in both the lake basin and Budd Inlet until equilibrium is restored, resulting in a **significant unavoidable adverse impact**.

5.4 AQUATIC INVASIVE SPECIES

This section describes the potential impacts from project construction on distribution and population of aquatic invasive species in the study area. The information presented in this section is summarized from the full analysis in the Aquatic Invasive Species Discipline Report (Attachment 8).

What construction impacts were considered in the aquatic invasive species analysis?

Construction impacts were analyzed based on their potential to change the population and distribution of aquatic invasive species, which could occur from construction equipment entering and exiting Capitol Lake, from dredging and habitat area creation, and from turbidity generated by these activities. The analysis considered opportunities to implement standard BMPs or permit conditions to avoid the spread of AIS during construction.

Key Findings: Aquatic Invasive Species Construction Impacts

Under any of the action alternatives, construction would impact AIS in the study area. Construction activities including initial dredging, placement of dredged material for habitat areas, export of sediment dredged, and dam repair or removal could have potentially spread existing AIS to other water bodies.

With pre-treatment of AIS in Capitol Lake to reduce AIS populations, implementation of BMPs to reduce turbidity that could otherwise spread AIS, avoidance of construction areas by some AIS, and upland placement and subsequent AIS monitoring, impacts on distribution and population of AIS from construction would be avoided or minimized; thus, construction impacts would be less than significant.

5.4.1 What methods were used to analyze construction impacts?

To determine the potential construction impacts of the action alternatives on AIS, the following three primary operations were evaluated: initial sediment dredging, placement for constructing habitats or export of sediments dredged during construction, and dam repair or removal.

These activities have the potential adverse impact of spreading existing AIS in Capitol Lake to other water bodies if the following occur:

- AIS associated with suspended sediment and debris are not contained
- Construction equipment is not properly decontaminated before it leaves the lake
- Dredged material is not properly treated before it leaves the lake
- Equipment is not properly decontaminated before use in the lake, leading to the introduction of new AIS
- Construction area is not properly contained during repair or removal of the 5th Avenue Dam

5.4.2 What are the construction impacts common to all action alternatives?

The common goal for AIS under all action alternatives is containment to prevent the spread and further distribution of AIS. The New Zealand mudsnail is the primary AIS of concern and eradication of New Zealand mudsnails is not feasible under any of the action alternatives regardless of the BMPs and mitigation measures implemented. This is because of their resistance to extreme environmental factors and treatment, and their ability to reproduce and establish new populations from a single survivor, as described in Section 3.4.3. Therefore, protocols would be followed during construction to prevent the spread of these AIS, or the introduction of new AIS into the waterbody.

Prior to construction of all action alternatives, Capitol Lake would be treated to significantly reduce some AIS populations within the waterbody and reduce the risk of potential spread once construction activities began.

5.4.2.1 Initial Dredging

Dredging and other construction activities will occur for all action alternatives in the North and Middle Basins. Most or all dredged material would be used within the basin to create habitat areas; this is a key design element to avoid or minimize the transport of AIS species from the Project Area.

How will construction impacts to AIS be managed under the action alternatives?

For the action alternatives, most or all dredged material would be used within the basins to create habitat areas. This is a **key design element** to avoid or minimize the transport of AIS species from the Project Area.

During construction, BMPs would be implemented to minimize the suspension of debris and sediment that could transport AIS.

All construction equipment would be appropriately decontaminated before entering and leaving the site to prevent import or export of AIS.

For the Estuary and Hybrid Alternatives, dredged material exported out of the study area would be treated (e.g., salt or Bayluscide), covered, and only disposed of at an approved and contained upland site.

BMPs to reduce and contain turbidity during dredging would minimize the potential for substantial transport of invertebrate AIS over the 5th Avenue Dam and into Budd Inlet during construction. Turbidity levels would be less than existing conditions during large storm events so it is reasonable to conclude that invertebrate AIS would be contained through construction.

Dredging would occur in places where few Eurasian watermilfoil plants, purple loosestrife, and other invasive plants are located, which is along the southern shorelines of the Middle Basin and within the South Basin, and would not likely affect the abundance of these species in the lake. Based on pre-treatment of AIS throughout Capitol Lake, implementation of BMPs to reduce turbidity, and the small portion of the populations located within the construction areas, initial dredging of any action alternative would have less than significant impacts on AIS populations and distribution.

Dredging and placement of dredged materials in the habitat areas may have minor beneficial effects due to removal and burial of some aquatic plant and invertebrate animal AIS.

5.4.2.2 Export of Sediment

Some dredged material would be transported out of the study area for the Estuary and Hybrid Alternatives, but export is not assumed under the Managed Lake Alternative. Thus, dredge sediment export would provide a potential vector for transmission of purple loosestrife seeds and invertebrate AIS outside the Capitol Lake Basin for two of the three alternatives. However, sediments exported from the Capitol Lake Basin during construction would be treated prior to transport to prevent export of living New Zealand mudsnails. Treatment methods may include chemical (e.g., salt or Bayluscide) or physical (e.g., desiccation, heating, or freezing) techniques that would need to be proven effective prior to transport. The sediment would only be disposed of at an approved upland site, and the upland placement site would be monitored to ensure no New Zealand mudsnails are present and no purple loosestrife plants become established. Project permit conditions would outline additional specific measures, as needed, to avoid risk of spreading AIS from sediment export. Therefore, there would be a less than significant impact on AIS outside the Capitol Lake Basin from export of sediment dredged during construction.

Construction of the action alternatives would have no impacts on fish, waterfowl, and mammal AIS because these animals would avoid

construction activities and would not be transported outside the Capitol Lake Basin.

5.4.3 What are the construction impacts under the Managed Lake Alternative?

In addition to impacts common to all action alternatives, construction impacts of the Managed Lake Alternative on AIS would primarily be associated with repairing the 5th Avenue Dam. Potential impacts from the other construction activities would be as described in Section 5.4.3.

Repair of 5th Avenue Dam

There would be no impacts to AIS associated with repairing the 5th Avenue Dam because all repair work would be contained within the spillways, conducted overwater, or conducted on the Budd Inlet side of the dam where no known AIS are present. All construction equipment would be appropriately decontaminated before entering and leaving the site to prevent import or export of AIS.

5.4.4 What are the construction impacts under the Estuary Alternative?

In addition to impacts common to all action alternatives, construction impacts of the Estuary Alternative on AIS would primarily be associated with removal of the 5th Avenue Dam, which would restore tidal flow to the Capitol Lake Basin. The impacts of dam removal are discussed as a part of long-term impacts in Section 4.4, Aquatic Invasive Species.

5.4.5 What are the construction impacts under the Hybrid Alternative?

In addition to impacts common to all action alternatives, construction impacts of the Hybrid Alternative on AIS would primarily be associated with removal of the 5th Avenue Dam, which would restore tidal flow to the Capitol Lake Basin. The impacts of dam removal are discussed as a part of long-term impacts in Section 4.4, Aquatic Invasive Species.

Invasive Species Management

The goal for all action alternatives is containment of AIS to prevent their spread and further distribution, with New Zealand mudsnails being the primary species of concern.

The eradication of New Zealand mudsnails is assumed to be not feasible under any of the action alternatives because of their resistance to extreme environmental factors and treatment, and their ability to reproduce and establish new populations from a single survivor.

5.4.6 What avoidance, minimization, and mitigation measures would be implemented for the project?

Enterprise Services would avoid and minimize potential impacts by complying with regulations, permits, plans, and authorizations. These anticipated measures, and other mitigation measures that could be recommended or required, are described in this section.

5.4.6.1 Measures Common to All Action Alternatives

An AIS Adaptive Management Plan would be developed and implemented for the selected alternative, as described in Section 4.4.7.1. Under all alternatives, Capitol Lake would be treated prior to construction to significantly reduce the population of AIS. This is a critical measure to avoiding or minimizing the spread of AIS during and after construction.

To avoid the risk for AIS transport outside of Capitol Lake, WDFW-approved BMPs would be implemented during construction. Enterprise Services would follow all protocols established by WDFW before and after entering the lake and would ensure all vessels and equipment are decontaminated by removing visible plants, algae, and mud and rinsing with potable water.

5.4.6.2 Managed Lake Alternative

No additional mitigation would be needed to address construction impacts to AIS from the Managed Lake Alternative.

5.4.6.3 Estuary Alternative

No additional mitigation would be needed to address construction impacts to AIS from the Estuary Alternative.

For the Estuary and Hybrid Alternatives, the AIS Management Plan would be followed during transport and upland disposal of material dredged during construction.

5.4.6.4 Hybrid Alternative

No additional mitigation would be needed to address construction impacts to AIS from the Hybrid Alternative.

5.4.7 What are the significant unavoidable adverse impacts to aquatic invasive species?

There would be no significant unavoidable adverse impacts related to AIS under any of the action alternatives.

5.5 FISH & WILDLIFE

This section describes the potential impacts from project construction on fish and wildlife and their habitats in the study area. The information presented in this section is summarized from the full analysis in the Fish and Wildlife Discipline Report (Attachment 9).

Key Findings: Fish & Wildlife Construction Impacts

Under any of the action alternatives, construction would impact fish and wildlife in the study area. Construction activities from initial dredging, creating habitat areas, clearing vegetation, placement of temporary fill, and use of staging areas and access could produce localized turbidity and sedimentation and temporarily disrupt ecological functions of aquatic and terrestrial habitats. With implementation of BMPs and other permit conditions (in particular, adherence to the established in-water work window), impacts on fish and wildlife from construction would be avoided or minimized; thus, construction impacts would be less than significant.

5.5.1 What methods were used to assess construction impacts?

Potential construction impacts were determined by evaluating known occurrences of species, or species groups, and indicator species in the study area, life history requirements, and the potential temporary changes in habitat condition under each alternative. The analysis considered construction timing, duration, methods, and BMPs and their relative implication for species and habitats under each alternative. Construction impacts were estimated based on the conceptual design for each alternative.

Pursuant to federal, state, and local laws, the project must include BMPs to avoid and minimize construction impacts. Following construction, the affected habitats would generally return to their pre-construction condition either through natural processes or active restoration, or some combination. Long-term habitat alterations, such as the conversion of a freshwater lake to an estuary, are discussed in Chapter 4.0, Long-Term Impacts, Benefits, and Mitigation; however, the general duration of recovery following construction is also considered in the impact analysis.

What construction impacts were considered in the fish and wildlife analysis?

Construction impacts are the temporary effects related to construction disturbance. Construction impacts were analyzed based on the known relationships between construction elements (e.g., turbidity and construction noise) and the effects on fish and wildlife (e.g., avoidance, decreased foraging activity).

5.5.2 What are the construction impacts common to all action alternatives?

The primary construction elements that could affect fish and wildlife include the following:

- Initial dredging in the North Basin; or North and Middle Basins
- Construction of habitat areas in the Middle Basin; or North and Middle Basins
- Construction of recreational amenities (boardwalks, dock, boat launch, and 5th Avenue Pedestrian Bridge)

Initial dredging activities would generate localized increases in suspended sediments and increase in-water turbidity levels. Dredging can injure or kill fish captured or entrained in the sediment and associated water removed during the activity, as well as result in mortality to fish eggs and larvae in the benthic environment.

All of the action alternatives include dredging, either in the North Basin or in the North and Middle Basins, as well as the placement of dredged sediments into temporary constructed containment cells to create habitat areas. Dredging and dredged material placement to establish habitat areas both present a risk of entrainment and injury or mortality, although these impacts would be localized and limited to the dredging time frame. Dredged material placement can also bury fish and other organisms. However, the implementation of fish exclusion and fish removal/relocation would substantially reduce the potential of any such impacts on both anadromous and resident freshwater fish. The magnitude and extent of these potential effects would depend on the type of dredge equipment and areal extent of dredging, which vary by alternative (Table 5.5.1).

Does the reuse of dredged sediment have ecological benefits?

Yes. **Maximizing the beneficial reuse of dredged material on-site** is a key design feature that would minimize the potential transport of invasive species outside the Project Area, avoiding impacts to other native species and habitat, among other benefits.

Table 5.5.1 Comparison of Construction Impacts from Initial Dredging

Dredging Action	Managed Lake Alternative	Estuary Alternative	Hybrid Alternative
Dredging Location	North Basin	North and Middle Basins	North and Middle Basins
Dredging Volume (cubic yards (<i>cubic meters</i>))	350,000 (270,000)	525,000 (400,000)	500,000 (380,000)
Months of Dredging (approximate)	12	15	15
In-Water Work Windows Required for Dredging	2	3	3

Dredging Action	Managed Lake Alternative	Estuary Alternative	Hybrid Alternative
Habitat Area Formation from Dredged Sediment	Yes	Yes	Yes
Sheetpiling for Dredged Material Containment Cells (linear feet (<i>linear meters</i>))	32,000 (9,800)	34,000 (10,000)	24,000 (7,300)

Dredging impacts would be localized to the immediate area of dredging at any given time, and adherence to state and federal timing restrictions on in-water work would ensure that there would be no direct impacts on anadromous salmon, including outmigrating juvenile salmon in the spring and early summer. Smaller anadromous (e.g., stickleback) and resident freshwater fish would have the greatest potential for impact. BMPs would be used during dredging to minimize turbidity and to reduce the potential for entrainment impacts on fish. The implementation of fish exclusion, such as turbidity curtains, and fish removal/relocation would substantially reduce the potential for impacts on both anadromous and resident freshwater fish in locations where such measures are feasible. Standard spill prevention and containment measures would also be implemented to prevent accidental spills of hazardous materials.

What is the allowable in-water work window?

The allowable in-water work window for the protection of fish is expected to be from **June 1 to August 15** and **November 15 to February 15** each year, based on early coordination with the regulatory agencies.

Habitat areas would be created by placing dredged material into containment cells formed by the temporary installation of sheetpiling. The sheetpile walls would be installed (and removed) using vibratory methods, with the length of sheetpiling varying by alternative. Vibratory pile driver hammers use an oscillatory motion and heavy weight to force the pile into the substrate. They typically produce substantially lower sound levels than do impact hammers, with a slower rise time (the time for the noise wave form to rise from 10 to 90% of its highest peak) and lower sound frequencies. As a result, the pile-driving sound levels from the vibratory hammer are less intense and spread over a longer time period, thereby minimizing the potential to harm aquatic organisms. Studies have found that the use of vibratory hammers for pile installation are not likely to have a significant impact on migrating salmon behavior, because infrasound produced by vibratory pile driving is short in duration and because of the relatively short range of the component of the total sound field to which salmon show an avoidance response. No mortality of fish or substantial behavioral impacts are expected to occur from the sheetpile installation.

Under any action alternative, impacts from initial dredging and containment cell installation would be temporary, with a 12- to 15-month total duration at any specific location. With the use of BMPs and adherence to approved work windows, widespread impacts would be avoided. Work windows are established to coincide with the times that species of concern have a low likelihood of being present in the area. With these measures, impacts on anadromous fish (including salmon) as well as resident freshwater fish from habitat disturbance and noise and vibration would be less than significant.

In-water work to construct new structures (boardwalks, 5th Avenue Pedestrian Bridge, rebuilt dock at Interpretive Center, new boat launch) would include the placement of foundation piles and minor grading. These activities would result in localized and temporary increases in both turbidity and in-water noise and vibration during construction. No substantial impacts on fish from in-water noise associated with auguring piles for boardwalk construction are anticipated; however, the use of impact hammers to construct the 5th Avenue Pedestrian Bridge could cause impacts on fish, including injury and mortality. Impact hammers use various mechanical methods to pound the piles into the substrate. The risk of injury or mortality for aquatic species and fish associated with impact pile driving noise is generally related to the effects of rapid pressure changes. Most fish within the North Basin could be disturbed to some degree by the impact pile-driving activities; however, these potential impacts would be minimized by the application of BMPs to dampen the sound levels and/or enhance the attenuation rate of the sound levels generated by the pile driving, such as air bubble curtains.

Curing concrete can contribute to high pH (alkaline) conditions in the water column if the concrete source has been recently cast and not allowed adequate curing times. Where the pH effects are of a large magnitude, the pH of the water column can rise to the point where deleterious effects to fish and wildlife could occur. However, no such effects are anticipated, considering the minimal number of concrete piles (20) associated with the project and the BMP of delaying installation of pre-cast concrete piles until the concrete has completely cured.

Terrestrial wildlife species that would be most likely affected by construction include great blue heron, dabbling ducks, shorebirds, and some passerine birds. Although terrestrial wildlife species would likely avoid active construction areas, substantial portions of the

Project Area would still be available for foraging. Wildlife that use the lake margins or wetlands in or near active construction areas, would avoid these sites during construction. Wildlife avoidance would be temporary, and similar habitats exist nearby that would be available to wildlife, including within areas of Capitol Lake that would not be undergoing construction.

In summary, under all action alternatives, impacts on fish, aquatic habitat, and wildlife would be less than significant, including impacts associated with fish entrainment and direct mortality, water quality, turbidity and sedimentation, and noise and vibration. Although individual fish or wildlife could be affected, the number of injured or killed individuals would be small and species avoidance of the work areas would reduce exposure. As a result, these impacts would not measurably affect their local populations. Impacts would be minimized through adherence to the agency-approved in-water work period and implementation of standard overwater and in-water construction BMPs in accordance with environmental regulatory permit requirements (as described in Section 5.5.6).

5.5.3 What are the construction impacts under the Managed Lake Alternative?

In addition to construction activities that are common to all alternatives, the Managed Lake Alternative would include the following:

- 5th Avenue Dam overhaul repairs

Most of the work associated with dam repair would not involve in-water work within either Capitol Lake or Budd Inlet. However, construction of a buttressing berm to improve stability of the earthen dam includes placement of up to 25,000 cubic yards (19,114 cubic meters) of aggregate and riprap placed along approximately 0.5 acres (0.2 hectares) of the shoreline on the downstream (West Bay) side of the earthen dam and adjacent to the dam along a portion of shoreline. This work, which would take approximately 4 weeks to complete, would result in some temporary turbidity and sedimentation in West Bay, which could have minor effects on aquatic life. Appropriate BMPs would be implemented for the buttressing and other dam overhaul work, such as the use of containment devices where appropriate, and in-water work timing restrictions would apply. Based on the temporary nature of the repairs and the available BMPs that would be implemented for the

protection of aquatic life, construction of the dam overhaul repairs would have less than significant impacts on fish species.

Wildlife species groups most likely affected by dam repair activities would be waterfowl that forage or rest near the dam. During repair activities, wildlife that use the north end of the lake or West Bay would likely avoid the area because of noise and increased human activity. Once construction is complete, the waterfowl would return to using this area. On the marine side of the dam, harbor seals may be disturbed by the construction noise and choose to use areas away from such noise. Because other areas of the lake and West Bay are available for wildlife to forage or rest in during repair activities, impacts on wildlife would be less than significant.

5.5.4 What are the construction impacts under the Estuary Alternative?

As shown in Table 5.5.1, the Estuary Alternative would involve the largest quantities of dredged material, and the most linear feet of sheetpiling for construction of habitat areas. However, the fish and wildlife impacts of these activities would be generally the same as described for impacts common to all action alternatives. In addition to construction activities that are common to all action alternatives, construction impacts of the Estuary Alternative would primarily be associated with the following:

- 5th Avenue Dam and 5th Avenue Bridge removal
- Construction of a new 5th Avenue Bridge for vehicles and Deschutes Parkway realignment
- Slope stabilization along Deschutes Parkway
- Stormwater outfall replacement (along the Deschutes Parkway and the Arc of Statehood)
- Culverts replacement at the Interpretive Center

The primary potential impacts on fish from dam and bridge removal are associated with in-water work, including increased turbidity and in-water noise. Approximately 64,000 cubic yards (48,931 cubic meters) of material would be removed over a footprint area of about 145,000 square feet (13,470 square meters), with a construction duration of approximately 4 to 6 weeks. To maintain water quality and reduce turbidity during removal of the earthen and structural dam components, coffercells with sealed interlocks would be installed around the earthen dam structure. The coffercells would isolate the in-water work area from fish and limit turbidity in the

construction area, and would be used to remove the earthen portion of the dam, prior to being repositioned to remove the concrete spillway. Once the coffercell installation is completed (during the approved regulatory in-water work window and including fish removal), excavation and demolition work can occur within the cells, as turbid water would be isolated from Capitol Lake and Budd Inlet. Because of the use of the coffercells, the application of appropriate BMPs, and adherence to in-water work windows, impacts from turbidity on all fish species groups potentially present in the work area, including both freshwater and marine, would be minor.

Likewise, although saw-cutting and micro-blasting would be used to remove the spillway structures, the work area would be isolated from the water column by the coffercells, and appropriate BMPs and micro-blasting methods would be implemented to eliminate waste materials entering the lake or bay, and to minimize vibration and overpressure that could harm fish. Demolition of the concrete spillway would use a combination of land- and marine-based equipment, with BMPs implemented for any marine barges or work boats, to minimize or eliminate grounding or propeller wash impacts on fish and fish habitat.

Construction of the coffercells would require the installation of sheetpiles using vibratory methods. Land-based pile installation equipment, stationed on the existing dam, would take approximately 8 to 10 weeks to construct the coffercells. As described for impacts common to all alternatives, in-water vibratory pile installation would have minimal impacts on fish.

Foundation piling for the new 5th Avenue Bridge, consisting of concrete columns supported by drilled shafts, would be installed within coffercells. Installing drilled shafts does not create in-water noise or sound pressures that have the potential to kill or injure fish and, in addition, this work would be conducted in the isolated coffercells.

Other construction activities that could temporarily affect fish and aquatic habitat, although on a much smaller scale, include replacing stormwater outfalls along Deschutes Parkway and the Arc of Statehood, replacing culverts at the Interpretive Center, and coating the concrete at the Arc of Statehood. With implementation of avoidance and minimization measures, such as containment of all overwater debris from entering the water column and minimization of the impacts from the use of work barges during bridge construction, removal of the 5th Avenue Bridge and 5th Avenue Dam,

construction of the new 5th Avenue Bridge, and construction of other work elements would result in temporary and minor direct impacts on fish, and would have less than significant impacts on all fish species groups.

Construction disturbances would cause wildlife that use the Capitol Lake Basin to avoid areas of active construction, as described for impacts common to all alternatives. Diving and dabbling ducks would be most affected as they regularly use the open-water and lake margin habitat.

Other species that use the lake, such as bald eagle, osprey, and river otter, would also avoid the area during active construction. River otter would continue to use the area in the evening when construction was not occurring. Passerine birds that use the upland and riparian habitat adjacent to the lake would avoid areas of active construction, such as along Deschutes Parkway during realignment activities. There would be minimal impacts on wildlife from replacing culverts; this is a relatively small construction project that would occur over the course of several weeks. Harbor seals that use West Bay at higher tides close to the dam and bridge would also avoid the area during the construction period.

Construction impacts on wildlife are considered less than significant because construction disturbances would not reduce the regional population of these common species, and foraging habitat is not limited and is available elsewhere for these relatively common species.

Several trees in a mixed forested area would need to be removed to construct the embankment for the realigned Deschutes Parkway. Trees would be surveyed as part of design and permitting of the selected alternative, and any removed trees would be replaced in accordance with City of Olympia's tree protection ordinance.

5.5.5 What are the construction impacts under the Hybrid Alternative?

In addition to construction activities that would occur under the Estuary Alternative and those that are common to all action alternatives, the Hybrid Alternative includes the following:

- Barrier wall construction in the North Basin

Construction impacts on fish and fish habitat under the Hybrid Alternative are nearly identical to those described for the Estuary

Alternative, including effects from turbidity and in-water noise associated with the 5th Avenue Dam removal, new 5th Avenue Bridge construction, Deschutes Parkway stabilization, and other minor construction elements. However, construction of the 2,600-foot-long (790-meter-long) sheetpile barrier wall to create a reflecting pool would lead to additional in-water noise and vibration impacts.

The reflecting pool barrier wall would require the construction of approximately 130 sheetpile tail walls to support the barrier wall. The sheetpiling for the structure would be installed using a barge-based vibratory hammer and constructed prior to dam removal to provide a consistent water level for the barge. Vibratory pile driving impacts on fish would be relatively minor, and impacts have not been shown to result in mortality or injury in previous studies. Although the wall installation would take approximately 15 months of work over three in-water work windows, the in-water noise levels from vibratory pile driving would not have a significant adverse impact on fish. An impact hammer may be needed to drive some of the sheetpiles, since the barrier wall will serve as a load-bearing structure. Impact pile driving produces in-water noise levels that can negatively impact fish, including lethal and sublethal effects. Although the sound levels from impact installation of sheetpiles are somewhat less than large-diameter steelpiles, monitoring of previous sheetpile installations has shown that sound levels at, or near, threshold for fish injury have occurred. The use of impact pile driving would increase the magnitude of adverse impacts on fish; however, with the use of noise attenuation devices (e.g., bubble curtains), it is unlikely that injury or mortality to fish would occur, and adherence to the in-water work timing requirement would further reduce the potential for impacts on any anadromous and freshwater resident fish species present during construction.

The type of construction impacts on wildlife would be the same as for the Estuary Alternative. With construction of the barrier wall, the magnitude of impacts on wildlife would be slightly greater than those described for the Estuary Alternative.

With adherence to approved in-water work windows and standard construction BMPs, impacts on fish and wildlife would be less than significant.

5.5.6 What avoidance, minimization, and mitigation measures would be implemented for the project?

5.5.6.1 Measures Common to All Alternatives

During construction of any action alternative, standard overwater and in-water construction and demolition BMPs would be implemented in accordance with permit requirements. In-water work would only occur within the allowable work window to minimize potential impacts to fish and wildlife from piledriving and other construction activities. The anticipated in-water work window for the Capitol Lake Basin, from June 1 to August 15 and November 15 to February 15 each year, would generally protect both outmigrating juvenile salmon and returning adults. In addition to standard BMPs, a key design measure has been included in all action alternatives. Dredged sediments would be beneficially reused to create habitat areas within the Capitol Lake Basin. This would substantially minimize the need for off-site disposal of dredged sediment, which would reduce the potential spread of invasive species outside of the lake basin.

BMPs that would be implemented to avoid or minimize impacts to fish and wildlife include:

- Where feasible, the project will utilize vibratory pile installation methods for all pile installation, including both sheetpile and round piles. Impact driving methods will only be used if geotechnical conditions require such methods for achieving required loading requirements, and where feasible, will be limited to pile proofing only.
- Appropriate BMPs and sound attenuation methods (e.g., bubble curtains) would be developed in coordination with the regulatory agencies and permitting processes to minimize potential impacts of any impact pile driving activities.
- Suspended tarps, or similar containment measures, would be used to contain falling debris during construction of the new 5th Avenue Bridge, 5th Avenue Pedestrian Bridge, and boardwalks.
- Cofferdams or other appropriate measures would be used to isolate work areas from open-water areas for the removal of the existing 5th Avenue Dam and construction of the new 5th Avenue Bridge.

- Cleared upland areas would be restored to preconstruction grades and the areas would be replanted with appropriate native herbaceous and woody species.
- Temporary erosion and sediment control measures and a stormwater management and pollution prevention plan would be implemented.
- A Spill Prevention and Control Plan would be implemented.

5.5.6.2 Managed Lake Alternative

Installation of the buttressing berm would be timed to occur at low tide as feasible. No additional mitigation would be needed to address construction impacts to fish and wildlife from the Managed Lake Alternative.

5.5.6.3 Estuary Alternative

No additional mitigation would be needed to address construction impacts to fish and wildlife from the Estuary Alternative.

5.5.6.4 Hybrid Alternative

No additional mitigation would be needed to address construction impacts to fish and wildlife from the Hybrid Alternative.

5.5.7 What are the significant unavoidable adverse impacts to fish and wildlife?

With the implementation of BMPs, minimization measures, and mitigation, there would be no significant unavoidable adverse impacts on fish and wildlife during construction.

5.6 WETLANDS

This section describes the potential temporary impacts from project construction on wetland resources in the study area. Long-term changes to wetlands are described in Section 4.6, Wetlands. The information presented in this section is summarized from the full analysis in the Wetlands Discipline Report (Attachment 10).

Key Findings: Wetlands Construction Impacts

Under any of the action alternatives, construction would impact wetlands in the study area. Construction activities from initial dredging, creating habitat areas, clearing vegetation, placement of temporary fill, and use of staging areas and access would produce localized turbidity and sedimentation and temporarily disrupt ecological functions of wetlands. With implementation of standard construction BMPs, however, all impacts on wetlands from construction would be avoided or minimized; thus, construction impacts would be less than significant.

5.6.1 What methods were used to assess construction impacts to wetlands?

Potential construction impacts were evaluated based on how construction activities would affect ecological functions of wetlands, including water quality (nutrient cycling, turbidity), hydrologic functions (alteration of flood flows, groundwater recharge), and habitat (disturbed habitat and species avoidance). Construction impacts were estimated based on the conceptual design for each alternative.

Pursuant to federal, state, and local laws, the project must include BMPs to avoid and minimize construction impacts. Following construction, the affected areas and habitats would generally return to their pre-construction condition following completion of the project either through natural processes, active restoration, or some combination; however, the general duration of recovery following construction is also considered in the impact analysis. Long-term wetland alterations, such as the conversion of a freshwater wetlands to saltmarsh and tideflats, are discussed in Chapter 4.0, Long-Term Impacts, Benefits, and Mitigation.

What construction impacts were considered in the wetlands analysis?

Construction impacts were analyzed based on their potential direct and indirect impacts to wetland functions. Wetlands help to cycle nutrients within the ecosystem, remove sediment from surface waters, absorb flood flows, and recharge groundwater. They are also important habitat for a range of wetland-dependent and wetland-associated fish and wildlife species.

5.6.2 What are the construction impacts common to all action alternatives?

The types of construction impacts that would occur are similar among the action alternatives and include the following:

- Initial dredging in the North Basin; or North and Middle Basins
- Construction of habitat areas in the Middle Basin; or North and Middle Basins
- Construction of recreational amenities (boardwalks, dock, boat launch, and 5th Avenue Pedestrian Bridge)

- Repair or removal of the 5th Avenue Dam and 5th Avenue Bridge
- Construction staging and access throughout the Capitol Lake Basin (including vegetation clearing, temporary fill, and lowering of water levels)

All of the action alternatives include initial dredging of the lake bed and deepwater areas to remove sediments that have accumulated since construction of the 5th Avenue Dam. The location, volume, and duration of the initial dredging would vary by alternative, with the Estuary and Hybrid Alternatives having a longer overall duration and dredging volume than the Managed Lake Alternative. Dredged material would be used to create habitat areas in the Middle Basin under all of the action alternatives; some habitat areas would also be created in the North Basin for the Estuary and Hybrid Alternatives. Dredging and habitat area construction would occur with the existing 5th Avenue Dam in place and would occur during the in-water work windows allowed by the regulatory agencies.

Dredging would likely be conducted in stages, so the area of disturbance in any particular year would be limited to the extent that could be completed within a work window or within 1 year. Dredging would directly remove aquatic vegetation, where present, in deepwater habitats. It is expected that aquatic vegetation would regrow within the growing season if disturbed by temporary construction activities.

The primary temporary construction impacts of dredging and habitat area construction would be direct disturbance of wetland habitats, and localized turbidity and sedimentation, which can negatively affect wetland vegetation growth or smother plants. Dredging would directly remove aquatic vegetation in deepwater habitats. However, aquatic vegetation that is affected by dredging would likely regrow between the allowable in-water work windows.

Construction of the 5th Avenue Pedestrian Bridge, boardwalks, dock, and boat launch could cause minor, temporary impacts on wetlands if the clearing of vegetation and/or the placement of temporary fill materials in wetlands is needed to allow construction access. Construction may also require lowering of the lake level for a few months to allow equipment to work in dry conditions. Lowering the lake would temporarily dewater wetlands along the perimeter of the basins and could harm plant growth and reduce habitat quality.

Construction of these structures would produce localized turbidity and sedimentation that could temporarily affect water quality.

Under all of the action alternatives, Marathon Park would be used as the primary construction staging and water access point for the duration of the project. Other potential temporary staging areas include Tumwater Historical Park and an area near the 5th Avenue Bridge. All of these sites are primarily upland areas but do contain some adjacent wetland areas, including fringing vegetated wetlands and deepwater. Use of these staging areas could damage vegetation and compact soils of emergent and scrub-shrub wetlands along the edge of the basins, but the staging and access areas would be sited and constructed in a way to avoid and minimize wetland impacts. Turbidity and sedimentation may also occur in deepwater habitats.

Under all action alternatives, the impact of dredging and habitat area creation in deepwater habitats would be limited in duration, and the temporarily disturbed areas would return to pre-construction condition. Given this, and considering that the types of temporary impacts on wetlands from other construction elements can typically be reduced through site-specific mitigation measures, temporary construction impacts on wetlands under all action alternatives are considered less than significant. BMPs will be implemented to avoid or minimize impacts on wetlands, and these measures will be specified in project permits (see Section 5.6.6 for more detail).

5.6.3 What are the construction impacts under the Managed Lake Alternative?

In addition to construction activities that are common to all alternatives, the Managed Lake Alternative would include the following:

- 5th Avenue Dam overhaul repairs

Most of the work associated with dam repairs would not involve in-water work within either Capitol Lake or Budd Inlet. However, construction of a buttressing berm to improve stability of the earthen dam includes placement of up to 25,000 cubic yards (19,114 cubic meters) of aggregate and riprap placed along approximately 0.5 acres (0.2 hectares) of the shoreline on the downstream (West Bay) side of the earthen dam and adjacent to the dam along a portion of shoreline. Construction may affect scrub-shrub wetlands adjacent to the dam, and in-water work associated with the buttressing berm would result in localized turbidity and effects from sedimentation on

deepwater habitat. Appropriate BMPs to avoid impacting vegetated scrub-shrub wetlands adjacent to the dam would be implemented. Based on the location and short-term nature of the repairs, any construction impacts on wetlands would be minor and temporary, and therefore less than significant.

5.6.4 What are the construction impacts under the Estuary Alternative?

In addition to wetland impacts that are common to all alternatives, the Estuary Alternative has the following construction activities:

- 5th Avenue Dam and 5th Avenue Bridge removal
- Construction of a new 5th Avenue Bridge for vehicles and Deschutes Parkway realignment
- Slope stabilization along Deschutes Parkway
- Stormwater outfall replacement (along the Deschutes Parkway and the Arc of Statehood)
- Culverts replacement at the Interpretive Center

Vegetated wetlands and deepwater freshwater and deepwater estuarine habitats would be temporarily affected during construction. The removal of the 5th Avenue Dam and 5th Avenue Bridge, construction of the new 5th Avenue Bridge, and realignment of Deschutes Parkway would be the most intensive of the additional construction activities that would occur under the Estuary Alternative. Some of the structures would take multiple years to construct; however, all in-water work would be constructed within dry cofferdams, limiting the duration of potential impacts on wetlands. Construction would be conducted in stages, so the area of disturbance in any particular area would be limited to the extent that could be completed within a work window or within 1 year. In other construction areas, wetland soils may be compacted and vegetation removed by the movement of construction equipment and materials. Construction activities may also release sediment into the deepwater habitat, affecting wetland vegetation. Potential construction impacts from slope stabilization, stormwater, and culvert replacement would likely be similar, potentially temporarily disrupting scrub-shrub and emergent wetlands along the shoreline.

With adherence to standard construction BMPs to minimize disturbance and turbidity and sedimentation effects, wetland impacts from these construction activities would be less than significant.

5.6.5 What are the construction impacts under the Hybrid Alternative?

For the Hybrid Alternative, construction impacts and the duration of impacts would be the same as those described under the Estuary Alternative, but would also include the installation of a barrier wall to create the new, smaller reflecting pool. The 2,600-foot-long (790-meter-long) sheetpile barrier wall would take approximately 15 months to construct, over three in-water work windows. Wall installation could create turbidity and impacts to adjacent wetlands and deepwater habitat, similar to the construction work described for the Estuary Alternative.

With adherence to standard construction BMPs to minimize disturbance and turbidity and sedimentation effects, wetland impacts from these construction activities would be less than significant.

5.6.6 What avoidance, minimization, and mitigation measures would be implemented for the project?

5.6.6.1 Measures Common to All Alternatives

BMPs would be implemented, in accordance with project permits, to minimize potential construction impacts on wetlands. Standard BMPs may include:

- Changing water access points to avoid wetland areas
- Fencing or marking wetland areas and construction limits
- Using erosion and sediment control methods and plans
- Using silt curtains to control turbidity
- Using steel plates or mats to minimize soil compaction from construction equipment
- Refueling vehicles at least 100 feet (30 meters) away from wetlands

5.6.6.2 Managed Lake Alternative

Installation of the buttressing berm would be timed to occur at low tide as feasible. No additional mitigation would be needed to address construction impacts to wetlands from the Managed Lake Alternative.

5.6.6.3 Estuary Alternative

No additional mitigation would be needed to address construction impacts to wetlands from the Estuary Alternative.

5.6.6.4 Hybrid Alternative

No additional mitigation would be needed to address construction impacts to wetlands from the Hybrid Alternative.

5.6.7 What are the significant unavoidable adverse impacts to wetlands?

With the implementation of BMPs, minimization measures, and mitigation, there would be no significant unavoidable adverse impacts on wetlands during construction.

5.7 AIR QUALITY & ODOR

This section describes the potential impacts from project construction on air quality and odor elements in the Project Area. The information presented in this section is summarized from the full analysis in the Air Quality and Odor Discipline Report (Attachment 11).

Key Findings: Air Quality and Odor Construction Impacts

For all action alternatives, air quality and odor impacts would result from construction-related activities, including initial dredging. Of the action alternatives, the Managed Lake Alternative would generate the lowest construction emissions and the Hybrid Alternative would generate the most construction emissions. For all action alternatives, the annual emissions for criteria pollutants are estimated to be less than the general conformity *de minimis* thresholds. The combined construction and post-construction emissions are also less than the GHG reporting threshold, as described in Section 4.7, Air Quality and Odor. Both the air quality and GHG impacts for the Managed Lake, Estuary, and Hybrid Alternatives would be less than significant.

5.7.1 What methods were used to assess construction impacts?

The air quality impacts from the construction phase of the project were assessed by calculating the total project emissions of each criteria pollutant (i.e., NO_x, SO₂, CO, VOC, PM₁₀, PM_{2.5}) from equipment associated with construction phase activities. Four categories of equipment were considered in estimating emissions: harbor craft, dredging vessels, construction equipment, and on-road

trucks. For all action alternatives, the annual emissions of criteria pollutants are compared against the general conformity *de minimis* thresholds—emission thresholds designed to serve as a check on whether emissions are prone to degrading a region’s ambient air quality. Additional details on the guidance documents and methods for determining emission totals are provided in the Air Quality and Odor Discipline Report (Attachment 11).

Construction GHG emissions were combined with the long-term (operational) emissions, as described in Section 4.7, Air Quality and Odor. All GHG emissions would contribute to the long-term impacts of climate change.

Odor impacts associated with construction (i.e., earthwork or equipment exhaust) would be intermittent over the 4 to 8 years of construction. Odors would generally be limited in duration and frequency such that any odors are unlikely to rise to a level that would be considered a nuisance or be characterized as significant. Long-term odor impacts were assessed based on the final configuration for each alternative and are discussed in Section 4.7, Air Quality and Odor.

5.7.2 What are the construction impacts common to all action alternatives?

The primary construction elements that would affect air quality include the following:

- Exhaust from operation of construction equipment, primarily associated with construction dredging, but also other vessel and vehicle construction for other construction activities

The construction-related emissions rely on the equipment use estimated for completing each of the alternatives. The hours of operation for dredging would depend on the material removal rates for a given alternative. Much of the dredged material would be beneficially reused on-site to establish the habitat areas, and would not generate emissions from truck trips to haul to an off-site disposal site. Disposal of any excess sediment or other materials from construction would be restricted to upland disposal given the presence of invasive species. The construction activity would, like most construction, create localized dust, exhaust, and associated odors that may be noticeable in near proximity to the activity.

Construction impacts would differ by alternative, as described below.

What construction impacts were considered in the air quality and odor analysis?

Air pollutant emissions would be generated by construction activities associated with earthwork, demolition, material/equipment deliveries, and construction. The analysis considers total project emissions of each criterial pollutant (i.e., NO_x, SO₂, CO, VOC, PM₁₀, PM_{2.5}) from equipment associated with construction activities.

5.7.3 What are the construction impacts under the Managed Lake Alternative?

Construction dredging would be the primary source of air pollutants and air quality impacts associated with the Managed Lake Alternative. Among the action alternatives, the Managed Lake Alternative involves comparatively less equipment and operating hours due to the lower dredge operating duration and volume, which results in lower emissions of each pollutant. The calculated air pollutant emission rates are summarized in Table 5.7.1. The total annual emissions of each pollutant would be less than the general conformity *de minimis* thresholds; therefore, the air quality impacts associated with the construction phase of this alternative would be less than significant.

The Managed Lake Alternative would generate lower levels of construction-related GHG emissions than the Estuary or Hybrid Alternatives (see Section 4.7, Air Quality and Odor, for information on combined construction and operation GHG emissions). The GHG emissions are much less than reporting thresholds but would contribute to GHG emissions cumulatively.

Table 5.7.1 Construction Air Pollutant Emission Results: Managed Lake Alternative

Pollutant	Project Emissions (tpy (mtpy))	General Conformity <i>De Minimis</i> Threshold (tpy (mtpy))	Greater Than <i>De Minimis</i> ?
CO	14 (13)	100 (91)	No
NO _x	65 (59)	100 (91)	No
VOC	1 (0.91)	100 (91)	No
SO ₂	0.04 (0.036)	100 (91)	No
PM ₁₀	1 (0.91)	100 (91)	No
PM _{2.5}	1 (0.91)	100 (91)	No

Abbreviations: mtpy = Metric tons per year, tpy = Tons per year

5.7.4 What are the construction impacts under the Estuary Alternative?

While construction dredging would be the primary source of air pollutant emissions, the Estuary Alternative includes considerably more construction activity than the Managed Lake Alternative with the removal of the 5th Avenue Bridge and 5th Avenue Dam, as well as the realignment of Deschutes Parkway. The calculated air pollutant

emission totals are summarized in Table 5.7.2. The total annual emissions of each pollutant would be less than the general conformity *de minimis* thresholds; therefore, the air quality impacts associated with the construction phase of this alternative would be less than significant.

The Estuary Alternative would generate greater levels of GHG emissions during construction than the Managed Lake Alternative. The GHG emissions are much less than reporting thresholds but would contribute to GHG emissions cumulatively. Over the long term, carbon sequestration would help to offset these contributions, as described in Section 4.7, Air Quality and Odor.

Table 5.7.2 Construction Air Pollutant Emission Results – Estuary Alternative

Pollutant	Project Emissions (tpy (mtpy))	General Conformity <i>De Minimis</i> Thresholds (tpy (mtpy))	Greater Than <i>De Minimis</i> ?
CO	18 (16)	100 (91)	No
NO _x	84 (76)	100 (91)	No
VOC	1 (0.91)	100 (91)	No
SO ₂	0.05 (0.045)	100 (91)	No
PM ₁₀	2 (1.8)	100 (91)	No
PM _{2.5}	1 (0.91)	100 (91)	No

5.7.5 What are the construction impacts under the Hybrid Alternative?

Initial construction dredging would be the primary source of air pollutant emissions. The Hybrid Alternative, like the Estuary Alternative, also includes considerably more construction activity than the Managed Lake Alternative with the removal of the 5th Avenue Bridge and 5th Avenue Dam, as well as the realignment of Deschutes Parkway. The calculated air pollutant emission totals from initial dredging are estimated to be almost the same as the Estuary Alternative, although emissions of NO_x would be slightly higher (see Table 5.7.3). Because these emissions would be below the general conformity *de minimis* thresholds, air quality impacts associated with the construction phase of this alternative would be less than significant.

Table 5.7.3 Construction Air Pollutant Emission Results – Hybrid Alternative

Pollutant	Project Emissions (tpy (mtpy))	General Conformity <i>De Minimis</i> Thresholds (tpy (mtpy))	Greater Than <i>De Minimis</i> ?
CO	18 (16)	100 (91)	No
NO _x	86 (78)	100 (91)	No
VOC	1 (0.91)	100 (91)	No
SO ₂	0.05 (0.045)	100 (91)	No
PM ₁₀	2 (1.8)	100 (91)	No
PM _{2.5}	1 (0.91)	100 (91)	No

Of the three action alternatives, the Hybrid Alternative would generate the greatest levels of GHG emissions during construction. The GHG emissions are much less than reporting thresholds but would contribute to GHG emissions cumulatively. As described for the Estuary Alternative, carbon sequestration would help to offset these emissions over the long term.

5.7.6 What mitigation measures would be implemented for the project?

5.7.6.1 Measures Common to All Alternatives

Although construction would not significantly affect air quality, construction contractors would be required to comply with all relevant federal, state, and local air quality rules. In addition, implementation of BMPs would reduce emissions related to the construction phase of the project. Management practices for reducing the potential for air quality impacts during construction include measures for reducing both exhaust emissions and fugitive dust. The Washington Associated General Contractors Guide to Handling Fugitive Dust from Construction Projects suggest a number of methods for controlling dust and reducing the potential exposure of people to emissions from diesel equipment. A list of the control measures that would be considered to minimize air quality impacts from construction are as follows:

- Require model year 2007 or newer engines for heavy duty vehicles (except trucks that are operated less than 100 hours each year on this job)
- Require the use of biofuel B20, or offer contractor incentive for this fuel

- Require contractor to have idle reduction plan or ensure that project specifications have a maximum idle time of 5 minutes; however, if equipment requires, in the colder months, idle times may be extended to achieve adequate equipment performance
- Require all off-road machinery to have emission reduction equipment (e.g., require participation in Puget Sound Region Diesel Solutions, a program designed to reduce air pollution from diesel, by project sponsors and contractors)
- Use carpooling or other trip-reduction strategies for construction workers
- Spray exposed soil with water or other suppressant to reduce emissions and deposition of particulate matter
- Pave or use gravel on staging areas and roads that would be exposed for long periods
- Cover all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck bed), to reduce emissions and deposition of particulate matter during transport
- Provide wheel washers to remove particulate matter that would otherwise be carried off-site by vehicles to decrease deposition of particulate matter on area roadways
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris

5.7.6.2 Managed Lake Alternative

No additional mitigation would be needed to address construction impacts to air quality and odors from the Managed Lake Alternative.

5.7.6.3 Estuary Alternative

No additional mitigation would be needed to address construction impacts to air quality and odors from the Estuary Alternative.

5.7.6.4 Hybrid Alternative

No additional mitigation would be needed to address construction impacts to air quality and odors from the Hybrid Alternative.

5.7.7 What are the significant unavoidable adverse impacts to air quality and odor?

No significant unavoidable adverse impacts associated with air quality or odors are expected during construction as a result of any of the action alternatives.

5.8 LAND USE, SHORELINES, & RECREATION

This section describes the potential construction impacts from project construction on land use, shorelines, and recreation. The information presented in this section is summarized from the full analysis in the Land Use, Shorelines, and Recreation Discipline Report (Attachment 12).

Key Findings: Land Use, Shorelines, and Recreation Construction Impacts

During construction, public access to parks and other public facilities would be reduced, in some areas for several years. Most of the recreation resources in the Project Area would remain open. However, most of Marathon Park would be closed for 4 to 8 years, depending on the alternative, and several areas around the lake would be partially closed for periods of time. There would also be construction noise and visual disturbance during the periods of dredging and construction within Capitol Lake. This disruption would reduce the value of the area for some popular recreation activities, such as walking, running, and biking. The Estuary and Hybrid Alternatives would have the longest duration of closures and disturbance, and the Hybrid Alternative would have the most intensive construction activity due to construction for the reflecting pool. Impacts to Marathon Park from staging and impacts on recreational use related to noise and other disruptions could not be fully mitigated and would be a **significant unavoidable impact** under all action alternatives.

5.8.1 What methods were used to assess construction impacts?

This analysis focused on construction impacts that would have the greatest potential to impact adjacent land and shoreline uses and recreational users. Impacts could occur when access to portions of recreation areas may be temporarily restricted or recreational enjoyment disrupted due to noise or other construction activity.

5.8.2 What are the construction impacts common to all action alternatives?

All action alternatives have construction impacts associated with the following:

- Initial dredging in the North Basin; or North and Middle Basins

What construction impacts were considered in the land use, shorelines, and recreation analysis?

Construction impacts include temporary disruption of adjacent land and shoreline uses, exclusion of public use from public recreation areas for safety purposes, and reduction in the quality of recreational resources due to construction noise, dust, or other factors.

- Construction of habitat areas in the Middle Basin; or North and Middle Basins
- Construction of recreational amenities (boardwalks, dock, boat launch, and 5th Avenue Pedestrian Bridge)
- Repair or removal of the 5th Avenue Dam
- Construction staging and access throughout the Capitol Lake Basin

In terms of land use, temporary disruptions from construction, staging, and construction access would not change any existing use into a different use, or create substantial land use conflicts. While creating inconveniences for some, these land use impacts would be less than significant.

Public access to parks and other public facilities would be reduced or restricted in certain areas during construction (Figure 5.8.1). Construction schedules provide a 4- to 5-year duration for construction of the Managed Lake Alternative, and a 7- to 8-year duration for construction of the Estuary and Hybrid Alternatives. Recreational use and enjoyment would be diminished in some locations because of equipment noise, full or partial closures of parks and trails, disruption of vegetation, and other aesthetic effects.

The Project Area has 165 acres (67 hectares) of park space. Of this, approximately 4.5 acres (1.8 hectares) would be temporarily directly impacted by construction staging for up to 8 years. Activities along Deschutes Parkway would require temporary closures of portions of the trail. Construction activities within the basin, such as dredging and habitat area establishment, would indirectly impact shoreline parks adjacent to Capitol Lake from noise and other disturbances.

All action alternatives involve the use of Marathon Park as the primary construction staging and contractor waterfront access point for the duration of project construction. Access around Marathon Park, including access to the existing pedestrian bridge that crosses the lake, would be allowed during construction, but use of the entire park would be otherwise restricted during the approximate 4- to 8-year construction period, depending on the alternative. Another construction access point would be established at Tumwater Historical Park for equipment needing to access the Middle Basin. Partial closures of a portion of Tumwater Historical Park are anticipated when this site was being used as an access point. Construction staging would also occur around the 5th Avenue Dam

In-Water Work Restrictions

In-water work restrictions will be in place to protect fish. Dredging and other in-water construction activities are only permitted to happen certain times of the year. This extends the overall construction schedule for all of the action alternatives and results in various activities starting and stopping for periods of time.



Exhibit 5.85 Pedestrian bridge at Marathon Park

during construction of the 5th Avenue Pedestrian Bridge. Construction staging and access areas would be returned to their previous conditions after construction.

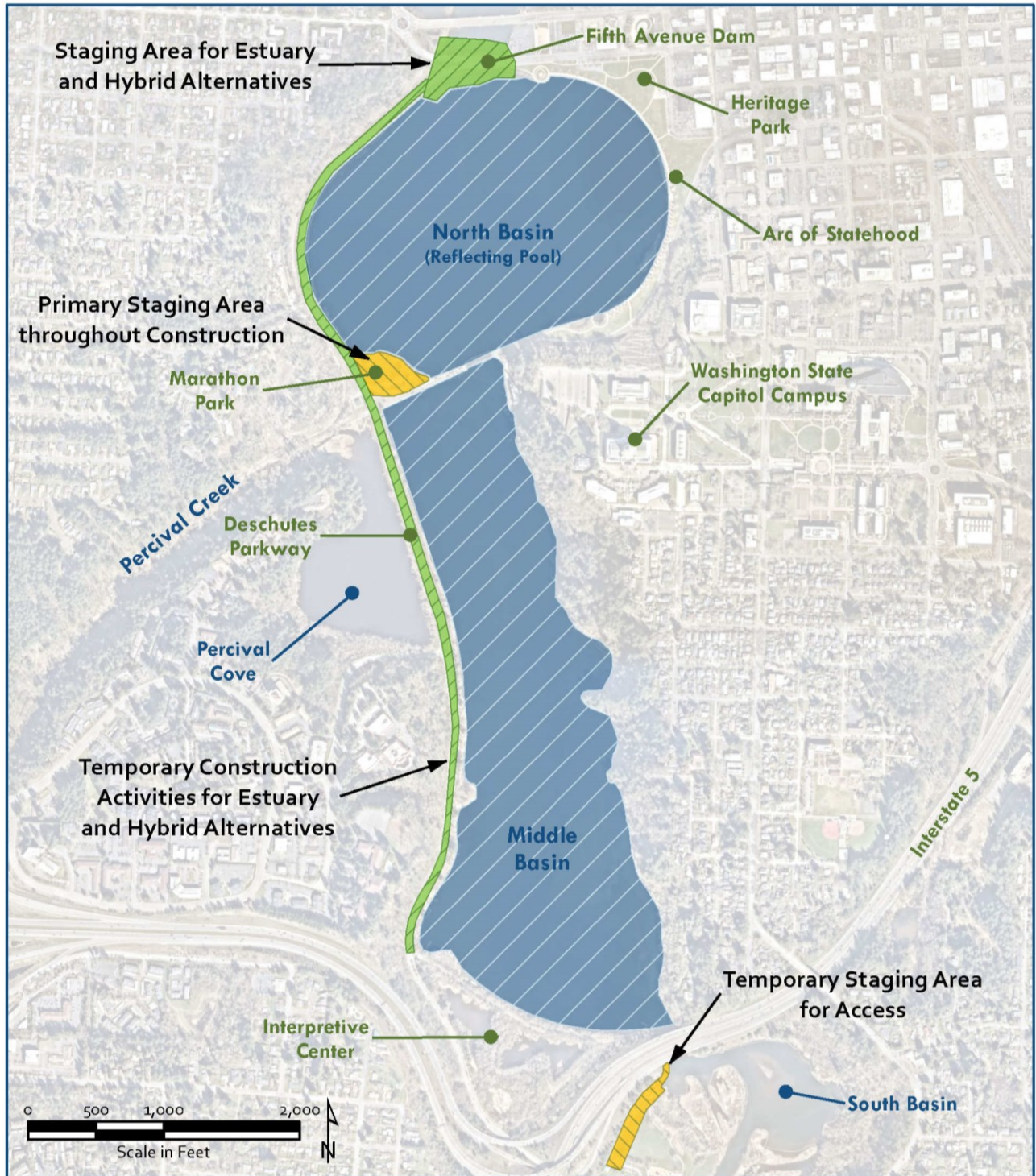
Recreational users would experience noise and would see dredging equipment for several months each year, including during the peak summer recreational season, which may detract from the recreational experience for some users. The containment cells that would be installed to support dredging and to develop habitat areas would remain in water for the majority of the construction duration and would not be removed after each in-water work window.

Most park users surveyed indicated that walking was one of the activities they came to the park for; noise and construction activity could detract from these users' enjoyment of the parks and trails. Some recreationists may also find the construction activities to be interesting to observe. Construction activity could also disrupt wildlife use of areas temporarily, reducing its value for recreational users.

On the south side of the 5th Avenue Bridge, a pedestrian bridge would be constructed, connecting existing pathways along Heritage Park and Deschutes Parkway, a popular loop trail around the North Basin. The 5th Avenue Pedestrian Bridge would not be constructed until after dam repair or removal is complete, which would mean that under all action alternatives there would be a temporary closure of this pathway connection. This connection would be closed for a period of approximately 4 years under the Estuary and Hybrid Alternatives, and only intermittently over a 6-month period of dam repair under the Managed Lake Alternative. To minimize this impact, Enterprise Services would evaluate the feasibility of constructing the 5th Avenue Pedestrian Bridge prior to removal or repair of the 5th Avenue Bridge in order to maintain a consistent trail loop connecting Heritage Park and Deschutes Parkway. Alternatively, a temporary trail trestle could be constructed.

Construction of other common elements, such as the new dock and boat launch, could include temporary park and trail closures or detours, noise, and dust. Nearby pedestrian and bicycle facilities could be affected areas while construction is occurring.

Figure 5.8.1 Construction Staging for Action Alternatives



Legend

- Staging Area for Action Alternatives
- Staging Area for Estuary and Hybrid Alternatives
- In-Water Staging and Construction Activities for Action Alternatives

Most of the recreation resources in the study area would remain open and continue to operate. However, a substantial portion of Marathon Park would be closed for 4 to 5 years, and many areas around and within Capitol Lake would be subject to 4 to 8 years of intermittent construction noise and other disturbances during the periods when dredging and other construction would occur, substantially reducing the value of the area for popular recreation activities, such as walking and wildlife viewing. For these reasons, construction impacts on recreation are considered **significant** for all action alternatives.

5.8.3 What are the construction impacts under the Managed Lake Alternative?

In addition to construction activities that are common to all alternatives, the Managed Lake Alternative would include the following:

- 5th Avenue Dam overhaul repairs

The existing 5th Avenue Dam and 5th Avenue Bridge provide a pedestrian and bicycle connection between Deschutes Parkway and Heritage Park. The dam overhaul repair work would take 6 months, as compared to the 4.5-year duration of dam removal and bridge construction under the Estuary and Hybrid Alternatives. As described for impacts common to all action alternatives, this connection would be closed intermittently over the 6-month period. To minimize this impact, Enterprise Services would evaluate the feasibility of constructing the 5th Avenue Pedestrian Bridge prior to removal or repair of the 5th Avenue Bridge in order to maintain a consistent trail loop connecting Heritage Park and Deschutes Parkway. Alternatively, a temporary trail trestle could be constructed.

All other construction impacts under the Managed Lake Alternative would be as generally described for activities common to all action alternatives. Construction of the Managed Lake Alternative would include dredging activities, temporary staging areas in parks, trail closures, and construction-related noise and dust, which could adversely affect land use, shoreline use, or recreation.

Most of the recreation resources in the study area would remain open and continue to operate. However, a substantial portion of Marathon Park would be closed for 4 to 5 years, and many areas around Capitol Lake would be subject to up to 5 years of construction noise during the periods when dredging and other construction would occur, substantially reducing the value of the area for popular recreation

activities, such as walking and wildlife viewing. For these reasons, construction impacts on recreation are considered **significant**.

5.8.4 What are the construction impacts under the Estuary Alternative?

In addition to construction activities that are common to all alternatives, the Estuary Alternative would include the following:

- 5th Avenue Dam and 5th Avenue Bridge removal
- Construction of a new 5th Avenue Bridge for vehicles and Deschutes Parkway realignment
- Slope stabilization along Deschutes Parkway
- Stormwater outfall replacement (along the Deschutes Parkway and the Arc of Statehood)
- Culvert replacements at the Interpretive Center

With these additional elements and work limited to the in-water work windows, construction is expected to take up to 8 years, 3 years longer than the Managed Lake Alternative.

Initial construction dredging for this alternative would be in the Middle and North Basins and would occur seasonally over 5 years during the anticipated in-water work windows, a slightly longer duration than under the Managed Lake Alternative.

An additional temporary staging area would be established at the northwestern edge of the North Basin during construction of Deschutes Parkway realignment, dam removal, and construction of the 5th Avenue Bridge and 5th Avenue Pedestrian Bridge.

Demolition of the dam and construction of the 5th Avenue Bridge would be the most notable differences during construction of this alternative, compared to the Managed Lake Alternative. The trail connection between Deschutes Parkway and Heritage Park would be closed for a period of approximately 4 years. Its closure for this period would affect a large number of park users. These recreationalists would still be able to access other portions of the trail around the lake, but following a loop path would not be possible without a substantial detour using 4th Avenue W, or early construction of the 5th Avenue Pedestrian Bridge, which is a minimization measure being evaluated by Enterprise Services.

The Estuary Alternative also involves armoring and replacement of stormwater outfalls along Deschutes Parkway, which would cause more temporary trail closures than the Managed Lake Alternative. Staging and construction would also progress along Deschutes Parkway as it is armored. Portions of the trail along the lake would be subjected to rolling closures for approximately 3 months as the construction progressed.

Most of the recreation resources in the study area would remain open and continue to operate. However, a substantial portion of some highly used resources would be closed for 5 to 8 years, including most of Marathon Park (5 years) and the north section of the loop trail around the North Basin. Many areas around the lake would be subject to up to 8 years of intermittent construction noise, particularly during the in-water works window, substantially reducing the value of the area for popular recreation activities, such as walking and wildlife viewing. For these reasons, construction impacts on recreation are considered **significant**.

5.8.5 What are the construction impacts under the Hybrid Alternative?

Construction impacts of the Hybrid Alternative would generally be as described for the Estuary Alternative and for impacts common to all alternatives, except that the Hybrid Alternative would include the following:

- Barrier wall construction in the North Basin

The 2,600-foot-long (790-meter-long) barrier wall would be constructed in the North Basin to create the new, smaller reflecting pool. The construction period would be the same duration as for the Estuary Alternative (seasonally, over approximately 7 to 8 years), but would include more intensive construction activity and noise during the 2 to 3 years of barrier wall construction. As such, this alternative would be more disruptive to recreationists using the parks adjacent to the North Basin. The overall duration of temporary trail and park closures would be the same as the Estuary Alternative.

Most of the recreation resources in the study area would remain open and continue to operate. However, a substantial portion of the resources would be closed for 5 to 8 years, including most of Marathon Park and the north section of the loop trail around the North Basin. Many areas around Capitol Lake would be subject to up to 8 years of construction noise, particularly during the in-water work

window, substantially reducing the value of the area for popular recreation activities, such as walking and wildlife viewing. For these reasons, construction impacts on recreation are considered **significant**.

5.8.6 What mitigation measures would be implemented for the project?

5.8.6.1 Measures Common to All Alternatives

Enterprise Services would evaluate the feasibility of constructing the 5th Avenue Pedestrian Bridge prior to removal or repair of the 5th Avenue Bridge in order to maintain the trail loop connecting Heritage Park and Deschutes Parkway during construction. Alternatively, Enterprise Services could consider construction of a temporary trail trestle.

In order to limit disruption of or interference with recreation activities during construction, the following additional measures should be considered:

- Use BMPs to minimize noise, dust, and other disturbances to visitors to recreation sites during construction, as well as in areas used for informal recreation (e.g., along roads).
- Coordinate with potentially affected park districts/ departments, to ensure that the public is well-informed of upcoming construction activities, and to plan construction to minimize conflicts with park events to the extent feasible.
- Provide alternative access points to recreation sites and trail detours.
- Provide signage along trails or park entrances at least 1 week prior to closures.
- Clearly mark pedestrian and bicycle access routes as well as locations of detour signage and other wayfinding elements.
- Restore recreation sites or trails after construction.
- Schedule construction activities in a way that minimizes or avoids impacts to major festival days, whenever feasible.
- Coordinate with festival and event planners when conflicting construction activities and closures cannot be

- avoided. This could include planning for detours, signage, media notifications, and similar actions.
- Limit construction hours to avoid high-use times in parks, such as weekends and festival hours.
 - Given the duration of construction, provide interpretative signage in adjacent parks to explain how the work meets project goals, adding interest for some users.
 - Provide a 24-hour hotline to address complaints or safety concerns that may arise during construction.

5.8.6.2 *Managed Lake Alternative*

There are no additional mitigation measures to offset land use, shorelines, and recreational impacts for the Managed Lake Alternative beyond those described for all action alternatives.

5.8.6.3 *Estuary Alternative*

There are no additional mitigation measures to offset land use, shorelines, and recreational impacts for the Estuary Alternative beyond those described for all action alternatives.

5.8.6.4 *Hybrid Alternative*

In order to limit disruption during sheetpile placement for the barrier wall, extent of impact piledriving should be limited and the use of vibratory piledriving should be maximized.

5.8.7 **What are the significant unavoidable adverse impacts to land use, shorelines, and recreation?**

There would be **significant unavoidable impacts** on recreation under any of the action alternatives during construction of the project given the duration of anticipated construction (4 to 8 years).

Trail access impacts could be reduced through mitigation, such as use of detours or a temporary trestle (under the Estuary and Hybrid Alternatives). However, impacts to Marathon Park from staging and impacts on recreational use related to noise and other disruptions could not be fully mitigated to less than significant levels.

5.9 CULTURAL RESOURCES

This section describes the potential indirect impacts from temporary, project construction activities on archaeological and historic built environment resources in the Project Area. Direct impacts that would permanently impact historic resources are addressed in Section 4.9, Cultural Resources. The information presented in this section is summarized from the full analysis in the Cultural Resources Discipline Report (Attachment 13).

Key Findings: Cultural Resources Construction Impacts

Construction impacts on archaeological resources are irreversible and permanent because these resources are nonrenewable and any impact on the depositional integrity (i.e., context) would be significant. Initial construction dredging in the North Basin and other construction activities could intersect, remove, or compact unrecorded archaeological resources, and impacts would be **potentially significant**. The Estuary and Hybrid Alternatives would have a greater risk of encountering unrecorded archaeological sites due to greater ground disturbance compared to the Managed Lake Alternative.

Construction impacts on historic resources would occur from temporary construction activities and could reduce a resource's historic register eligibility or reduce the ability of the resource to convey its historic significance. Construction would generate traffic congestion, noise, dust, and access limitations. While these impacts may inconvenience residents and visitors, and temporarily diminish the integrity of historic resources, they would be reversible and would not permanently diminish the ability for a historic resource to convey its historical significance. Measures to reduce construction impacts would be implemented, and impacts from temporary construction activities would be less than significant.

5.9.1 What methods were used to assess construction impacts?

To determine the potential construction impacts of the project alternatives on cultural resources, the characteristics of archaeological resources and historic built environment resources within the study area were first identified. Archaeological resources are nonrenewable, and any impact on the depositional integrity (i.e., context) of a protected archaeological resource is considered a significant impact. Analysis of historic built environment resources focused on the potential impacts on a resource's integrity (i.e., location, design, setting, materials, workmanship, feeling, and association).

5.9.2 What are the construction impacts common to all alternatives?

All action alternatives would have construction impacts associated with the following:

- Initial dredging in the North Basin; or North and Middle Basins
- Construction of habitat areas in the Middle Basin; or North and Middle Basins
- Construction of recreational amenities (boardwalks, dock, boat launch, and 5th Avenue Pedestrian Bridge)
- Construction staging and access throughout the Capitol Lake Basin

5.9.2.1 Archaeological Resources

The construction activities associated with the action alternatives could result in ground disturbance or compaction of soil that impacts archaeological resources.

As described in Section 3.9, Cultural Resources, there are recorded archaeological sites adjacent to all three basins. In the North Basin area, there are two recorded precontact sites immediately west of Deschutes Parkway, and one precontact site east of Deschutes Parkway; it is also possible that remains associated with these sites extend into the basin itself. Landforms in the vicinity of the 5th Avenue Dam are known to contain historic-era archaeological sites, including bottle and refuse dumps, as well as bridge and piling structural ruins. Additionally, the roadbed of the historic Olympia and Chehalis Valley Railroad runs generally along Deschutes Parkway in the Middle Basin.

Construction has the potential to intersect, remove, or compact unrecorded, potentially protected resources that may be present within the basins. Ground disturbance and the placement of fill for habitat areas also have the potential to damage unrecorded, potentially protected archaeological resources through compaction. Construction of structures within the Middle Basin (e.g., boardwalks, rebuilt dock) could impact submerged archaeological resources, including unrecorded upland sites that extend downslope into the basins.

What construction impacts were considered for the cultural resources analysis?

Construction of the project is expected to cause potential impacts on archaeological resources from excavation, compaction, and other activities. Construction of the project is also expected to cause direct and indirect impacts on historic built environment resources from demolition, changes in setting and design, road realignment, construction staging and access, noise, dust, and construction traffic.

There are no recorded archaeological resources within the proposed construction staging area and water access point at Marathon Park, and since the park landform was created using fill material, the park is considered to have a low potential to contain intact archaeological sites. Although use of the park for staging and water access has a low potential to damage unrecorded archaeological resources, it is possible that unrecorded sites are present. Similarly, there are no recorded archaeological sites within Tumwater Historical Park, which is also proposed for construction staging. The park landform was substantially modified with creation of the park, and the park is considered to have a low potential to contain intact archaeological sites. However, it is possible that unrecorded sites are present within Tumwater Historical Park.

Construction impacts on recorded and unrecorded, protected archaeological sites from ground disturbance or compaction of soil would be irreversible and permanent; therefore, if they were to occur, impacts would be **potentially significant**.

5.9.2.2 Historic Built Environment Resources

In addition to the permanent changes to historic resources that are described in Section 4.9, Cultural Resources, construction activities could result in indirect and temporary impacts that reduce a resource's historic register eligibility or reduce the ability of the resource to convey its historic significance. All action alternatives would involve construction activities in or near eligible or potentially eligible historic resources.

During construction, the presence and activity of barges, pile drivers, temporary sheetpiles, containment cells, trucks, and materials would have temporary impacts on historic resources. These impacts would be typical of large-scale construction projects, such as noise, vibration, dust, visual impacts, and tracking of dirt and mud. There would also be short-term access limitations and traffic congestion. While these construction impacts may inconvenience residents and visitors, and temporarily diminish the integrity of historic resources, these impacts would be reversible and would not permanently diminish the ability for a historic resource to convey its historical significance.

Construction staging and access could have more than a temporary impact on a historic resource's integrity. Truck trips could damage historic roadways and bridges, depending on volume, weight, and frequency; and construction activities could damage features in

Marathon Park, and this would constitute an impact if the park was eligible for listing and if the features were character-defining. These impacts could be mitigated through design or BMPs, such as an access plan to assess and avoid any potential damage. With these measures, impacts are expected to be less than significant.

5.9.3 What are the construction impacts under the Managed Lake Alternative?

In addition to the construction activities that are common to all alternatives, the Managed Lake Alternative would include the following:

- 5th Avenue Dam overhaul repairs

5.9.3.1 Archaeological Resources

5th Avenue Dam overhaul repairs would occur within the footprint of the existing structure or immediately adjacent, in areas previously disturbed during original dam construction. In particular, jet grouting along the earthen dam would involve considerable ground disturbance. Because jet grouting would be accomplished in the deep subsurface without visual contact, any impacts on archaeological resources could not be assessed. Removal, disturbance, and/or compaction of unrecorded, potentially protected archaeological resources could also occur. No construction impacts on archaeological resources beyond those common to all action alternatives are anticipated. Construction impacts on recorded and unrecorded, protected archaeological sites from ground disturbance or compaction of soil would be irreversible and permanent; therefore, if they were to occur, impacts would be **potentially significant**. The Managed Lake Alternative would have less overall ground disturbance than the Estuary and Hybrid Alternatives. Because of this, the Managed Lake Alternative would have less risk of encountering protected archaeological sites.

5.9.3.2 Historic Built Environment Resources

Overhaul repairs would occur in various places in and along the 5th Avenue Dam and would include work on the electrical components within the control house, appurtenances outside of the control house and spillways, and to components of the concrete spillways. Repair work would cause temporary impacts during construction, but would not diminish the integrity of the essential physical features for which the resource is potentially eligible for listing in a historic register, and are, therefore, less than significant.

All other construction impacts associated with the Managed Lake Alternative are the same as those described for impacts common to all action alternatives.

5.9.4 What are the construction impacts under the Estuary Alternative?

In addition to construction activities noted for impacts common to all action alternative, the Estuary Alternative has the following construction activities:

- 5th Avenue Dam and 5th Avenue Bridge removal
- Construction of a new 5th Avenue Bridge for vehicles and Deschutes Parkway realignment
- Slope stabilization along Deschutes Parkway
- Stormwater outfall replacement (along Deschutes Parkway and the Arc of Statehood)
- Culvert replacement at the Interpretive Center

5.9.4.1 Archaeological Resources

The Deschutes Parkway corridor in particular has a very high risk for precontact archaeological sites, and there are recorded sites along both sides of the parkway. It is possible that construction of the parkway actually bisected sites that originally were contiguous. The following activities have a potential to expose, damage, or remove archaeological sites:

- Use of upland areas along Deschutes Parkway for staging could impact recorded as well as unrecorded archaeological sites through grading, leveling, compaction, and other ground disturbances. Known sites include two precontact archaeological sites, as well as the roadbed of the historic Olympia and Chehalis Valley Railroad.
- Placement of fill for slope stabilization along Deschutes Parkway would cover one recorded precontact site as well as any unknown sites. Placement of fill as part of slope stabilization would impact sites by covering them further and making them more difficult to detect. The weight of material could compact sites also and deform or crush fragile artifacts such as shell, bone, and wood.

- Depending on depths and methods employed, habitat area construction immediately east of Deschutes Parkway could impact recorded as well as unrecorded sites.

Landforms in the vicinity of the 5th Avenue Dam are notable for the presence of historic-era archaeological sites such as bottle and refuse dumps, and ruined structural bridge and piling remains. Precontact sites are also possible. While removal of the 5th Avenue Dam itself is unlikely to intersect archaeological sites, road revisions to Deschutes Parkway, utility revisions, and other ground disturbances to landforms at each end of the dam could expose, damage, and remove archaeological sites.

Construction impacts on recorded and unrecorded archaeological sites would be irreversible and permanent; therefore, construction impacts on protected archaeological sites, if they were to occur, would be **significant**. The Estuary Alternative, as well as the Hybrid Alternative, would have a greater risk of encountering unrecorded archaeological sites due to greater ground disturbance compared to the Managed Lake Alternative.

5.9.4.2 Historic Built Environment Resources

Construction of the Estuary Alternative would involve direct impacts on eligible or potentially eligible historic resources, and would result in permanent impacts on those resources. These long-term impacts are described in Section 4.9, Cultural Resources.

Construction activities under the Estuary Alternative would cause the same type of indirect and temporary impacts on potentially eligible historic resources as described for impacts common to all action alternatives; however, construction under the Estuary Alternative would involve more activities and would cover more areas. These potential impacts could be mitigated through an access plan developed by the contractor prior to construction (see Section 5.9.7). As a result, impacts are expected to be less than significant.

5.9.5 What are the construction impacts under the Hybrid Alternative?

5.9.5.1 Archaeological Resources

Under the Hybrid Alternative, construction impacts on archaeological sites would be the same as those described for the Estuary Alternative. Impacts on protected archaeological resources, if they

were to occur, would be **significant**. Construction of the reflecting pool barrier wall would present a similar level of risk of encountering buried archaeological sites as the Estuary Alternative.

5.9.5.2 Historic Built Environment Resources

Under the Hybrid Alternative, construction impacts on historic resources would be the same as those described for the Estuary Alternative. Construction of the reflecting pool barrier wall would not introduce new types of construction impacts on the historic resource. Impacts would be less than significant.

5.9.6 What mitigation measures would be implemented for the project?

5.9.6.1 Mitigation Measures Common to All Action Alternatives

Mitigation for impacts on archaeological resources and historic built environment resources, including “adverse effects” on historic resources, would be identified through consultation under Section 106 with the federal lead agency, affected tribes, DAHP, and other consulting parties.

Additional mitigation measures may be separately developed through consultation with DAHP, affected tribes, the City of Olympia, the City of Tumwater, and other stakeholders. Additionally, an Archaeological Site Alteration and Excavation Permit may be required if impacts on a protected archaeological resource could not be avoided and would contain conditions and stipulations. Potential mitigation measures identified below can be adopted voluntarily by Enterprise Services and/or imposed as conditions as part of the permit process.

Archaeological Resources

- DAHP may request and recommend archaeological survey and/or monitoring of all areas that will be impacted by construction. A variety of approaches, including terrestrial shovel probing, terrestrial auger probing, terrestrial geoprobing, and in-water geoprobing and/or sonar, could be evaluated for use.
- Delineate recorded sites to determine if they can be avoided.

- Conduct archaeological monitoring during geotechnical and other ground-penetrating studies.
- Conduct archaeological review of all available geotechnical logs.
- Conduct all ground-disturbing work under the terms of an Archaeological Resources Inadvertent Discovery Plan and/or Archaeological Resources Monitoring Plan.
- Develop BMPs to minimize compaction of unpaved surfaces to the extent possible.
- Conduct archaeological monitoring during construction under the terms of an Archaeological Resources Inadvertent Discovery Plan and/or Archaeological Resources Monitoring Plan.

Historic Built Environment Resources

During construction, Enterprise Services would protect the historic and physical integrity of historic structures, properties, and districts through the avoidance, minimization, and mitigation measures developed for other elements of the environment. Formal documentation following DAHP mitigation standards will be completed for historic resources that will be demolished due to construction.

5.9.6.2 Mitigation Measures for the Managed Lake Alternative

Avoidance, minimization, and mitigation measures for construction of the Managed Lake Alternative are the same as those common to all alternatives.

5.9.6.3 Mitigation Measures for the Estuary Alternative

Mitigation would be the same as described for all action alternatives, with the following additions:

- Develop a protection and monitoring plan for historic resources adjacent to the Deschutes Parkway realignment work.
- Monitor construction work adjacent to the Deschutes Parkway realignment work as needed based on the protection and monitoring plan for historic resources.

5.9.6.4 Mitigation Measures for the Hybrid Alternative

Mitigation would be the same as described for all action alternatives and for the Estuary Alternative.

5.9.7 What are the significant unavoidable adverse impacts to cultural resources?

5.9.7.1 Archaeological Resources

There is no feasible mitigation to completely avoid the potential to impact unrecorded, protected archaeological sites.

5.9.7.2 Historic Built Environment Resources

With implementation of measures to reduce potential temporary impacts during construction, including BMPs and mitigation measures, there would be no significant indirect and temporary impacts on historic built environment resources. However, as described in Section 4.9.7.2, there would be significant unavoidable impacts as a result of permanent changes to historic built environment resources in the study area.

5.10 VISUAL RESOURCES

This section describes the potential impacts from project construction on visual resources in the study area.

Key Findings: Visual Quality Construction Impacts

Under all action alternatives, construction staging areas would be established in nearby parks. Public access to these parks and other public facilities would be reduced or restricted, in some areas for several years, as described in Section 5.8, Land Use, Shorelines, and Recreation. Most of Marathon Park would be closed for 4 to 8 years, depending on the alternative, during which time visual access to the shoreline would be obstructed. In addition, it is expected that construction equipment/materials, such as coffercells, would remain in place in the water of the Capitol Lake Basin for several years. These visual disruptions would substantially reduce the value of the area for some popular recreation activities, such as walking and wildlife viewing. The Estuary and Hybrid Alternatives would have the longest duration of closures at Marathon Park. Given the duration of construction-related staging at Marathon Park and in-water construction and staging, construction impacts on visual resources are considered a **significant unavoidable impact** for all action alternatives.

5.10.1 What methods were used to assess construction impacts?

The project is expected to cause temporary impacts, changes, and modifications to visual quality, due to the presence of construction equipment and staging in the Project Area, and temporary changes to the landscape during construction, such as grading, clearing, and replanting. The scale, proximity, and duration of construction activities determine the intensity of potential impacts.

5.10.2 What are the construction impacts common to all action alternatives?

All action alternatives would have construction impacts associated with the following:

- Initial dredging in the North Basin; or North and Middle Basins
- Construction of habitat areas in the Middle Basin; or North and Middle Basins
- Construction of recreational amenities (boardwalks, dock, boat launch, and 5th Avenue Pedestrian Bridge)
- Construction staging and access throughout the Capitol Lake Basin

Construction of all action alternatives would impact visual quality on a temporary, but extended, duration (4 to 8 years). Construction activities would be visible to recreationalists, workers, residents, commuters, and visitors. Visible elements of the project during construction include construction equipment on the lake and heavy machinery occupying staging and construction areas. The scale and duration of construction activities would vary among the action alternatives.

Staging areas would be the most prominent features of the project during construction. All action alternatives would use Marathon Park as the primary construction staging and contractor waterfront access point for the duration of project construction. Access around Marathon Park, including access to the pedestrian bridge across the lake, would be allowed during construction. The park would be otherwise closed during the approximate 4- to 8-year construction period, depending on the alternative. Visual access to the lake from Marathon Park would be obstructed for an extended period, and large numbers of viewers would be affected. Another construction

What construction impacts were considered in the visual resources analysis?

Construction impacts to visual resources include temporary reductions to visual quality, due to the presence of construction equipment and staging in the Project Area, and short-term changes to the landscape during construction, such as grading, clearing, and replanting.

access point would be established at Tumwater Historical Park for equipment needing to access the Middle Basin.

Dredging within the lake would involve floating equipment, as well as coffercells, where the dredged material would be placed. Dredging activities would be visible from many locations surrounding the basins for up to 5.5 months of the year, over a 4- to 5-year period. Dredging would temporarily increase turbidity in the water. Muddy-colored water would affect the visual quality for viewers; however, these impacts would be of relatively short duration and would not severely affect the visual quality for viewers in any of the basins. Coffercells would remain in place beyond the limited in-water work window each year, and until all dredging and habitat creation was completed.



Exhibit 5.86 Coffercell

All action alternatives would include the construction of new boardwalks and a dock and boat launch. These construction activities would contrast with the normally placid visual character of the lake, but would be relatively small in scale and would not dominate views from any of the shorelines.

Visual access to the lake along 5th Avenue SW may be reduced during construction of dam repairs or dam removal, depending on the alternative. Construction staging would also occur around the 5th Avenue Dam during construction of the 5th Avenue Pedestrian Bridge. The 5th Avenue Dam staging area would be adjacent to the existing path and scenic Deschutes Parkway and would be visible for many viewers, both in vehicles and on the path.

Many visual impacts during construction would be small in scale, occur intermittently, and shift location around the basins, and are therefore not considered significant. However, a substantial portion of Marathon Park would be closed for 4 to 5 years, eliminating or obstructing visual access to a portion of the North Basin for numerous users. In addition, coffercells would be present year-round in the North and Middle Basins for 4 to 5 years, creating a long-duration disturbance in the visual landscape. Considered together with the intermittent disruptions to visual access that would occur over the 4- to 8-year period, large numbers of viewers may find the visual quality of the lake diminished during construction of any of the action alternatives. For these reasons, construction impacts on visual resources are considered **significant** for all action alternatives (though some viewers may find the construction activities to be interesting to observe).

5.10.3 What are the construction impacts under the Managed Lake Alternative?

In addition to the construction activities that are common to all alternatives, the Managed Lake Alternative would include the following:

- 5th Avenue Dam overhaul repairs

Dam overhaul repairs would require approximately 6 months of major maintenance work concurrent with construction dredging. This could involve heavy equipment and restricted public access around the dam. Impacts on visual resources from construction of this alternative would primarily be associated with the presence of heavy equipment, temporary in-water structures, and in-water equipment.

These construction activities, while minor, would contribute to the overall construction impacts described for all action alternatives, which were determined to be **significant** because of the duration of impacts on Marathon Park.

5.10.4 What are the construction impacts under the Estuary Alternative?

In addition to construction impacts that are common to all alternatives, the Estuary Alternative has the following construction activities:

- 5th Avenue Dam and 5th Avenue Bridge removal
- Construction of a new 5th Avenue Bridge for vehicles and Deschutes Parkway realignment
- Slope stabilization along Deschutes Parkway
- Stormwater outfall replacement (along Deschutes Parkway and the Arc of Statehood)
- Culvert replacements at the Interpretive Center

Removal of the 5th Avenue Dam would begin with roadway realignment at Deschutes Parkway, demolition and excavation, followed by construction of the new 5th Avenue Bridge. Overall construction would take approximately 4.5 years. Construction impacts on visual resources specific to this alternative would primarily be associated with the presence of heavy equipment, temporary in-water structures, and in-water equipment. Visual impacts would be minor to moderate in scale depending on where they are viewed from.

Constructing the shoreline stabilization would involve placing material along the base of the slope on the east side of Deschutes Parkway. The visual impacts include clearing this area of vegetation and having equipment alongside the road to place the material. Stormwater outfall and culvert replacement would involve similar visual impacts, but at specific locations along the Arc of Statehood, Heritage Park, and within the Interpretive Center. Construction at any given location would be for a limited period of time only, but cumulatively, parkway and park users would see construction next to the roadway and within discrete locations within parks for about 2.5 months.

These construction activities would contribute to the overall construction impacts described for all action alternatives, which were determined to be **significant**.

5.10.5 What are the construction impacts under the Hybrid Alternative?

Construction impacts of the Hybrid Alternative would generally be as described for the Estuary Alternative and for impacts common to all alternatives, except that the Hybrid Alternative would also include the following:

- Barrier wall construction in the North Basin

The barrier wall would be constructed in an arc across the North Basin, from north to south, for a distance of approximately 2,600 feet (790 meters).

Construction of the barrier wall would involve barges, pile-driving equipment, and any temporary in-water structures that may be needed, and would occur concurrently with initial dredging. This construction equipment would be relatively small in scale compared to the basin but would be conspicuous because it would be in the middle of open water and would contrast with the otherwise calm water body.

Construction activities specific to the Hybrid Alternative, while minor or moderate, would contribute cumulatively to the overall construction impacts described for all action alternatives, which were determined to be **significant**.

5.10.6 What mitigation measures would be implemented for this project?

5.10.6.1 Measures Common to All Alternatives

All action alternatives could include the following measures to minimize construction impacts:

- The staging area in Marathon Park could be minimized during periods of no construction to allow visual access where feasible.
- Project areas in parks and along Deschutes Parkway could be planted as soon as feasible to minimize the duration of construction disturbance.
- In-water construction equipment, other than coffercells, could be removed from the lake between construction seasons.

5.10.6.2 Managed Lake Alternative

No additional mitigation would be needed to address construction impacts to visual resources from the Managed Lake Alternative.

5.10.6.3 Estuary Alternative

No additional mitigation would be needed to address construction impacts to visual resources from the Estuary Alternative.

5.10.6.4 Hybrid Alternative

No additional mitigation would be needed to address construction impacts to visual resources from the Hybrid Alternative.

5.10.7 What are the significant unavoidable adverse impacts to visual resources?

Although mitigation measures described in this report could avoid or minimize some adverse visual quality impacts for the construction, there would be **significant unavoidable visual quality impacts** under any of the action alternatives during construction of the project given the scale of construction, the contrast it would have with the park setting, and the duration of anticipated construction staging at Marathon Park.

5.11 ENVIRONMENTAL HEALTH

This section describes the potential impacts from construction on environmental health in the Project Area.

The primary focus of the environmental health analysis is sediment quality because the EIS focuses on the most important elements and conclusions of the discipline-specific analyses. The analysis concludes that sediment quality of Capitol Lake is generally good with the exception that high sulfides are present in surface and dredge layer sediments. As described in Chapter 3.0, Existing Conditions and Affected Environment, sulfides may be toxic to benthic organisms but do not pose a health risk to humans during construction activities. Therefore, impacts associated with construction of the alternatives focus on impacts to sediment quality and effects on benthic organisms, not risks to humans. The information presented in this section is summarized from the full analysis in the Sediment Quality Discipline Report (Attachment 15) and focuses on the potential construction-related impacts from the project, as well as the necessary context to interpret the conclusions.

Key Findings: Sediment Quality Construction Impacts

Sediment dredging and placement of dredged sediments in constructed habitat areas would have **no adverse impacts** on sediment quality because high sediment quality is present throughout the lake within and below the planned dredge areas.

For all action alternatives, dredging would not change sediment quality in the lake basin, although it would uncover sediment with lower sulfide concentrations, which would result in minor beneficial effects on sediment quality in Capitol Lake.

For the Estuary and Hybrid Alternatives, there would be no adverse impacts to sediment quality associated with removing the 5th Avenue Dam because all dam demolition would be contained within a coffer cell to prevent the spread of sediment beyond the mixing zone established by the water quality permit. Sediment quality in the immediate vicinity of the dam is not known but is expected to be good because sediment samples collected nearby did not exceed applicable criteria.

5.11.1 What methods were used to assess construction impacts?

To determine the potential construction impacts of the action alternatives on environmental health, the following three primary activities were evaluated:

- Initial dredging in the North Basin; or North and Middle Basins

- Construction of habitat areas in the Middle Basin; or North and Middle Basins
- Off-site disposal of a limited quantity of dredged sediments for the Estuary and Hybrid Alternatives

Impacts are considered less than significant if they would not increase the risk of exceeding sediment cleanup criteria. Sediment cleanup criteria are established to protect human health and ecological health. Impacts are considered significant if there would be a substantial increased risk to exceeding sediment cleanup criteria.

5.11.2 What are the construction impacts common to all action alternatives?

Construction-related impacts common to all action alternatives are associated with initial construction dredging and placement or export of dredged sediments.

Sediment dredging and placement of dredged sediments in constructed habitat areas would have **no adverse impacts** on sediment quality because high sediment quality is present throughout the lake within and below the planned dredge areas. For all action alternatives, dredged sediments would not be expected to settle outside the dredge areas because dredging would be performed using a hydraulic dredge that does not suspend a significant amount of sediment at its intake.

Dredged sediments would be placed in temporary sheetpile containment cells to contain sediment and allow it to settle within the constructed habitat area. BMPs could be employed to reduce turbidity and ensure water quality permit compliance. Water quality impacts from sediment suspension are addressed in the Water Quality Discipline Report (Attachment 7).

The only parameter of concern for sediment quality impacts from dredging would be total sulfides, which is toxic to benthic organisms but would have no impacts to human health based on the concentrations in Capitol Lake, as described in Chapter 3.0, Existing Conditions and Affected Environment. Because sulfides and other chemical concentrations are similar in surface and dredged sediments based on the 2020 sediment sampling, initial dredging and placement of dredged sediments in the habitat areas would slightly improve sediment quality in Capitol Lake.

What construction impacts were considered for the environmental health analysis?

Construction impacts were analyzed based on the potential change in sediment quality from initial construction dredging and placement or export of dredged sediments.

For the **Managed Lake Alternative**, dredging would occur in the entire North Basin and all dredged sediments would be used to construct habitat areas in the Middle Basin.

For the **Estuary and Hybrid Alternatives**, dredging would occur in portions of the North and Middle Basins and most dredged sediments would be used to construct habitat areas in other portions of those basins, while some excess dredged sediments would be transported to and disposed of at an approved upland landfill or placed at an upland site for reuse.

Sulfide concentrations are much lower in the deeper samples so lake sediments uncovered by dredging would have low sulfide concentrations that would result in **minor beneficial effects** on sediment quality (i.e., a decrease of sulfides in sediment) in Capitol Lake. The extent of these beneficial effects would vary by dredge area, ranging from approximately 50 acres (20 hectares) for the Hybrid Alternative to 127 acres (51 hectares) for the Managed Lake Alternative.

Some initial dredged sediments would be transported for disposal or reuse outside of the study area for the Estuary Alternative (13,000 cubic yards [9,900 cubic meters]) and Hybrid Alternative (98,000 cubic yards [75,000 cubic meters]) because of limited space available for habitat areas relative to the total dredge volume. Sediment export is not assumed under the Managed Lake Alternative because the lower dredge volume could be accommodated within the habitat areas. Therefore, potential impacts from off-site disposal or reuse of sediments are addressed below for the Estuary and Hybrid Alternatives.

Vehicles and equipment used for construction activities (and subsequent operations) would include the use of fuels, oils, lubricants, and other petroleum-related projects within the Project Area. These potentially hazardous materials would be subject to applicable local, state, and federal regulations and guidance pertaining to use, handling, and storage. Construction can result in the release of hazardous materials to the environment if proper protective measures are not followed. Fuel spills can occur during mobile fueling of heavy equipment. Hydraulic oil leaks are not uncommon on large construction sites. Spill prevention and response planning is typically conducted prior to the start of construction to prevent, and if needed, respond to such spills. The potential risk of spills continues throughout the duration of construction given the continued presence of construction equipment and construction-related activities. For the Managed Lake Alternative, construction would take approximately 4 years. For the Estuary and Hybrid Alternatives, construction would take approximately 8 years.

5.11.3 What are the construction impacts under the Managed Lake Alternative?

In addition to impacts common to all action alternatives, construction impacts of the Managed Lake Alternative on sediment quality would primarily be associated with the dredging in the North Basin and using dredged sediments to create habitat areas in the Middle Basin.

Impacts from initial dredging and other construction activities would be consistent with those common to all alternatives. Dredging generally would not change sediment quality in the North Basin except it would uncover 127 acres (51 hectares) of sediments with lower sulfide concentrations resulting in a **minor beneficial effect** on sediment quality in the lake. Implementation of BMPs during dredging would limit the transport of sediment out of the lake, resulting in **no adverse impacts** to sediment quality in Budd Inlet during construction.

There would be **no adverse impacts** to sediment quality associated with repairing the 5th Avenue Dam because all repair work would be contained with spillways, conducted overwater, or conducted on the Budd Inlet side of the dam, using appropriate containment BMPs. Sediment quality in the immediate vicinity of the dam is not known but is expected to be good because sediment samples collected nearby did not exceed applicable criteria. Minor amounts of sediment may be suspended during dam repair but it is anticipated that those suspended sediments would not travel far from the dam on either side of the dam because BMPs would be required to reduce turbidity impacts.

5.11.4 What are the construction impacts under the Estuary Alternative?

Construction impacts of the Estuary Alternative on sediment quality would generally be consistent with those common to all alternatives. **No adverse impacts** to sediment quality would occur during dredging in the North Basin and Middle Basin, and dredged sediments would be used to create habitat areas in both basins. Reusing dredged sediments within the system is a key design element that avoids or minimizes the disposal of sediments outside the Project Area.

Dredging generally would not change sediment quality in the lake basin except it would uncover approximately 60 acres (24 hectares) of sediments with lower sulfide concentrations resulting in a **minor beneficial effect** on sediment quality (meaning, less sulfide exposure to benthic organisms) in the dredge areas. As noted for the Managed Lake Alternative, the required implementation of BMPs during dredging and placement of dredged materials in habitat areas would limit the transport of sediment out of the lake, resulting in **no adverse impacts** to sediment quality in Budd Inlet during construction.

A small portion (less than 3%) of the dredged sediments would be transported off-site for upland reuse or landfill disposal because of

Initial Dredging and Placement

Managed Lake Alternative

Approximately 348,000 cubic yards (270,000 cubic meters) dredged from the entire 127 acres (51 hectares) of the North Basin. All dredged sediments would be placed over approximately 35% of the 147-acre Middle Basin to construct habitat areas.

Estuary Alternative

Approximately 526,000 cubic yards (400,000 cubic meters) dredged from 30 acres of the North Basin, 30 acres (12 hectares) of the Middle Basin, and less than

5 acres at the opening at the 5th Avenue Bridge. All but 3% of the dredged sediments would be placed in other areas of the North and Middle Basin to construct habitat areas covering approximately 30% of each basin. In addition, approximately 10 acres of the west shoreline of each basin would be filled with dredged material to stabilize Deschutes Parkway.

Hybrid Alternative

Initial dredging for the Hybrid Alternative would be similar to that described for the Estuary Alternative except less sediment would be dredged from the North Basin and placed in the North Basin for habitat construction. The estimated dredge volume for the Hybrid Alternative is approximately 499,000 cubic yards (380,000 cubic meters), with 20% of that being exported compared to 3% for the Estuary Alternative.

the limited area for constructing habitat areas, as these sediments would not be suitable for in-water disposal due to the presence of aquatic invasive species. All dredged sediments are expected to be suitable for unrestricted upland disposal.

There would be no adverse impacts to sediment quality associated with removing the 5th Avenue Dam because all dam demolition would be contained to prevent the spread of sediment beyond the mixing zone established by the water quality permit. Sediment quality in the immediate vicinity of the dam is not known but is expected to be good because sediment samples collected nearby did not exceed SMS criteria.

5.11.5 What are the construction impacts under the Hybrid Alternative?

Construction impacts of the Hybrid Alternative on sediment quality would generally be as described for all alternatives and the Estuary Alternative. No adverse impacts to sediment quality would occur for the initial dredging of the North Basin and Middle Basin, and dredged sediments would be used to create habitat areas in both basins. Reusing dredged sediments within the system is a key design element that avoids or minimizes the disposal of sediments outside the Project Area. Implementation of BMPs during dredging and placement of dredged sediments in habitat areas would limit the transport of sediment out of the lake.

In addition, minor beneficial effects of reduced sulfide concentrations in dredge areas common to all action alternatives would occur as described in Section 5.11.2.

A small portion of the dredged sediments would be transported off-site for upland disposal, and not to an open-water disposal site due to the presence of aquatic invasive species. All dredged sediments are expected to be suitable for unrestricted upland disposal, but may need to be treated for invasive species.

There would be no adverse impacts to sediment quality associated with removing the 5th Avenue Dam because all dam demolition would be contained to prevent the spread of sediment beyond the mixing zone established by the water quality permit. Sediment quality in the immediate vicinity of the dam is not known but is expected to be good because sediment samples collected nearby did not exceed SMS criteria.

5.11.6 What mitigation measures would be implemented for this project?

Enterprise Services would avoid and minimize potential impacts by complying with regulations, permits, plans, and authorizations. These anticipated measures, and other mitigation measures that could be recommended or required, are described below.

5.11.6.1 Measures Common to All Alternatives

In accordance with the environmental permits that would be obtained prior to dredging, BMPs for turbidity management and spill prevention would be implemented during construction and operational dredging activities to minimize and avoid impacts to sediment quality, as related to environmental and ecological health. The BMPs are nondiscretionary actions that are needed to maintain water quality standards throughout the work. They often include the following measures.

- Use of a hydraulic dredge or closed bucket dredging
- Limiting the amount of dredged sediment on the receiving barge
- Slowing the rate of dredging to minimize turbidity
- Working within the in-water work window to avoid impacts to migrating salmonids
- Installing a silt curtain to contain turbidity within the immediate dredge area

A WQMPP would also be prepared, approved by the regulatory agencies, and implemented throughout construction. This plan is intended to measure the performance of the BMPs implemented to maintain water quality standards, identify potential violations, and outline contingency measures that would be implemented if water quality standards were violated. The plan would include turbidity monitoring, inspection of spill control equipment, and actions required by the certification. Therefore, no specific sediment quality mitigation plans would be necessary for the project.

5.11.6.2 Managed Lake Alternative

No additional mitigation would be needed to address construction impacts to sediment quality from the Managed Lake Alternative.

5.11.6.3 Estuary Alternative

No additional mitigation would be needed to address construction impacts to sediment quality from the Estuary Alternative.

5.11.6.4 Hybrid Alternative

No additional mitigation would be needed to address construction impacts to sediment quality from the Hybrid Alternative.

5.11.7 What are the significant unavoidable adverse impacts to environmental health?

There would be no significant unavoidable adverse impacts related to sediment quality under any of the action alternatives.

5.12 TRANSPORTATION

This section describes the potential impacts from project construction on surface transportation elements in the study area. The information presented in this section is summarized from the full analysis in the Transportation Discipline Report (Attachment 16).

Key Findings: Transportation Construction Impacts

Construction for all action alternatives would include a period in which the 5th Avenue Bridge is closed. For the Managed Lake Alternative, the bridge would be narrowed or closed for approximately 7 weeks for repairs and overhaul work. For the Estuary and Hybrid Alternatives, the bridge would be closed for approximately 4.5 years for replacement. Although mitigation measures would minimize adverse traffic impacts, traffic increases along the 4th Avenue detour route still could result in congested operations during some periods of peak traffic demand, resulting in a **significant unavoidable impact** during the times that it occurs.

For all other construction activities, implementation of a Construction Traffic Management Plan (CTMP) and Traffic Control Plan is expected to reduce impacts from the temporary narrowing of streets, sidewalks, or bike lanes; construction-generated truck trips; and construction employee trips and parking to less than significant levels.

5.12.1 What methods were used to assess construction impacts?

To determine the potential construction impacts of the action alternatives on transportation, the characteristics of the transportation facilities within the study area were identified. Truck trips generated by construction activity were estimated by applying typical truck capacities to earthwork (for expected off-site hauling

only), demolition, and delivery estimates, assuming averages over the anticipated duration of construction activities. Estimates of construction worker trips and parking demand were based on the peak number of construction workers expected to be at the site. The traffic effects (vehicular and nonmotorized) of temporary removal of the 5th Avenue Bridge during construction of the Estuary or Hybrid Alternative were evaluated through review of traffic operational standards, policies, and available traffic data from the Cities of Olympia and Tumwater.

5.12.2 What are the construction impacts common to all action alternatives?

Under all action alternatives, construction impacts would be associated with the construction activities described in Chapter 2.0, Project Alternatives and Construction Approach. These construction activities would contribute to the following potential impacts on the transportation network:

- Street capacity, sidewalk, or bike lane restrictions
- Construction worker trips and parking
- Truck trips generated by mobilization and deliveries
- Truck trips generated by the export of dredged or demolition material
- Vehicle traffic operations during the potential 5th Avenue Bridge closure
- Rail operations
- Transit during potential 5th Avenue Bridge closure
- Pedestrian and bicycle traffic during the 5th Avenue Bridge closure
- Pavement degradation due to construction traffic

Construction activities for the action alternatives include the delivery of equipment and materials to the site, and transporting of dredged or demolished material away from the site. All three action alternatives would reuse dredged material to build habitat areas, which would substantially reduce or eliminate the amount of material that would need to be transported off-site. As described below, the quantity of dredged material transported off-site (and therefore the number of truck trips required) would vary by alternative. Potential truck haul routes are shown in Figure 5.12.1.

What construction impacts were considered for the transportation analysis?

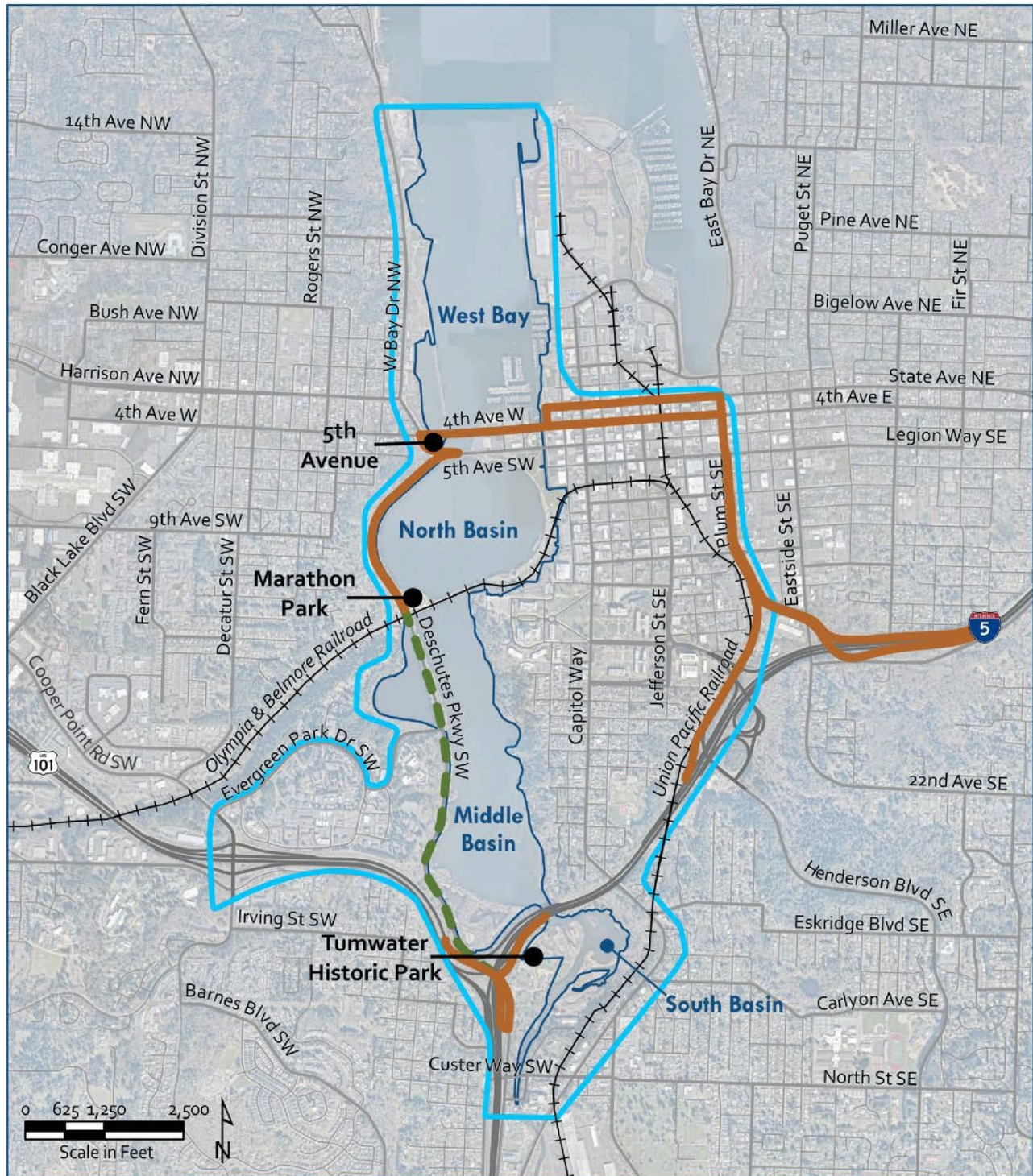
Truck trips would be generated by construction activities associated with earthwork, demolition, and material/equipment deliveries. Construction worker trips would generate vehicle trips and parking demand. In general, most project-related impacts on transportation would be associated with construction, not long-term operation of the project.

An average of five truck trips or fewer each hour would be generated, primarily occurring during off-peak times of day (outside of commuter peak hours). Although these trips may be noticeable to nearby residents and businesses, they would cause very small increases in the average delay at intersections along the truck haul routes but would not change the LOS at intersections in the study area. There would also be times during the overall 4- to 8-year construction duration when there would be no truck trips generated by the project. Project construction could also result in temporary narrowing or closure of streets, sidewalks, or bicycle facilities adjacent to construction activities. These temporary closures, and the small amount of delay added by truck trips, would have a less than significant impact on traffic operations.

In addition, construction workers would generate commute trips and parking demand at the project site. Construction worker commute trips would vary depending on the construction activity occurring on any given day (expected to range between 15 and 40 trips inbound in the morning prior the beginning of the workday and outbound in the evening after the workday is completed). Based on typical construction shifts, most construction employee commute trips would occur during off-peak times of day, with morning trips occurring before the start of the peak morning commute period and afternoon trips occurring before the beginning of the peak evening commute period.

Enterprise Services would prepare a CTMP and Traffic Control Plan, as a primary BMP, prior to construction. Implementation of the CTMP and Traffic Control Plan is expected to reduce impacts resulting from the temporary narrowing of streets, sidewalks, or bike lanes, construction-generated truck trips, and construction employee trips and parking to less than significant levels.

Figure 5.12.1 Potential Truck Haul Routes



Legend

- Construction Staging Area
- Project Area
- Potential Truck Haul Route (Via Designated Truck Streets)
- Potential Truck Haul Route (Via Non-Designated Truck Street)
- Study Area

Because the project site is directly served by railroad, it may be possible to use rail to support construction activities. The feasibility of using rail would depend on a number of factors and would be determined by the project contractor prior to construction. Although the use of trucks for construction activities would have a small impact on traffic operations, the use of rail to support some or all of the construction activities would reduce truck trips and lower traffic operational impacts along the truck haul routes. Because the train volumes associated with construction activities would be consistent with existing activity on the tracks, the impact on traffic operations at crossings would be less than significant.

Construction of all action alternatives would include a period in which the 5th Avenue Bridge would be closed, with the length of closure ranging from about 7 weeks to 4.5 years, depending on the alternative. Vehicle traffic that currently uses the bridge would need to be detoured during the closure. The detour route (Figure 5.12.2) would be determined in coordination with the City of Olympia, but with a connection provided between 4th Avenue W and Deschutes Parkway, the detour would likely utilize the 4th Avenue Bridge. Some drivers may choose alternate routes (i.e., other than the signed detour) around the south end of the waterway, particularly if they are traveling to or from the area west of the Middle Basin. Based on the analysis of existing and projected future conditions described in the Transportation Discipline Report (Attachment 16), most intersections within the study area have the capacity to accommodate additional traffic that would be generated by the detours, and it is expected that with mitigation in place to manage traffic, they would continue to operate within the City of Olympia and City of Tumwater standards during most times of the day. However, this impact is still considered **potentially significant** because the analysis indicates that during some peak conditions (and taking future traffic growth into consideration), traffic increases could be high enough that some downtown intersections would degrade to a congested condition (i.e., LOS F).

To reduce impacts associated with the bridge closure, the CTMP would establish the vehicular and nonmotorized detours during the period that the 5th Avenue Bridge would be closed and traffic control measures to be implemented along the detour route (and potentially along other alternate routes that could experience traffic increases). These, and other potential measures during bridge closure, are discussed below in Section 5.12.6.

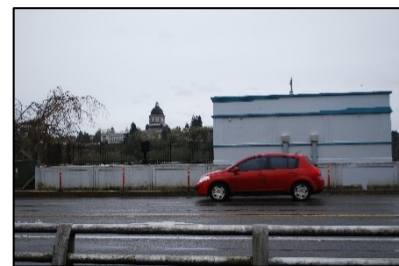
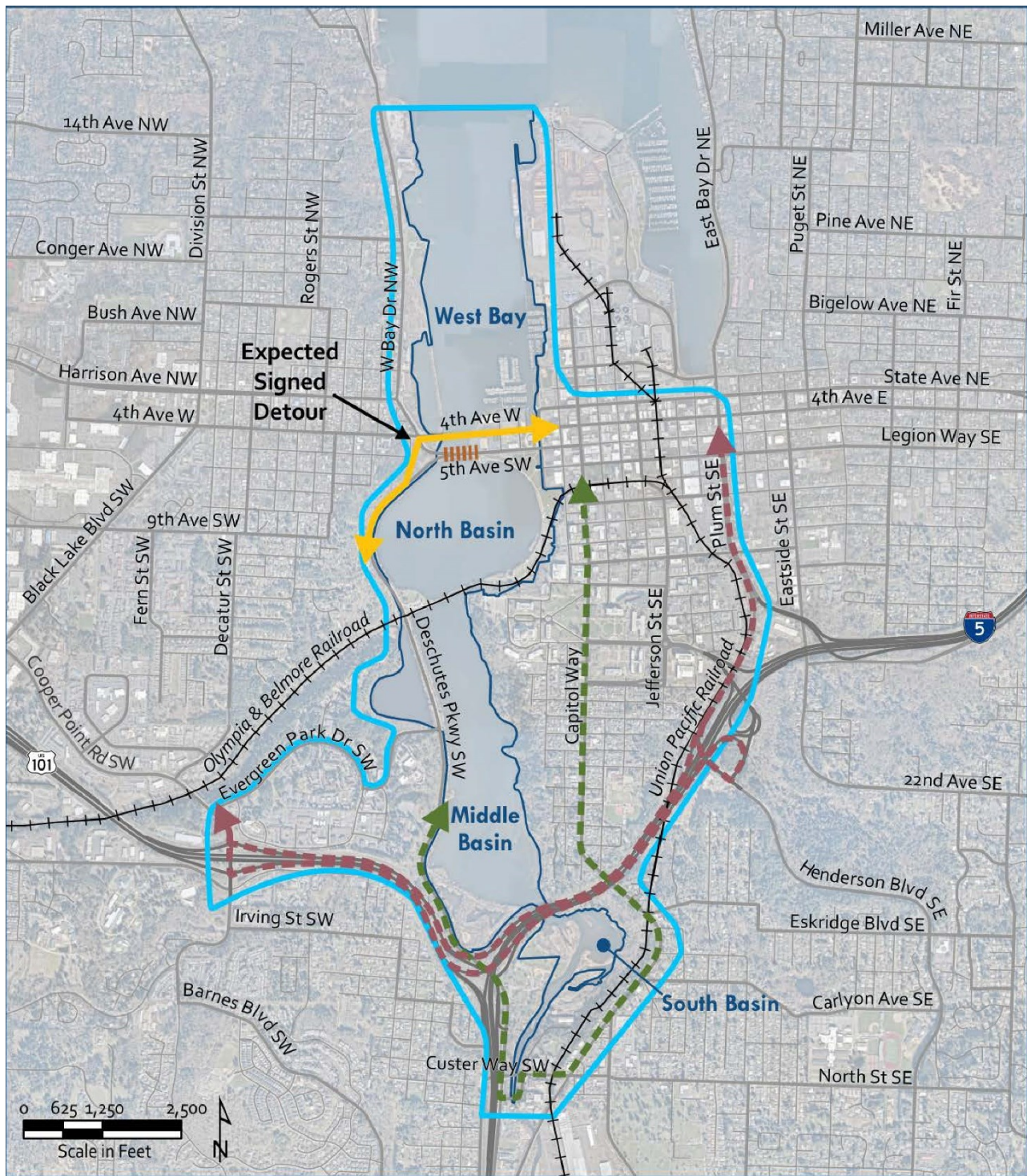


Exhibit 5.87 Traffic on the existing 5th Avenue Bridge

Although mitigation measures would avoid or minimize adverse traffic impacts identified for construction of the three action alternatives, during periods when the 5th Avenue Bridge would be closed, traffic increases along the 4th Avenue W detour route still could result in congested operations during some periods of peak traffic demand, resulting in a **significant unavoidable impact** during the times that it occurs.

Construction impacts on transportation common to all action alternatives are listed and summarized in Table 5.12.1.

Figure 5.12.2 Potential Traffic Detours During 5th Avenue Bridge Closure



Legend

- Expected Signed Detour
- Potential Alternate Routes
- Potential Alternate Routes
- Bridge Closure
- Project Area
- Study Area

Table 5.12.1 Summary of Construction Impacts Common to All Action Alternatives

Impact	Impact Finding	Measures to Reduce or Mitigate for Significant Impacts	Significant & Unavoidable Impacts
Truck Trips Generated by Mobilization and Deliveries	Less than significant impact	In addition to implementation of a CTMP with measures described in Section 5.12.6, the following additional measures could be considered: <ul style="list-style-type: none"> • Apply time-of-day restrictions for construction trips • Use rail to reduce truck trips 	No
Truck Trips Generated by Export of Dredged or Demolition Material	Less than significant impact (<i>differs by action alternative; see Sections 5.12.3 through 5.12.5</i>)	In addition to implementation of a CTMP with measures described in Section 5.12.6, the following additional measures could be considered: <ul style="list-style-type: none"> • Apply time-of-day restrictions for construction trips • Use rail to reduce truck trips 	No
Vehicle Traffic Operations During Potential 5 th Avenue Bridge Closure	Significant impact (<i>differs by action alternative; see Sections 5.12.3 through 5.11.5</i>)	In addition to implementation of a CTMP with measures described in Section 5.12.6: <ul style="list-style-type: none"> • Coordinate with City of Olympia to establish and sign traffic detour, which is expected to use the 4th Avenue Bridge and new connection to Deschutes Parkway that would be constructed with the project • Develop and implement a public communications strategy, to encourage alternative transportation choices and reduce overall volumes crossing the waterway 	Yes, potentially during some periods of peak traffic demand (also see additional analysis for Managed Lake Alternative)
Street Capacity, Sidewalk, or Bike Lane Restrictions	Less than significant impact	Implement a CTMP and Traffic Control Plan with measures described in Section 5.12.6	No
Construction Worker Trips and Parking	Less than significant impact	In addition to implementation of a CTMP with measures described in Section 5.12.6: <ul style="list-style-type: none"> • Prohibit construction employee parking in residential neighborhoods, Capitol Campus, and downtown streets 	No
Rail Operations	Less than significant impact	Coordinate with rail owner to ensure that construction activities do not interfere with scheduled rail trips across the Project Area	No

Impact	Impact Finding	Measures to Reduce or Mitigate for Significant Impacts	Significant & Unavoidable Impacts
Transit During Potential 5 th Avenue Bridge Closure	Significant impact <i>(differs by action alternative; see Sections 5.12.3 through 5.12.5)</i>	In addition to implementation of a CTMP with measures described in Section 5.12.6: <ul style="list-style-type: none"> • Coordinate with Intercity Transit to reroute affected bus routes to the 4th Avenue Bridge • Move bus stops for 5th Avenue SW routes to 4th Avenue W, about 300 to 500 feet (91 to 150 meters) away 	Yes (potentially for Managed Lake Alternative) No (for Estuary and Hybrid Alternatives)
Pedestrian and Bicycle Traffic During 5 th Avenue Bridge Closure	Less than significant impact	In addition to implementation of a CTMP with measures described in Section 5.12.6: <ul style="list-style-type: none"> • Construct the pedestrian bridge prior to closure of the 5th Avenue Bridge • Alternatively, construct a temporary trail trestle during the time the 5th Avenue Bridge is closed 	No
Pavement Degradation Due to Construction Traffic	Less than significant impact	Restore pavement after construction is completed	No

5.12.3 What are the construction impacts under the Managed Lake Alternative?

Under the Managed Lake Alternative, the 5th Avenue Bridge would be overhauled to significantly extend the serviceable life of the structure (i.e., through electrical system and structural upgrades). While jet grouting occurs, the bridge would be narrowed or closed for up to about 7 weeks (the shortest closure time among the action alternatives). With the Managed Lake Alternative, all dredged material generated during construction would be transferred and used on-site and there would be no off-site hauling of dredged material during construction (unlike the other action alternatives).

For the Managed Lake Alternative, if closure of the 5th Avenue Bridge was needed during some or all of the period jet grouting occurs, and a temporary connection between 4th Avenue W and Deschutes Parkway was not constructed, all detoured vehicles and buses would be required to use the routes around the south end of the Middle Basin. This would substantially increase travel time between the east and west sides of the waterway and likely degrade operations along

the detour routes to LOS F during peak times of day, resulting in **significant unavoidable impacts** on both traffic operations and transit service. Without a connection between 4th Avenue W and Deschutes Parkway, this would be a **significant and unavoidable impact** during all periods of the day. The remaining impacts on surface transportation from construction of the Managed Lake Alternative would be less than significant.

5.12.4 What are the construction impacts under the Estuary Alternative?

Under the Estuary Alternative, bridge reconstruction would require work in the area for up to about 4.5 years, during the period of roadway realignment, removal, and reconstruction of the new 5th Avenue Bridge.

During the 4.5-year period when the 5th Avenue Bridge was closed and a 4th Avenue W detour was in place, traffic increases along the detour route could result in congested operations during some periods of peak traffic demand. For the Estuary Alternative, this would be a **significant unavoidable impact** on vehicle traffic operations during the times that it occurred. The remaining impacts on surface transportation from construction of the Estuary Alternative would be less than significant.

5.12.5 What are the construction impacts under the Hybrid Alternative?

The Hybrid Alternative would have the most dredged material transported off-site (via truck trips) because it would have less habitat constructed with the addition of the reflecting pool.

As with the Estuary Alternative, during the 4.5-year period when the 5th Avenue Bridge was closed and a 4th Avenue detour was in place, traffic increases along the detour route could result in congested operations during some periods of peak traffic demand. For the Hybrid Alternative, this would be a **significant unavoidable impact** on vehicle traffic operations during the times that it occurred. The remaining impacts on surface transportation from construction of the Hybrid Alternative would be less than significant.

5.12.6 What mitigation measures would be implemented for this project?

5.12.6.1 Measures Common to All Alternatives

All action alternatives include the following BMP commitments to manage vehicular and nonmotorized transportation during project construction.

- **CTMP and Traffic Control Plan.** Enterprise Services would develop a CTMP that includes a Traffic Control Plan in accordance with City of Olympia and City of Tumwater requirements. The CTMP would establish the vehicular and nonmotorized detours during the period that the 5th Avenue Bridge would be closed, and determine traffic control measures to be implemented along the detour route (and potentially along other alternate routes that could experience traffic increases). Traffic control would follow the guidelines of the WSDOT Standard Specifications. All barricades, signs, coning, and flagging should conform to the requirements of the Manual on Uniform Traffic Control Devices. In addition to the standard requirements, the CTMP would detail truck haul routes and the parking plan for construction workers. Haul routes would utilize streets designated as truck routes to the greatest extent possible and would be established in coordination with the Cities of Olympia and Tumwater. The CTMP and Traffic Control Plan would be submitted to and approved by the Cities with jurisdiction prior to the start of construction. Implementation of the CTMP and Traffic Control Plan is expected to reduce impacts resulting from temporary narrowing of streets, sidewalks, or bike lanes, construction-generated truck trips, and construction employee trips and parking to less than significant levels.
- **Pavement restoration.** After completion of construction activities, any pavement damaged or degraded by construction-generated trucks would be restored to pre-construction condition or better.

The following additional mitigation measures have been identified for all action alternatives:

- **Construction trip restrictions.** Avoid creating additional delay at intersections by restricting construction trips

during the commuter peak periods when traffic volumes on the street system would be highest. The CTMP measures could vary based on seasonal fluctuations in traffic and parking patterns as appropriate.

- **Construction vehicle parking.** Provide adequate off-street parking areas at designated staging areas for construction-related vehicles. Prohibit construction employee parking in nearby residential neighborhoods, the Capitol Campus, and on downtown streets with either unrestricted or metered parking.
- **Use of rail for hauling materials to or from project site.** Reduce truck trips by using rail to haul materials to or from the project site. Depending on the train volumes that would be generated, measures may be needed in the CTMP to manage traffic at at-grade railroad crossings (e.g., the use of flaggers or temporary signals).

The following measures are identified to address the transportation impact of closure of the 5th Avenue Bridge during construction:

- To reduce impacts on vehicle traffic operations, coordinate with the City of Olympia to establish and sign the traffic detour, which is expected to utilize the 4th Avenue Bridge and new connection to Deschutes Parkway that would be constructed with the project.
- To encourage alternative transportation choices and reduce overall volumes crossing the waterway, develop and implement a public communication strategy.
- To reduce impacts on transit, coordinate with Intercity Transit to reroute affected bus routes to the 4th Avenue Bridge. Move bus stops for 5th Avenue SW routes to 4th Avenue E and 4th Avenue W, about 300 to 500 feet (91 to 150 meters) away.
- To reduce impacts on pedestrian and bicycle traffic, construct the 5th Avenue Pedestrian Bridge prior to closure of the 5th Avenue Bridge. Alternatively, construct a temporary trail trestle during the time the 5th Avenue Bridge is closed.

These measures are summarized from the full mitigation measures included in the Transportation Discipline Report (Attachment 16).

5.12.6.2 *Managed Lake Alternative*

No additional transportation mitigation would be needed during construction of the Managed Lake Alternative.

5.12.6.3 *Estuary Alternative*

No additional transportation-related mitigation would be needed during construction of the Estuary Alternative.

5.12.6.4 *Hybrid Alternative*

No additional transportation-related mitigation would be needed during construction of the Hybrid Alternative.

5.12.7 **What are the significant unavoidable adverse impacts to transportation?**

Although mitigation measures described in this EIS would avoid or minimize adverse traffic impacts identified for construction of the three action alternatives, the following impacts would still be considered significant and unavoidable.

- For both the Estuary and Hybrid Alternatives, when the 5th Avenue Bridge was closed and a 4th Avenue W detour was in place, traffic increases along the detour route could still result in congested operations during some periods of peak traffic demand, resulting in a **significant unavoidable impact** during the times that it occurred.
- For the Managed Lake Alternative, if closure of the 5th Avenue Bridge was needed during some or all of the period when jet grouting occurs, and a temporary connection between 4th Avenue W and Deschutes Parkway was not constructed, all detoured vehicles and buses would be required to use the routes around the south end of the Middle Basin. This would substantially increase travel time between the east and west sides of the waterway during all times of day and likely degrade operations along the detour routes to LOS F during peak times of day, resulting in **significant unavoidable impacts** on both traffic operations and transit service.

5.13 **PUBLIC SERVICES & UTILITIES**

This section describes the potential impacts from project construction on public services and utilities in the study area. The

information presented in this section is summarized from the full analysis in the Public Services and Utilities Discipline Report (Attachment 17).

Key Findings: Public Services and Utilities Construction Impacts

Under all action alternatives, accidental damage to utility lines during project construction could temporarily disrupt utility services. However, with measures to locate utility lines and to coordinate final construction plans with affected utilities, the potential impact on utilities would be less than significant. Under the Managed Lake Alternative, closure of the 5th Avenue Bridge for repairs would be temporary and short (about 7 weeks), so impacts related to increased emergency response time and travel time in the corridor would be less than significant. The bridge closure would be much longer (about 4.5 years) under the Estuary and Hybrid Alternatives, which could have a **significant impact** on emergency service response times. With development of a CTMP and additional coordination with the local jurisdictions, impacts could be reduced to less than significant levels and ensuring that emergency services are not compromised.

5.13.1 What methods were used to assess construction impacts?

Potential construction impacts were determined by considering whether project activities could temporarily interrupt utility service during relocation or replacement, or as a result of accidental disruption, or create longer response times for emergency response and other public services on a temporary basis. This analysis qualitatively assessed where construction impacts would have the greatest potential to impact utilities adjacent to the Project Area and public services in the area.

Project construction would last 4 to 8 years, depending on the alternative, and would entail initial dredging, creation of habitat areas, and construction of a new 5th Avenue Pedestrian Bridge, boardwalks, dock, and boat launch.

5.13.2 What are the construction impacts common to all action alternatives?

The types of construction impacts that would occur are similar among the action alternatives and include the following:

- Initial dredging in the North Basin; or North and Middle Basins
- Construction of habitat areas in the Middle Basin; or North and Middle Basins

What construction impacts were considered for the public services and utilities analysis?

Factors considered for the analysis of construction effects on utilities included interruptions and temporary outages from the relocation or replacement of infrastructure or facilities that provide water, refuse services, electricity, natural gas, or telecommunications. Factors considered for the analysis of construction effects on public services include the increased demands on emergency services, and the project's potential to alter or hinder the timely provision of emergency services or other public services during construction.

- Construction of recreational amenities (boardwalks, dock, boat launch, and 5th Avenue Pedestrian Bridge)
- Construction staging and access throughout the Capitol Lake Basin

During construction of these common elements, public services would be affected by a nominal increase in traffic congestion, and delays on the primary roads affected by construction and on roads around the construction area. Truck trips from project construction could result in nominal increases in both response times for emergency service providers and travel times for other services (e.g., solid waste collection, postal services, and school buses). With implementation of traffic control plans and proper notifications (as described in Section 5.13.6), potential impacts on response times and existing services associated with these elements would be less than significant.

All action alternatives would require the temporary use of power during construction for trailers and equipment. Construction crews would likely use on-site generators or existing electricity infrastructure provided by Puget Sound Energy. This would be unlikely to result in interruptions in service and would not affect any other existing utilities.

Although no public utilities have been identified within the areas of the Capitol Lake Basin proposed for initial dredging, habitat area creation, or boardwalk/dock/launch construction, several utilities cross the Project Area or are adjacent to construction sites. Streets, roads, and bridges in the Project Area serve as utility corridors. As much as possible, piers associated with the new 5th Avenue Pedestrian Bridge would be located to avoid conflicting with underground utilities.

Under all action alternatives, accidental damage to utility lines during project construction could temporarily disrupt utility services. Overhead utility poles and lines could be susceptible to accidental damage when moving large construction equipment and vehicles throughout the Project Area. Similarly, accidental damage to utility lines during project construction could temporarily disrupt utility services. The construction contractors would be required to confirm the location of existing utilities and mark the confirmed locations accurately on the final construction drawings; work with utility service providers to minimize the risk of damage to existing utility lines and ensure prompt reconnection of service in the event of a

service disruption; and take special precautions when working near high-risk utility lines, including tailgate meetings with contractor staff on days when work will occur near high-risk utilities. With implementation of measures to locate and confirm utility locations and to coordinate final construction plans with affected utilities, the potential impact on utilities would be less than significant.

Other potential construction impacts on public services and utilities would vary by alternative, as described in the sections below.

5.13.3 What are the construction impacts under the Managed Lake Alternative?

For the Managed Lake Alternative, if closure of the 5th Avenue Bridge were needed for jet grouting and a temporary connection between 4th Avenue W and Deschutes Parkway were not constructed, all detoured vehicles would be required to use routes around the south end of the Middle Basin. While this would likely increase response times for emergency vehicles through this east-west corridor during peak times of day, impacts would be less than significant given the short-term duration of closure (7 weeks).

The overhaul repairs to the 5th Avenue Dam would require the replacement or overhaul of electrical systems within the dam; however, no utility conflicts are anticipated, and no utilities would be relocated. As a result, there would be no impacts on public services or utilities.

In general, construction-related impacts under the Managed Lake Alternative would be less disruptive than under the Estuary or Hybrid Alternative, given the much shorter closure of the 5th Avenue Bridge (7 weeks versus about 4.5 years). Based on the location and short-term nature of the repairs, any impacts on public services and utilities would be minor and temporary, and therefore less than significant.

5.13.4 What are the construction impacts under the Estuary Alternative?

The Estuary Alternative would require closing the 5th Avenue Bridge for an extended duration (about 4.5 years) during its removal and reconstruction. Ongoing construction activities could result in temporary lane closures, increased truck traffic, and other roadway effects. Response times and access for public services and utility providers may be temporarily affected by detours during this time. Based on their locations in downtown Olympia (Fire District 1) and

West Olympia (Fire District 2), service calls within those districts typically do not require an east–west crossing of the 5th Avenue Bridge. However, during multiple concurrent or large-scale events, any fire district can respond, which could require travelling east–west. Emergency response times for emergency vehicles that would need to respond through the area would likely be increased for an estimated 4.5 years, and would potentially be a **significant impact** given the extended duration.

Trenching or excavation associated with replacing outfalls and stabilizing Deschutes Parkway could result in utility conflicts and disruptions. In most cases, service disruptions would be temporary and would not exceed 1 day. An accidental rupture of or damage to utility lines during project construction could also temporarily disrupt utility services. The potential for impact would be minimized with implementation of measures to locate and confirm utility lines and coordination of final construction plans with utilities.

Construction impacts on utilities under the Estuary Alternative would mostly be associated with the removal/demolition of the 5th Avenue Bridge. Existing utility lines on the 5th Avenue Bridge (including potable water, sewer line, and natural gas line) would need to be relocated. Utility lines would likely be relocated to the 4th Avenue Bridge, under the 5th Avenue Pedestrian Bridge, or directionally drilled under the opening. The methods for relocating utilities would be identified during the design phase of the project. Service disruptions would be minimal as utility lines would be relocated prior to removal of the bridge. Replacing the stormwater outfalls along Deschutes Parkway and along the Arc of Statehood would avoid temporary impacts on stormwater conveyance either by timing construction to avoid times when stormwater flow would occur, or by providing temporary diversions. With measures to minimize utility disruptions, impacts would be less than significant.

With implementation of measures to mitigate for impacts on public services and utilities, temporary construction impacts from these activities are considered less than significant.

5.13.5 What are the construction impacts under the Hybrid Alternative?

For the Hybrid Alternative, construction impacts and the duration of impacts would be the same as those described for the Estuary Alternative, with potential impacts related to the 4.5-year closure of the 5th Avenue Bridge and the need for utility replacement.

Emergency response times for emergency vehicles that would need to respond through the area would likely increase for that period, which would potentially be a **significant impact**. As described for impacts common to all alternatives, measures will be implemented to mitigate for impacts on public services and utilities (see Section 5.13.6). With implementation of these measures, impacts on public services and utilities from the Hybrid Alternative would be less than significant.

5.13.6 What avoidance, minimization, and mitigation measures would be implemented for this project?

5.13.6.1 Measures Common to All Action Alternatives

- Prior to construction, consult with local police, fire, and emergency response to develop and implement emergency response plans, establish emergency vehicle routes, and ensure that general emergency management services are not compromised.
- Prior to the completion of final project construction plans, individual utility agencies with utilities located within or adjacent to areas of construction activity shall be contacted to determine the extent and type of temporary protective measures that must be implemented to prevent construction damage to surface and subsurface utilities.
- Coordinate with utility companies and other relevant agencies before construction to locate existing utilities and avoid damage. Avoid the relocation of utilities whenever possible. Provide notification of any potential interruptions in services to the appropriate agencies.
- Stage utility relocations to minimize interruptions in service.
- Require contractors to prepare traffic control plans for construction activities that may affect road rights-of-way. Measures typically used in traffic control plans include advertising of planned lane closures, warning signage, a flag person to direct traffic flows when needed, and methods to ensure continued access by emergency vehicles. (For more details on the CTMP, see Section 5.12.6.)

5.13.6.2 *Managed Lake Alternative*

No additional mitigation would be needed to address construction impacts to public services and utilities from the Managed Lake Alternative.

5.13.6.3 *Estuary Alternative*

No additional mitigation would be needed to address construction impacts to public services and utilities from the Estuary Alternative.

5.13.6.4 *Hybrid Alternative*

No additional mitigation would be needed to address construction impacts to public services and utilities from the Hybrid Alternative.

5.13.7 What are the significant unavoidable adverse impacts to public services and utilities?

With the implementation of BMPs, minimization measures, and mitigation, there would be no significant unavoidable adverse impacts on public services and utilities during construction.

5.14 ECONOMICS

This section describes the potential construction impacts of the Capitol Lake – Deschutes Estuary Long-Term Management Project on economic activity and economic value in the study area. The EIS focuses on the most important elements and conclusions of the analysis and, in particular, the differences among the three action alternatives. For more detailed information on the full analysis, see the Economics Discipline Report (Attachment 18).

What construction impacts were considered in the economics analysis?

Construction impacts were analyzed based on their potential to affect downstream economic activity, development in the City of Olympia, demand for and value of recreation, and demand for and value of ecosystem services.

Key Findings: Economic Construction Impacts

Effects from the project on economic activity and economic value in the study area would primarily be long-term impacts, as described in Section 4.14, Economics. During construction, initial dredging, creation of habitat areas, and construction of a new 5th Avenue Pedestrian Bridge, boardwalks, dock, and boat launch would generate spending that would temporarily support jobs, labor income, and economic output. Construction activities are unlikely to affect current or future development in downtown Olympia in any measurable way. Some recreation facilities (especially trails) would be closed or blocked during construction, causing people to recreate elsewhere or choose other lower-preference activities, although some people might enjoy watching the construction activities. Construction would also disrupt some ecosystems and values, but the effects would be localized and temporary. Because of its shorter construction window, impacts from the Managed Lake Alternative would be less than those of the Estuary and Hybrid Alternatives. The No Action Alternative would not result in construction impacts on economics because the project would not be implemented.

5.14.1 What methods were used to assess construction impacts on economics?

As described in Section 3.14, Economics, SEPA does not require economic analysis of a proposed action, and its rules and statutes do not provide specific guidance for what methods to use to analyze economic effects in an EIS. Consistent with the analysis of long-term impacts, the analysis of construction impacts also considered four main economic categories: downstream economic activity, development in the City of Olympia, demand for and value of recreation, and demand for and value of ecosystem services. The analysis examined these impacts (and potential beneficial effects) for the three action alternatives. The No Action Alternative would not result in construction impacts on economics because the project would not be implemented.

As described in Section 4.14, Economics, the assessment of impacts for each of these four topics required different methods, each considering the geographic extent, data sources, and analytical approach for assessing impacts. The analyses entailed both qualitative and quantitative components, including use of the IMPLAN input-output model to calculate the change in jobs, labor income, and economic output that may arise from changes in spending related to constructing the infrastructure required to support the action alternatives. More details on the methodology for each component (including the study area for each topic) are presented in the Economics Discipline Report (Attachment 18).

5.14.2 What are the construction impacts common to all action alternatives?

Construction activities that could contribute to economic effects include all activities that have an associated monetary cost, such as spending on labor, equipment, and materials. Project construction would last 4 to 8 years, depending on the alternative, and would entail initial dredging; creation of habitat areas; construction of a new 5th Avenue Pedestrian Bridge, boardwalks, dock, and boat launch; and use of construction staging and access areas.

The project could begin construction as soon as 2026 or 2028, pending funding, and be completed within 4 to 8 years, depending on the selected alternative. Capital expenditures on building new infrastructure, dredging sediment, and other in-water work could support regional economic activity (jobs and income) through the purchase of goods and services and labor in the study area.

What criteria were considered in the analysis of construction impacts on economics?

As SEPA does not provide guidance for how to conduct economic analyses (or require them for an EIS), this section instead uses potential impact indicators to identify how the action alternatives would produce short-term impacts. Consistent with the analysis of long-term impacts, the short-term impacts are described as minor adverse impacts, adverse impacts, or substantial adverse impacts. Beneficial effects are also identified. The EIS does not, however, identify specific criteria to determine whether an impact is significant.

Table 5.14.1 summarizes the planning-level estimates for upfront construction costs.

Table 5.14.1 Planning Level Costs for Design, Permitting, & Construction

Project Alternative	Design, Permitting, & Construction Costs
No Action	\$0
Managed Lake	\$89–\$160M
Estuary	\$131–\$235M
Hybrid	\$177–\$319M

5.14.2.1 Downstream Economic Activity

Under all action alternatives, much of the construction spending would be to purchase goods and services from outside the region, given the greater presence of in-water construction companies and equipment farther north. Spending at the local level is not directly proportional to total costs, and would vary by alternative depending on how construction activities are implemented. Local expenditures would be estimated at about \$37.7 million over a 5-year period for the Managed Lake Alternative, \$56.7 million over a 7-year period for the Estuary Alternative, and \$84.4 million over a 7-year period for the Hybrid Alternative. Most local spending would be for transportation services, with smaller amounts for construction services, machinery rental, landscape and horticultural services, and architectural and engineering services.

5.14.2.2 Development in Downtown Olympia

More than 450 local businesses and 1,900 residents are currently located in the downtown Olympia study area. Impacts on development in downtown Olympia from construction activities are unlikely to differ based on the alternative selected, and temporary disruption from construction is unlikely to have a meaningful effect on the market for downtown development. No impact is anticipated from construction activities on current or future development in downtown Olympia.

5.14.2.3 Demand for and Value of Recreation

Construction of the action alternatives would temporarily disrupt recreation activity and potentially reduce the quality of recreational experiences, particularly in the parts of the study area with the highest levels of use (e.g., around the North Basin and at Marathon Park). Closure of the loop trail around the North Basin would disrupt existing patterns of recreational use. In the Managed Lake Alternative, this disruption would last about 6 months, imposing a temporary cost on users. In the Estuary and Hybrid Alternatives, disruption from dam removal and construction of the pedestrian bridge would last up to 4 years. In the Hybrid Alternative, recreational trail access would be disrupted for up to 7 years, with major construction of the barrier wall in the North Basin also occurring during that time and lasting 2 to 3 years. The Estuary and Hybrid Alternatives would produce more substantial disruptions and costs to recreational users compared to the Managed Lake Alternative, potentially causing people to choose substitute sites, at a higher travel cost or lower value. These effects would result in adverse impacts stemming from lost recreation value. As described in Section 5.8.7, actions could be implemented to reduce the disruption and restore connectivity along trails via detours and temporary structures, but impacts from using Marathon Park as a staging site for dredging activities would be unavoidable.

Construction activity is inherently disruptive to some people and interesting to others (and potentially both disruptive and interesting to some people). It is possible that construction activity may actually serve as a draw or enhance the experience and value some users obtain from recreating in the Capitol Lake Basin during the construction period, producing a beneficial effect that could potentially offset some of the adverse impacts on recreation.

5.14.2.4 Value of Ecosystem Services

Construction of the action alternatives would temporarily affect the value of ecosystem services generated in the study area, as water quality, habitat provision, and visual aesthetic values are disrupted. As the effects would be temporary and relatively short in duration, they would be minor adverse impacts for all action alternatives.

The construction impacts on economic activity and economic value are summarized by alternative in the subsections below.

5.14.3 What are the construction impacts under the Managed Lake Alternative?

In general, construction-related impacts under the Managed Lake Alternative would be less disruptive than under the Estuary or Hybrid Alternative, given the much shorter time frame for the closure of the 5th Avenue Bridge (7 weeks versus about 4.5 years). The construction impacts are described as part of the comparison of all action alternatives. Construction impacts on economics associated with the Managed Lake Alternative are listed and summarized in Table 5.14.2.

Table 5.14.2 Summary of Construction Impacts: Managed Lake Alternative

Impact	Impact Finding
Downstream Economic Activity	Minor Beneficial Effect – Temporary short-run increases in jobs, labor income, and economic output would occur in the region from construction spending, the local share of which (an estimated \$39 million) ranks second behind the Hybrid Alternative. A funding plan for construction spending is under development; depending on how the project is funded, the net effect in the economy of project-related spending may be smaller if diverted from other locally productive investments.
Downtown Development	No Impact – Construction activities are unlikely to affect current or future development in downtown Olympia.
Demand for and Value of Recreation	Adverse Impact – The Managed Lake Alternative would have the shortest duration of the action alternatives for closures and disturbance of recreational amenities. As such, reductions in economic value from the loss of access and temporary nuisances would be lowest compared to the other action alternatives. Minor Beneficial Effect – Some people may derive value from observing construction activities, which may partially offset the losses associated with construction disturbance.
Demand for and Value of Ecosystem Services	Minor Adverse Impact – The Managed Lake Alternative would temporarily disrupt ecosystem functions and water quality regulation, habitat provision, visual aesthetics, and cultural, heritage, spiritual, and educational values. The effects would be temporary and shorter in duration compared to the Estuary and Hybrid Alternatives.

5.14.4 What are the construction impacts under the Estuary Alternative?

The Estuary Alternative would require closing the 5th Avenue Bridge for an extended duration (about 4.5 years) during its removal and reconstruction. The construction impacts are described as part of the comparison of all action alternatives. Construction impacts on

economics associated with the Estuary Alternative are listed and summarized in Table 5.14.3.

Table 5.14.3 Summary of Construction Impacts: Estuary Alternative

Impact	Impact Finding
Downstream Economic Activity	Minor Beneficial Effect – Temporary short-run increases in jobs, labor income, and economic output would occur in the region from construction spending, the local share of which (an estimated \$27 million) is lowest in this alternative compared to the other alternatives. Depending on the source of funding, which is still undetermined, this could be offset by opportunity costs.
Downtown Development	No Impact – Construction activities are unlikely to affect current or future development in downtown Olympia.
Demand for and Value of Recreation	<p>Adverse Impact – The Estuary Alternative would have a longer duration for closures and disturbance of recreational amenities compared to the Managed Lake Alternative. This could cause people to substitute recreation at other sites, at a higher travel cost and lower value.</p> <p>Minor Beneficial Effect – Some people may derive value from observing construction activities, which may partially offset the losses associated with construction disturbance.</p>
Demand for and Value of Ecosystem Services	Minor Adverse Impact – The Estuary Alternative would temporarily disrupt ecosystem functions and water quality regulation, habitat provision, visual aesthetics, and cultural, heritage, spiritual, and educational values. The effects would be temporary and shorter duration compared to the Hybrid Alternative.

5.14.5 What are the construction impacts under the Hybrid Alternative?

For the Hybrid Alternative, construction impacts and the duration of impacts would be the same as those described for the Estuary Alternative, with potential impacts related to the 4.5-year closure of the 5th Avenue Bridge. The construction impacts are described as part of the comparison of all action alternatives. Construction impacts on economics associated with the Hybrid Alternative are listed and summarized in Table 5.14.4.

Table 5.14.4 Summary of Construction Impacts: Hybrid Alternative

Impact	Impact Finding
Downstream Economic Activity	Minor Beneficial Effect – Temporary short-run increases in jobs, labor income, and economic output would occur in the region from construction spending, the local share of which (an estimated \$97 million) is highest in this alternative. Depending on the source of funding, which is still undetermined, this could be offset by opportunity costs.
Downtown Development	No Impact – Construction activities are unlikely to affect current or future development in downtown Olympia.
Demand for and Value of Recreation	Adverse Impact – The Hybrid Alternative would have the longest duration of the action alternatives for closures and disturbance of recreational amenities. This could cause people to substitute recreation at other sites, at a higher travel cost and lower value. Minor Beneficial Effect – Some people may derive value from observing construction activities, which may partially offset the losses associated with construction disturbance.
Demand for and Value of Ecosystem Services	Minor Adverse Impact – The Hybrid Alternative would temporarily disrupt ecosystem functions and water quality regulation, habitat provision, visual aesthetics, and cultural, heritage, spiritual, and educational values. The effects would be the longest compared to the other action alternatives.

5.14.6 What avoidance, minimization, and mitigation measures would be implemented for the project?

The impacts on economic resources from construction of the action alternatives would largely be minor and temporary, and not require avoidance, minimization, and mitigation measures beyond those described for other resources (i.e., Sections 5.1 through 5.13). As described in Section 5.8.7, unavoidable impacts on recreation such as temporary trail and access closures and disruption from staging at Marathon Park could be minimized by detours and other design features. No avoidance, minimization, or mitigation measures specifically designed for economic impacts from construction are recommended or proposed.