CHAPTER 3 – AFFECTED ENVIRONMENT, ENVIRONMENTAL IMPACTS, AND MITIGATION MEASURES

This chapter describes the existing environmental conditions within areas potentially affected by the project alternatives and the probable environmental impacts associated with each of the alternatives. Mitigation measures that could be implemented to avoid, minimize, and/or compensate for adverse environmental impacts are identified. Beneficial impacts for some disciplines are identified where appropriate.

Project scoping identified several elements of the environment for particular focus in this EIS: Land and Shoreline Use, Parks and Recreation, and Plants and Animals. A number of other areas were also identified in the scoping notice for discussion, but not with the same focus.

Land and Shoreline Use

The information in this section is based on Technical Appendix B: Land Uses, Policies, and Plans.

Affected Environment

Piers 62/63 are surrounded by a variety of land uses, including public/institutional, terminal/warehouse, multi-family, office, open space, and retail. A map of land uses in the area is included in Technical Appendix B.

Bell Street Pier

Seattle Aquarium

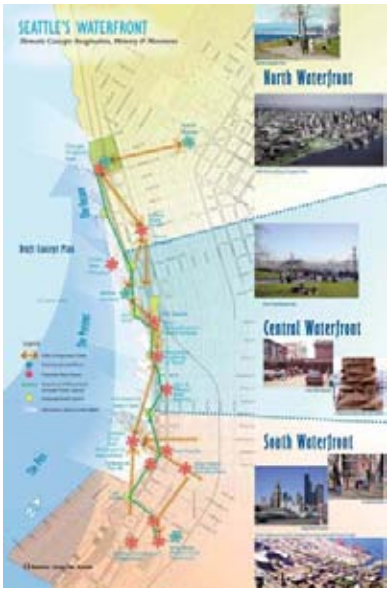
Waterfront Landings Condominiums

The following land use activities are in the immediate vicinity of Piers 62/63 and could potentially be affected:

- **Bell Street Pier.** Piers 62/63's closely spaced wood piles currently provide limited wave protection for Bell Harbor Marina's entrance. The piers also form a definitive edge to the marina's entryway, which is the submerged Virginia Street right-of-way.
- **Seattle Aquarium.** Piers 62/63 currently provide nearby outdoor public space for Seattle Aquarium patrons, accessible via the sidewalk along Alaskan Way. Outdoor Seattle Aquarium functions are often accommodated in the adjacent portion of Waterfront Park. Seattle Aquarium animals are currently minimally impacted by concert noise, both because of the distance between the Seattle Aquarium and the piers and because of the orientation of the concert stage.
- **Pike Place Market.** Piers 62/63 have generated revenue for the Pike Place Market parking garage because the garage has served as the preferred parking supply for the Summer Nights at the Pier concert series. In the same way, the piers have also generated additional patronage for the Market, especially its restaurants.
- **Private Uses.** Several types of private land use exist along the Central Waterfront in the vicinity of the project area. These include commercial, retail, hotel, office, and residential uses. Just north of the piers across Alaskan Way are the Waterfront Landings Condominiums. This group of four five-story buildings includes 240 units with views of Elliott Bay and ground-floor commercial space.

The following policies, plans, and objectives apply to the project area:

- **City of Seattle Zoning.** Piers 62/63 are located in the Downtown Harborfront 1 (DH1) Zone.
- **Seattle Shoreline Master Program.** Piers 62/63 are located in the Urban Harborfront (UH) Shoreline Environment in the City's Shoreline Master Program (SSMP).
- **WDNR Harbor Area Designation.** Washington State, through WDNR, owns all of the shorelines, tidelands, and lands underlying navigable waters that had not already been sold by the federal government at the time of statehood, including the land on which Piers 62/63 are currently located.
- **Public View Protection.** It is the City's policy to protect public views of significant natural and human-made features. In the project area, Victor Steinbrueck and Waterfront Parks have views protected under SEPA.
- **Seattle's Central Waterfront Concept Plan.** Seattle DPD's Plan provides guidance to reconnect downtown and the waterfront in conjunction with replacement of the Alaskan Way Viaduct.
- **Seattle City Council's Seven Framework Principles for Waterfront Planning.** In April of 2004, the Seattle City Council adopted seven framework principles for waterfront planning that reflect key values expressed by Seattleites over time about the Central Waterfront's future (City Council Resolution 30664).
- **WRIA 9 Salmon Habitat Plan.** The WRIA 9 Salmon Habitat Plan (WRIA 9 2005) identifies recommended projects and programs to be undertaken in the next 10 years in order to achieve its goal "to protect, rehabilitate, and enhance habitat to support viable salmonid populations in response the ESA listing of Chinook salmon and bull trout using an ecosystem approach."



Seattle's Central Waterfront Draft Concept Plan

Operational Impacts

The day-to-day operation of the alternatives could have operational effects on the Bell Street Pier (wave protection and navigation), the Seattle Aquarium (quantity, connectivity, and proximity of public space; and noise during events), and the Pike Place Market (potential parking revenues and patronage).

Figures 3-1 through 3-5 and Table 3-1 summarize the operational impacts.

The following adverse operational impacts were identified:

- **Seattle Aquarium.** The Aqua Link and No Action/No Build Alternatives would decrease the amount of nearby outdoor public space. Under the Aqua Link and Multi-Purpose Pier Alternatives, noise associated with special events would be closer to the Aquarium, potentially disturbing Aquarium activities. The Aqua Link Alternative would also decrease the availability of outdoor space used for Aquarium events.
- **Pike Place Market.** The Aqua Link and No Action/No Build Alternatives would decrease the amount of potential parking revenues and additional patronage generated during special events.

The following beneficial operational impacts were identified:

- **Bell Street Pier.** The Aqua Link, Multi-Purpose Pier, and No Action/No Build Alternatives would create a larger entryway to the marina.
- **Seattle Aquarium.** The Aqua Link, Connector, and Multi-Purpose Pier Alternatives would increase the proximity and connectivity of outdoor public space. The Connector and Multi-Purpose Pier Alternatives would increase the quantity and connectivity of public space. The No Action Alternative would decrease noise associated with special events.
- **Pike Place Market.** The Multi-Purpose Pier Alternative would increase the amount of potential parking revenues and additional patronage generated during special events.

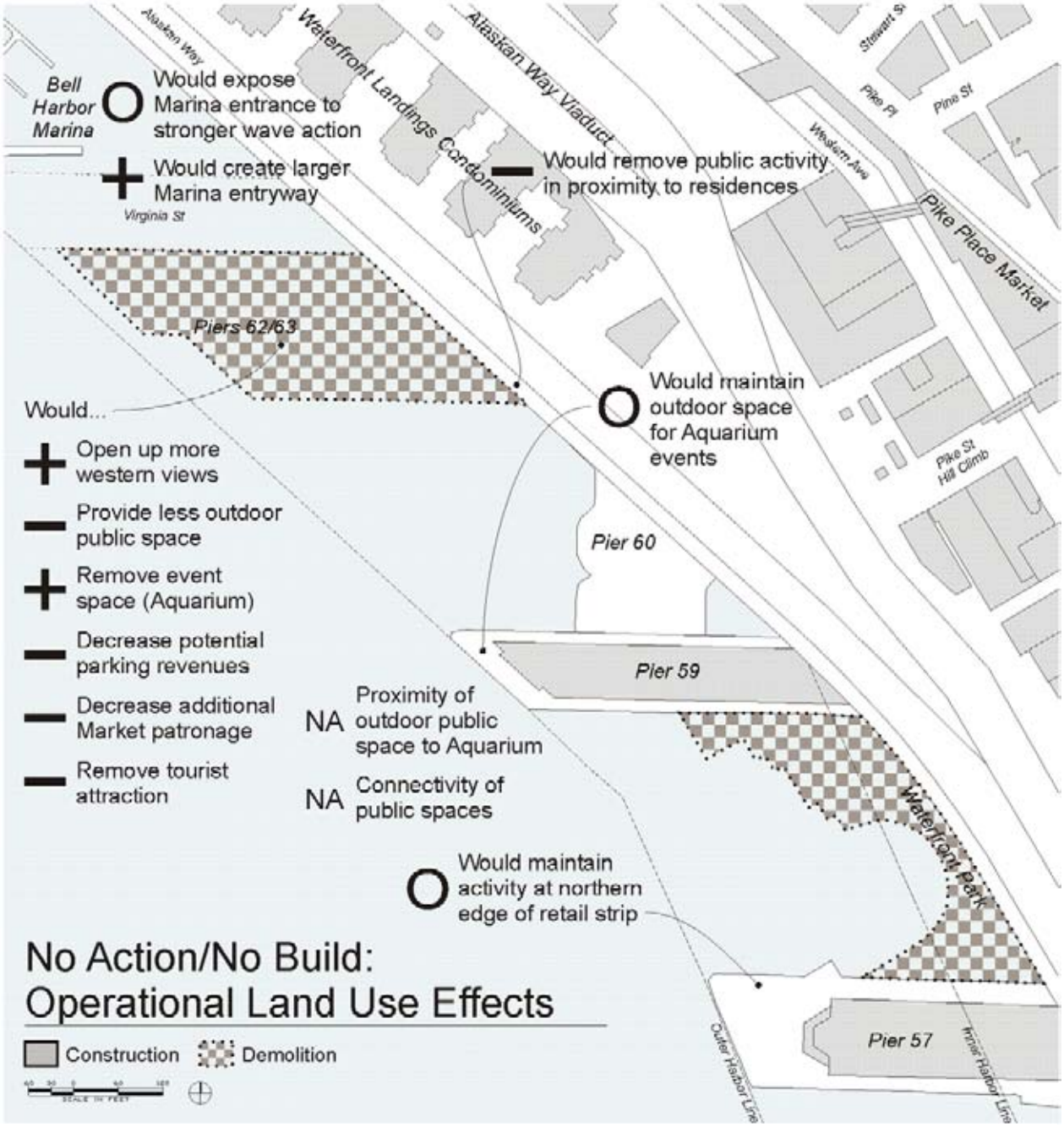


Figure 3-1. Operational Land Use Effects of No Action/No Build Alternative

Effects

+ The alternative's effect is positive/beneficial relative to the effect of other alternatives.
O All alternatives have the same effect, or the alternative's effect is relatively neutral.
– The alternative's effect is negative/adverse relative to the effect of other alternatives.
NA The alternative has no effect or the effect cannot be evaluated.

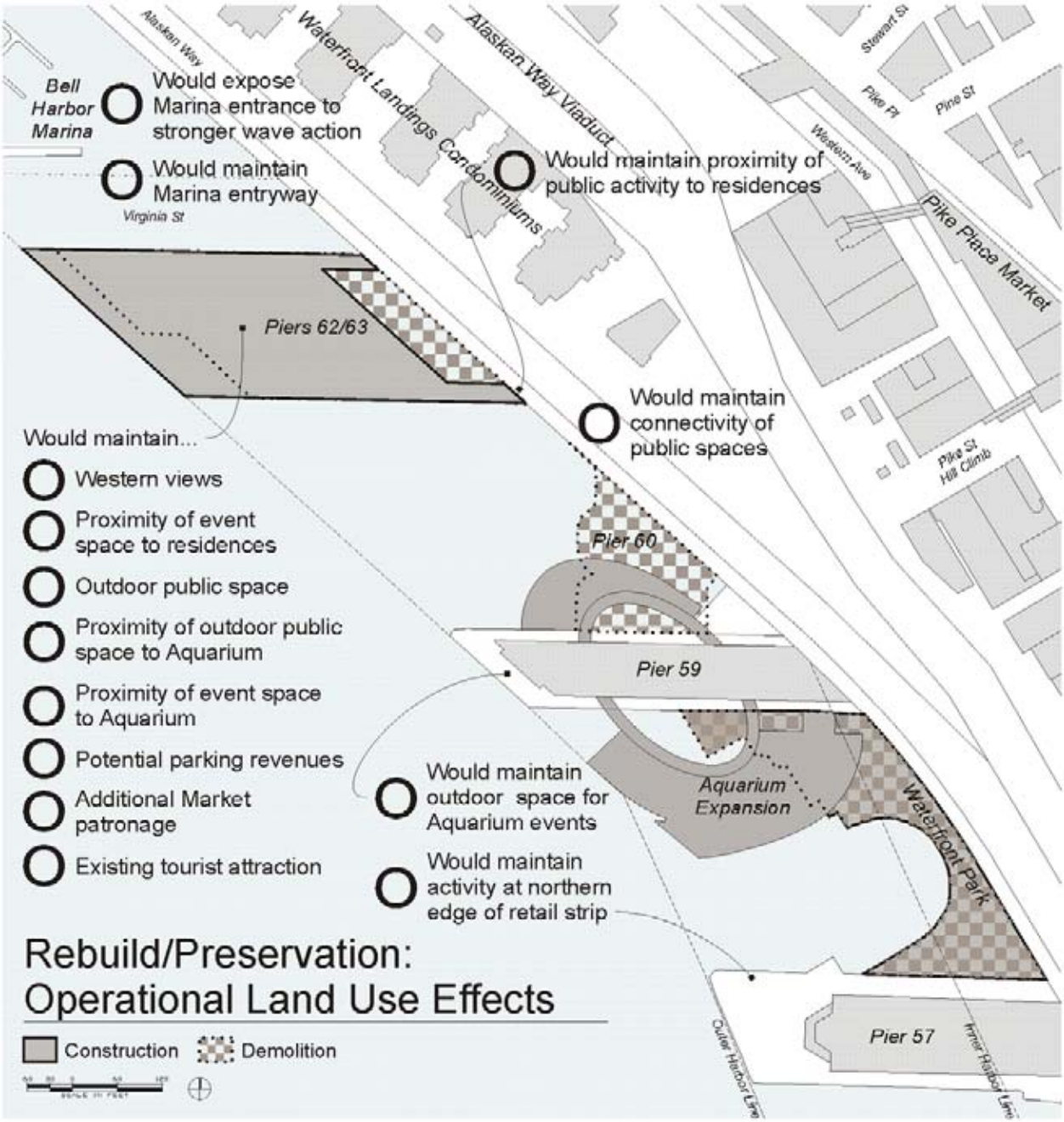


Figure 3-2. Operational Land Use Effects of Rebuild/Preservation Alternative

Effects

✚ The alternative's effect is positive/beneficial relative to the effect of other alternatives.
○ All alternatives have the same effect, or the alternative's effect is relatively neutral.
— The alternative's effect is negative/adverse relative to the effect of other alternatives.
NA The alternative has no effect or the effect cannot be evaluated.

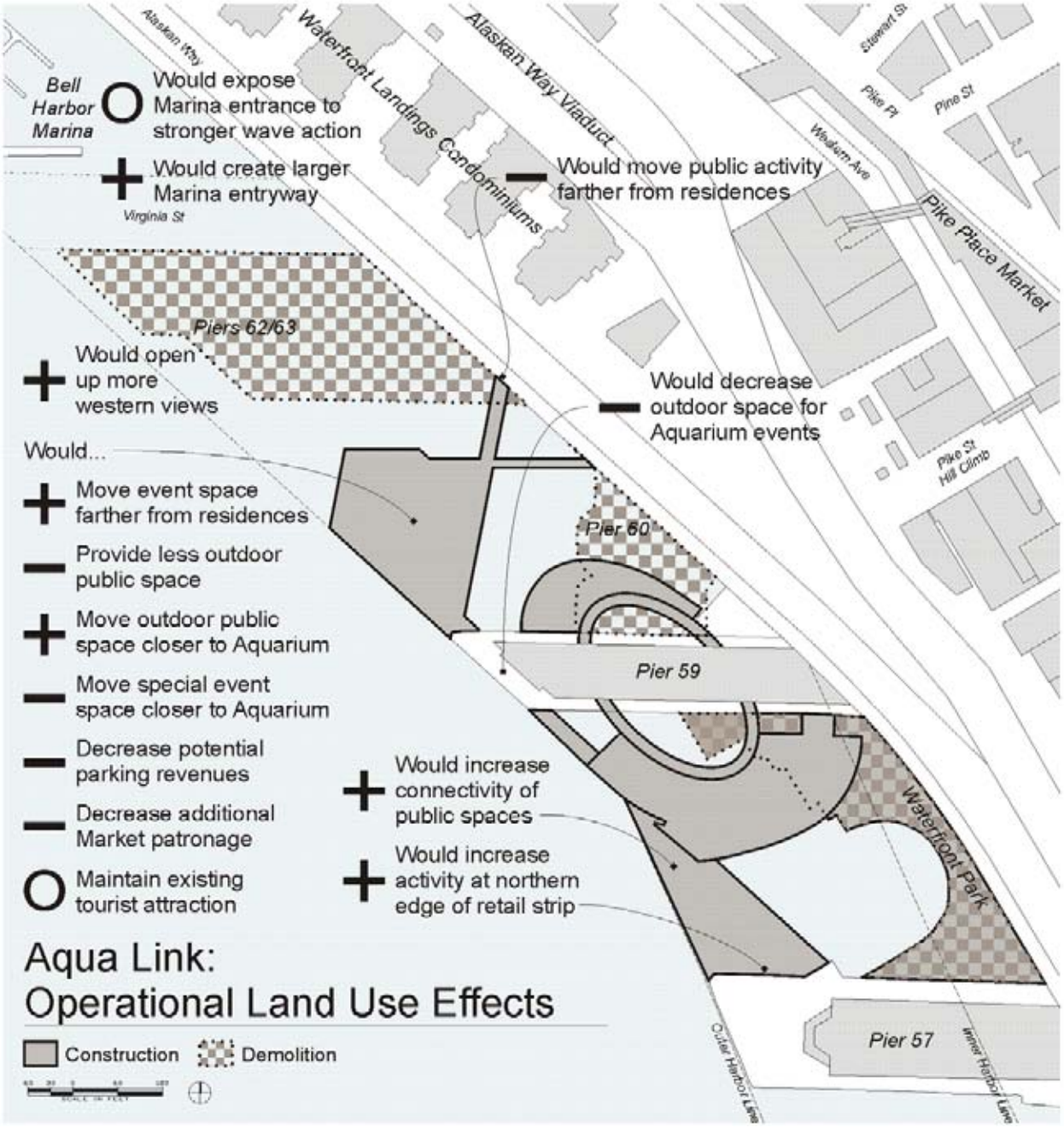


Figure 3-3. Operational Land Use Effects of Aqua Link Alternative

Effects

+ The alternative's effect is positive/beneficial relative to the effect of other alternatives.

O All alternatives have the same effect, or the alternative's effect is relatively neutral.

− The alternative's effect is negative/adverse relative to the effect of other alternatives.

NA The alternative has no effect or the effect cannot be evaluated.

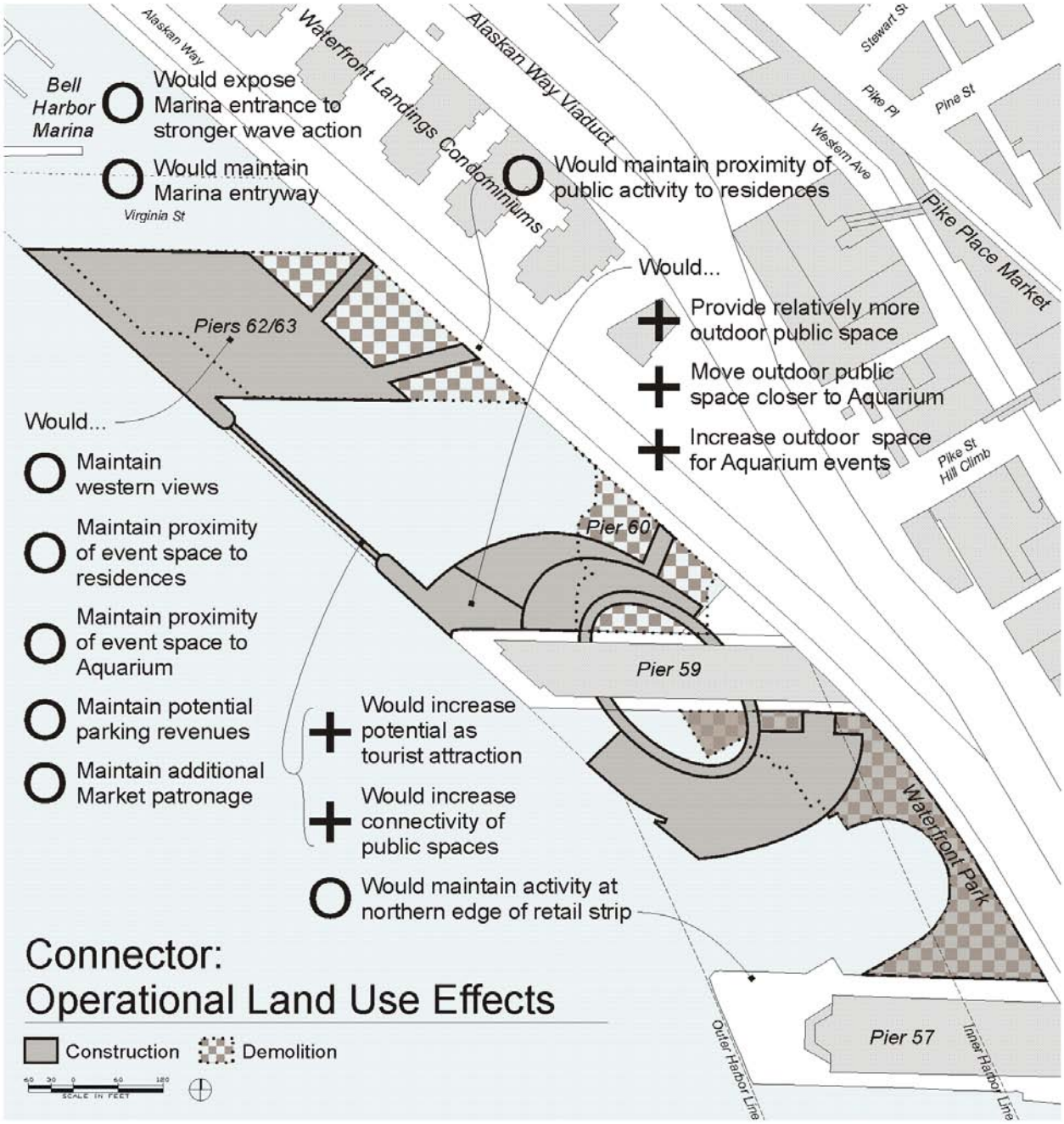


Figure 3-4. Operational Land Use Effects of Connector Alternative

Effects

✚ The alternative's effect is positive/beneficial relative to the effect of other alternatives.
○ All alternatives have the same effect, or the alternative's effect is relatively neutral.
— The alternative's effect is negative/adverse relative to the effect of other alternatives.
NA The alternative has no effect or the effect cannot be evaluated.

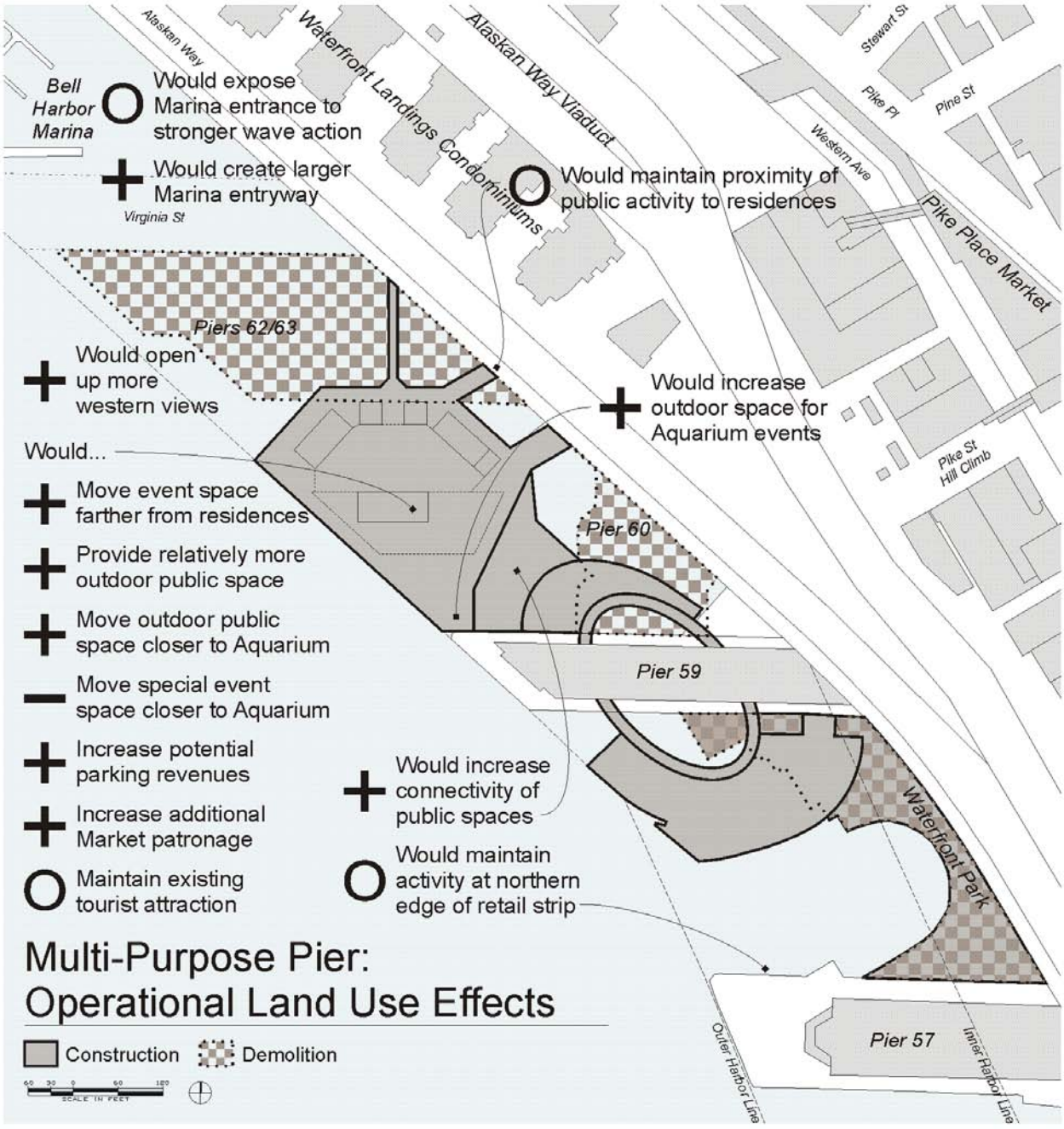


Figure 3-5. Operational Land Use Effects of Multi-Purpose Pier Alternative

Effects

✚ The alternative's effect is positive/beneficial relative to the effect of other alternatives.

○ All alternatives have the same effect, or the alternative's effect is relatively neutral.

— The alternative's effect is negative/adverse relative to the effect of other alternatives.

NA The alternative has no effect or the effect cannot be evaluated.

Table 3-1. Summary of Operational Land Use Effects

	NO ACTION/ NO BUILD	REBUILD/ PRESERVATION	AQUA LINK	CONNECTOR	MULTI-PURPOSE PIER
Bell Street Pier					
Wave protection	○	○	○	○	○
Navigation	✚	○	✚	○	✚
Seattle Aquarium					
Quantity of public space	—	○	—	✚	✚
Connectivity of public space	**NA**	○	✚	✚	✚
Proximity of public space	**NA**	○	✚	✚	✚
Availability of outdoor event space	○	○	—	✚	✚
Noise during events	✚	○	—	○	—
Pike Place Market					
Parking fees	—	○	—	○	✚
Additional patronage	—	○	—	○	✚

Effects

✚ The alternative's effect is positive/beneficial relative to the effect of other alternatives.
○ All alternatives have the same effect, or the alternative's effect is relatively neutral.
— The alternative's effect is negative/adverse relative to the effect of other alternatives.
NA The alternative has no effect or the effect cannot be evaluated.

Construction Impacts

Construction of the alternatives could impact the land use activities that are in the immediate vicinity of Piers 62/63 in the same ways as the day-to-day operational impacts. Table 3-2 summarizes the construction effects of each alternative.

The following temporary adverse construction impacts were identified:

- **Bell Street Pier.** The Connector and Rebuild/Preservation Alternatives would potentially restrict the marina's entryway.
- **Seattle Aquarium.** The Aqua Link, Connector, and Multi-Purpose Pier Alternatives would have the most noise associated with demolition and construction in proximity to the Aquarium.

The following temporary beneficial construction impacts were identified:

- **Seattle Aquarium.** The No Action/No Build Alternative would have the least noise associated with demolition and construction.

Table 3-2. Summary of Land Use Construction Effects

	NO ACTION/ NO BUILD	REBUILD/ PRESERVATION	AQUA LINK	CONNECTOR	MULTI-PURPOSE PIER
Bell Street Pier					
Wave protection	○	○	○	○	○
Navigation	○	—	○	—	○
Seattle Aquarium					
Quantity of public space	○	○	○	○	○
Connectivity of public space	**NA**	**NA**	**NA**	**NA**	**NA**
Proximity of public space	**NA**	**NA**	**NA**	**NA**	**NA**
Availability of outdoor event space	○	○	—	—	—
Noise	+	○	—	—	—
Pike Place Market					
Parking fees	○	○	○	○	○
Additional patronage	○	○	○	○	○

Effects

+ The alternative's effect is positive/beneficial relative to the effect of other alternatives.

○ All alternatives have the same effect, or the alternative's effect is relatively neutral.

— The alternative's effect is negative/adverse relative to the effect of other alternatives.

NA The alternative has no effect or the effect cannot be evaluated.

Consistency

The alternatives were reviewed for consistency with the following policies, plans, and objectives:

- City of Seattle Zoning
- SSMP
- WDNR Harbor Area Designation
- Public View Protection
- Seattle's Central Waterfront Concept Plan
- Seattle City Council's Seven Framework Principles for Waterfront Planning
- WRIA 9 Salmon Habitat Plan

Table 3-3 summarizes the consistency of each alternative with each of the aforementioned policies, plans, and objectives.

In general, the No Action/No Build Alternative was not consistent with any of the policies, plans, or objectives, while the other four alternatives were consistent with most. The following differences in consistency were identified:

- **Seattle's Central Waterfront Concept Plan.** The Aqua Link Alternative would enhance the most shoreline, intertidal, and shallow sub-tidal habitat (Recommendation 3) while the Rebuild/Preservation Alternative would enhance the least.
- **Seattle City Council's Seven Framework Principles for Waterfront Planning.** The Multi-Purpose Pier Alternative provides the best balance of environmental restoration and public use (#1), the most flexible space (#5), and the most opportunity for economic development (#6). The Aqua Link Alternative would provide the most enhanced nearshore environment to improve salmon migration (#7). The Connector Alternative would enhance north/south movement along the waterfront by providing a dramatic over-water route (#4). The Rebuild/Preservation Alternative would be the most authentic (#3).
- **WRIA 9 Salmon Habitat Plan.** The Aqua Link Alternative would create the most enhanced shallow water habitat benches and fish-friendly structures.

Table 3-3. Summary of Land Use Consistency

	NO ACTION/ NO BUILD	REBUILD/ PRESERVATION	AQUA LINK	CONNECTOR	MULTI-PURPOSE PIER
City of Seattle Zoning					
Intent of DH1	—	+	+	+	+
SSMP					
Intent of UH	—	+	+	+	+
WDNR Harbor Area Designation					
Filling	—	○	○	○	○
Public View Protection					
Steinbrueck	○	○	○	○	○
Waterfront	—	○	○	○	○
Seattle's Central Waterfront Concept Plan					
Rec. 1	—	+	+	+	+
Rec. 2	—	○	+	+	+
Rec. 3	—	—	++	+	+
Seattle City Council's Seven Framework Principles for Waterfront Planning					
Principle 1	—	+	+	+	++
Principle 2	—	○	○	+	+
Principle 3	—	++	+	+	+
Principle 4	—	+	+	++	+
Principle 5	○	+	+	+	++
Principle 6	—	○	+	+	++
Principle 7	—	+	++	+	+
WRIA 9 Salmon Habitat Plan					
NS-4	—	+	++	+	+

Consistency

++ The alternative is the most consistent.
+ The alternative is generally consistent.
○ The alternative is neither consistent nor inconsistent.
— The alternative is mostly inconsistent.

Mitigation

The following opportunities for mitigation were identified:

- **Multi-Purpose Pier Alternative.** The primary potential operational impact of the Multi-Purpose Pier Alternative is that activities on the pier may create noise that would disturb Seattle Aquarium mammals. This can be substantially mitigated by locating new mammal exhibits on the south side of the new Seattle Aquarium complex, as is currently planned.

Significant Unavoidable Adverse Impacts

The following significant unavoidable adverse impacts were identified:

- The No Action/No Build Alternative is inconsistent with the Central Waterfront Plan, WDNR policies, and the Council's Principles because it does not provide for public space, public access, moorage, or environmental enhancement. Once Piers 62/63 are removed, environmental regulations likely would not allow new over-water construction to replace what was lost.

Parks and Recreation

The information in this section is based on Technical Appendix C: Parks and Recreation.

Affected Environment

Recreational activities currently occur at two primary locations on the Central Waterfront: Piers 62/63 and Waterfront Park. The Seattle Aquarium is located between these facilities and is also a popular destination. Victor Steinbrueck Park, located at the north end of the Pike Place Market, also provides space for recreational activities in the general vicinity. Existing activities on the Central Waterfront[1] include:

- General passive recreation (sitting, reading, picnicking, people watching, etc.)
- Walking and running
- Views and sight-seeing

Views of Elliott Bay (top) and the Seattle Aquarium (bottom) from the northeast corner of Piers 62/63

[1] Existing recreational activities at Piers 62/63 are based on activities occurring prior to the discovery of current structural deficiencies.

Views of the Seattle Aquarium from near the center of Waterfront Park

Seattle Aquarium

- Public art
- Fishing
- Temporary events (concerts, auto shows, and festivals)
- Special events occurring at the Seattle Aquarium

The replacement of Piers 62/63 will create opportunities for continued public access and events on the Central Waterfront. Specific activities that might take place and their specific requirements (if available) are summarized in Table 3-4.

Table 3-4. Future Parks and Recreation Activity Summary

Activity	Space Required (sq. ft.)	Considerations
General Use Activities		
General Passive Recreation	NA	Public access, visibility, seating, and activity
Promenading and Jogging	NA	Public access, seating, and wayfinding
Beach Walking	NA	Public access, debris removal, and public safety
Sight-seeing	NA	Public access, view corridors, and seating
Fishing	NA	Public access, fish cleaning, and lighting
Games	NA	Public access, tables, and seating
Educational	NA	Public access and informational kiosks
SCUBA	NA	Water access, impacts on ship moorage, and underwater refuse removal
Temporary Activities		
Large Events	77,000	Utilities, shelter, concessions, restrooms, noise impacts, and efficient access
Small Events	35,000	Utilities, shelter, concessions, restrooms, noise impacts, and efficient access
Ship Moorage	1,200	Structural reinforcement, water depth, wave attenuation, and visitor queuing
Bike Rentals	1,400	Storage, security, and weather protection
Public Events/Rallies	2,000 - 77,000	Public access and infrastructure
Private Rentals	5,400	Kitchen, restrooms, and weather protection
Dedicated Space Activities		
Playground	5,000	Safety and visibility
Skateboard Park	8,000	Visibility and seating
Concessions	6,000	Location, orientation, and utilities

NA Not Applicable

Operational Impacts

Table 3.5 summarizes the operational impacts.

The following adverse operational impacts were identified:

- **General passive recreation.** The No Action/No Build Alternative eliminates all opportunities for passive recreation currently provided by Piers 62/63.

- **Walking and running.** Pedestrians will no longer have the option of walking on Piers 62/63 or Waterfront Park in the No Action/No Build Alternative.

- **Public art.** Existing public art on Piers 62/63 will be removed or relocated with the demolition of that structure in all of the alternatives. Opportunities for relocation of existing art or incorporation of new art will be afforded in all of the build alternatives.

- **Fishing.** The No Action/No Build Alternative will eliminate access to deeper waters for fishing.

- **Temporary events.** The Aqua Link and Connector Alternatives, each having less contiguous deck space than currently exists, would constrain the possibility of larger temporary events. The No Action/No Build Alternative provides no space for temporary events.

- **Special events (Aquarium).** The No Action/No Build Alternative, with demolition of Waterfront Park and Piers 62/63, will limit the Seattle Aquarium's opportunities for special events.

The following beneficial operational impacts were identified:

- **Walking and running.** The Aqua Link and Connector Alternatives would both create a new walkway along the Outer Harbor Line.

- **Special events (Aquarium).** The Aqua Link, Connector and Multi-Purpose Pier Alternatives would provide deck space immediately adjacent to the Seattle Aquarium that could potentially be used for Seattle Aquarium events.

Table 3-5. Summary of Operational Impacts to Existing Parks and Recreation Activities

Activity	NO ACTION/ NO BUILD	REBUILD/ PRESERVATION	AQUA LINK	CONNECTOR	MULTI-PURPOSE PIER
General Passive Recreation	—	O	O	O	O
Walking and Running	—	O	+	+	O
Views and Sight-seeing	O	O	O	O	O
Public Art	—	—	—	—	—
Fishing	—	O	O	O	O
Temporary Events	—	O	—	—	O
Special Events (Aquarium)	—	O	+	+	+

+ Alternative has a positive impact or improves the activity
O Alternative has no impact on the activity
— Alternative has a negative impact on the activity or makes it impossible

Construction Impacts

Construction activities on the Central Waterfront will have an impact on most recreational activities that currently take place. During demolition and reconstruction, activities occurring at Piers 62/63 and Waterfront Park will be temporarily suspended. However, current project phasing would replace Piers 62/63 and Waterfront Park in two independent phases, ensuring that one of the facilities would be in operation at all times.

Access to the Seattle Aquarium is not expected to be impacted during construction. Entrances may require some relocation or modification, but access would still be provided.

Possible Future Uses

The alternatives were evaluated based on their ability to support possible future activities. Table 3-6 summarizes this evaluation.

Table 3-6. Summary of Ability to Support Future Parks and Recreation Uses

ACTIVITY	NO ACTION/ NO BUILD	REBUILD/ PRESERVATION	AQUA LINK	CONNECTOR	MULTI-PURPOSE PIER
General Use Activities					
General Passive Recreation	—	✚	✚	✚	✚
Promenading and Jogging	—	○	✚	✚	○
Beach Walking	—	—	✚	✚	✚
Sight-seeing	○	✚	✚	✚	✚
Fishing	—	○	✚	✚	✚
Games	—	✚	✚	✚	✚
Educational	—	○	✚	✚	✚
SCUBA	—	—	✚	✚	○
Temporary Activities					
Large Events	—	✚	—	○	✚
Small Events	—	✚	✚	✚	✚
Ship Moorage	—	✚	✚	✚	✚
Bike Rentals	—	✚	✚	✚	✚
Public Events/Rallies	—	✚	○	✚	✚
Private Rentals	—	✚	✚	✚	✚
Dedicated Space Activities					
Playground	—	✚	✚	✚	✚
Skateboard Park	—	✚	✚	✚	✚
Concessions	—	✚	✚	✚	✚

✚ Alternative is able to fully support activity

○ Alternative can support activity, but configuration is less than ideal when compared to other alternatives

— Alternative is unable to support activity

Mitigation

Opportunities for placement of public art will be afforded by all of the build alternatives.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts were identified.

Cultural and Historical Resources

Affected Environment

The following discussion of cultural and historical resources in the project area is based principally on relevant information in the following documents:

- Amendment to the Central Waterfront Master Plan: Pacific Northwest Aquarium and Waterfront Park, SEPA Environmental Checklist (Parks 2004)
- Seattle Aquarium Pier 59 Piling Superstructure Maintenance, SEPA Environmental Checklist (Parks 2003)
- SR 99: Alaskan Way Viaduct and Seawall Replacement Project, Historical Resources Technical Memorandum (WSDOT 2004c)
- SR 99: Alaskan Way Viaduct and Seawall Replacement Project, Archaeological Resources and Traditional Cultural Places Technical Memorandum (WSDOT 2004d)

The Central Waterfront has a long history of human use. The area is within the ethnographic territory of the Duwamish Indians, a fishing-hunting-gathering people who spoke Puget Salish. Besides a winter village located near what is now First Avenue and Yesler Way in Pioneer Square, abandoned before 1800, the Duwamish people had camps at other locations along Elliott Bay when settlers arrived in the Puget Sound area. A Duwamish camp was located at the current foot of Bell Street. This camp was presumably on the east side of Alaskan Way, since Pier 66 and Alaskan Way were built on fill over the water.

There are three distinct elements on the project site: Waterfront Park (Pier 58), the Seattle Aquarium (Piers 59 and 60), and the pier deck of Piers 62/63 Park. The City

purchased Piers 57 through 61 in 1978, and leased the tidelands from the WDNR. In 1989, the City traded Pier 57 for Piers 62 and 63, and thereby opened the site to northward expansion. Pier 58 was originally located on the site of Waterfront Park, between Pier 59 and Pier 57.

Pier 59 is the oldest structure still standing on the Seattle Central Waterfront. When first constructed in 1872, the pier served as a terminal for loading and shipping coal. The original pier structure succumbed to teredos (a marine boring organism) late in the decade, and was replaced in 1896 with a new pier on the standardized east-west alignment.

The pier shed on Pier 59 was erected in 1905. It is a heavy timber superstructure, sheathed in ship lap wood siding on wood deck and originally supported by wood piles. The piling system has been extensively replaced by new concrete and steel piles in 2005 and 2006. It is similar to other pier sheds built at the time and still existing on the waterfront, although its roof support system is unique. The east and west end walls of the wharf include distinctive and original curvilinear parapets, and the exterior retains much of its original siding and some of its original windows.

Pier 59 originally served as a terminal for the Northwestern Steamship Dock Company, and later for Dodwell & Co. First referred to as Pier 8, the structure was renumbered to Pier 59 in the 1940s. The building was purchased by the City, renovated to house the Seattle Aquarium, and, along with the adjacent concrete exhibit building (Pier 60), opened as the Seattle Aquarium in 1977.

Piers 60 and 61 were relatively minor piers built between World Wars I and II. Pier 60 was demolished for construction of the Seattle Aquarium, and Pier 61 was demolished in the 1970s. Piers 62 and 63 occupy the north end of the site. Built in 1901 and 1905, respectively, these piers once had sheds that were contemporary with that of Pier 59. Pier 62 was originally known as Pier 9, or Gaffney Dock, and housed Puget Sound Freight Lines for many years. Pier 63 was known as Pier 10, the Virginia Street Dock.

Three plaques in Waterfront Park commemorate historic events:

- The S.S. Portland plaque describes the July 1897 arrival of the S.S. Portland at Schwabacher's Wharf carrying the "ton of gold" that started the stampede to the Klondike.
- The Miike Maru plaque noting the arrival of the Miike Maru in 1896 with a cargo of tea heralding the first regular shipping service from the Far East and the birth of Seattle as an international port.
- The Joshua Green Memorial Plaque noting the establishment of the Puget Sound Navigation Company, which operated steamboats and automobile ferries by Joshua Green.

There are also several works of art in Waterfront Park:

- A bronze fountain designed by J. Fitzgerald and M. Tomkins, located at the north end of Waterfront Park.
- A bronze statue of Christopher Columbus by D. Bennett at the south end of Waterfront Park.
- A concrete 'colonnade,' which projects from the west side of the fountain.

Bronze Fountain at Waterfront Park

In addition, artwork in the form of painted questions is located on a dense chain-link guardrail bordering Piers 62/63. The artwork, titled *Piers 62/63*, was one of two permanent artworks installed in conjunction with the 1 percent for Art project *In Public. In Public* presented primarily temporary artworks to coincide with the opening the new Seattle Art Museum. The painted artwork is fading, deteriorated, and rusted due to exposure to the marine air.

Christopher Columbus statue at Waterfront Park

The fountain, bronze statue, and artwork titled *Piers 62/63* are included in the Seattle Municipal Art Collection. The status of the colonnade, which projects from the west side of the fountain pool structure, is uncertain.

City Landmark Status

Pier 59 was designated as a City Landmark in 2001. The Landmarks Preservation Board determined that Pier 59 met three of the standards set forth in SMC 25.12.350 necessary for designation:

- It is associated in a significant way with a significant aspect of the cultural, political, or economic heritage of the community, city, state, or nation.

- It embodies the distinctive visible characteristics of an architectural style, period, or method of construction.
- Because of its prominence of spatial location, contrasts of siting, age, or scale, it is an easily identifiable feature of its neighborhood or the City and contributes to the distinctive quality or identity of such nationhood or the City.

The Designation Approval for Pier 59 included the following features:

- The pier and pier piling, from the west edge of the right-of-way of Alaskan Way (the seawall) to the Outer Harbor Line, and from the north edge to the south edge of the wooden piling pier.
- The exterior of the pier shed, excluding the elevated walkway to Waterfront Park.
- The following features of the interior of the pier shed: the perimeter walls and windows, the ceiling, trusses, the interior structure, and the floor.

As a result of the designation, a Certificate of Approval issued by the Landmarks Preservation Board, is required before any significant alteration or changes can be made to any of the designated features of Pier 59.

Waterfront Historic Character Area

The Seattle Land Use Code (SMC 23.60.704) defines a Historic Character Area along the Waterfront that includes all lots from the southerly edge of Pier 54 to the northerly edge of Pier 59. The southern portion of the Aquarium/Waterfront Park site lies within these boundaries. All applications for development along this stretch of the waterfront are referred to the Landmark Preservation Board and Department of Neighborhoods for review and comment prior to issuance of a permit. Twelve criteria are used to review new construction and modification of existing structures. The criteria are intended to assist the City in maintaining the historic character of the area.

Resources Eligible for Listing on the National Register of Historic Places

In historic resource evaluations for Washington State Department of Transportation's (WSDOT's) SR 99 Viaduct project, a determination of eligibility for listing on the National Register was made for the district encompassing the City's

identified Historic Character Area between and inclusive of Pier 54 and Pier 59. The eligibility determination was based on how these piers retain their original setting and configuration. Also, much of their original character has been maintained (WSDOT 2004c).

The Alaskan Way Seawall is also eligible for listing on the National Register, according to the Historic Resources Technical Memorandum prepared for the SR 99: Alaskan Way Viaduct and Seawall Replacement (WSDOT 2004c). The seawall was built to stabilize the shoreline starting in 1934 when the railroad tracks were moved to the east side of Alaskan Way, then called Railroad Avenue (Sherwood History Files).

The archaeological overview conducted for the SR 99: Alaskan Way Viaduct and Seawall Replacement Project (WSDOT 2004d) identified no significant archaeological resources or traditional cultural places within the Alaskan Way Viaduct and Seawall area of potential effect. The seawall represents the westernmost limit of the area of potential effect for that project. The analysis suggested the possibility that project excavations could encounter presently unknown intact archaeological resources in subsurface deposits.

Operational Impacts

Effects on Seattle Landmark Status of Pier 59

The build alternatives reflect various designs of pier decks that would be connected to Pier 59, which houses the Seattle Aquarium. In the Aqua Link Alternative, a new deck connecting the offshore ends of Pier 57 and Pier 59 would be built. Phase 1 in the Connector Alternative would build a slender footbridge and deck connecting to the offshore end of Pier 59. In the Multi-Purpose Pier Alternative, Piers 62/63 would be removed and rebuilt as a large open platform abutting an eventually expanded Seattle Aquarium.

Each of these build alternatives would affect Pier 59 through the attachment of connecting pier decks. Based on the preliminary conceptual designs illustrated by the alternatives, it appears unlikely that the attachment of these pier decks to Pier 59 would have a substantial effect on the historic characteristics of Pier 59.

Effects on Historic Character Area

The character of the designated Historic Character Area encompassing Piers 54 through 59 would not be substantially affected by any of the alternatives. The review criteria (SMC 23.60.704) reflect historic characteristics, orientation, structural support features, and exterior windows that should be maintained for any changes to the piers in the Historic Character Area. New structures in the Historic Character Area, which applies between Pier 57 and the north side of Pier 59 for this project, will need to be reviewed by the Landmarks Preservation Board and the Department of Neighborhoods for consistency with the review standards. For the project area, this process will occur during the project-level design and environmental review phase.

Effects on National Register-eligible Properties

- **Piers 54 to 59 Historic District.** As discussed in the previous section (Effects on Historic Character Area), no substantial alterations of the characteristics that make the Piers 54 to 59 district eligible for listing on the National Register would likely occur. The Rebuild/Preservation Alternative would have the least effect on Piers 57 and 59 because it would maintain the status quo. The No Action Alternative would have little effect on Piers 57 and 59 except for the eventual removal of Waterfront Park, which currently connects to both piers. All of the other alternatives would involve removal of Waterfront Park, which would be a similar impact as the No Action Alternative. All of the alternatives would also be connected to the north side of Pier 59. During the project-level environmental review and permitting process, compliance with Section 106 of the National Historic Preservation Act will be needed. This process will be triggered by the federal regulatory process administered by the Corps of Engineers (Section 10 and Section 404 permits). A Section 106 report will be needed to determine the effects of the selected design on the National Register-eligible properties. Concurrence by the State Historic Preservation Officer will be required and, if any adverse effect is determined, appropriate mitigation could be needed.

- **Alaskan Way Seawall**. As part of the SR 99: Alaskan Way Viaduct and Seawall Replacement Project, it is likely that the historic seawall that borders the east side of the project area would be demolished. Accordingly, the replacement of Piers 62/63, removal of Waterfront Park,

and the associated habitat enhancements would have no effect on the National Register-eligible seawall.

Removal of Artwork

Several pieces of artwork in the Seattle Municipal Art Collection are located at Waterfront Park and at Piers 62/63. The demolition of these structures under each of the alternatives would involve the removal or relocation of this artwork, including:

- Bronze statue of Christopher Columbus at Waterfront Park (relocate)
- Bronze fountain (and associated colonnade) at Waterfront Park (remove)
- Artwork titled *Piers 62/63;* the artwork is a series of questions painted on a dense chain-link guardrail at Piers 62/63 (remove).

Three commemorative plaques are also located at Waterfront Park. They could be relocated in Phase 2 with the removal of Waterfront Park.

Construction Impacts

Potential impacts during construction include noise, traffic disruptions, and limitations on access to the Seattle Aquarium/Pier 59 (City Landmark) and to areas eligible for listing on the National Register. These impacts will be temporary and short in duration, and would not be expected to substantially affect the historic character of the protected resources.

Construction activities, such as pile removal and pile driving, would be unlikely to discover presently unknown intact archaeological deposits. Pile removal and installation would not offer the potential for discovery of intact archaeological resources as would occur with upland excavations, which would not occur with pier construction or habitat enhancements.

Mitigation

Operational

To avoid substantial impacts to the historic character of Pier 59 (a Seattle Landmark) and the Historic Character Area consisting of Piers 54 to 59 (designated as such in the SMC

and determined to be a National Register-eligible historic district), the future design of any piers and associated structures connecting to or adjacent to Piers 57 and 59 should be consistent with the review standards in SMC 23.60.704 (Historic Area Character Review). Designs for modifications to Piers 57 and 59 and new structures will need to be reviewed and approved by the Landmarks Preservation Board and Department of Neighborhoods.

The following list reflects the review criteria (SMC 23.60.704). Many of these are not applicable to future pier design; however, to the extent that they are applicable, implementation as design criteria could reinforce the historic character of the protected facilities.

1. Preserves the single linear form of the pier shed.
2. Does not alter the pier shed form in a major way.
3. Preserves the gabled roof planes with clerestories, including the unbroken roof ridge line and the symmetrical and parallel pitch of each roof plane.
4. Preserves the east-west orientation parallel to submerged street rights-of-way of the major axis of the pier and its pier shed.
5. Maintains the façade so as to reinforce the street edge and has no front setback.
6. Intends to create windows, doors, and openings that are composed of small-scale panes and panels.
7. Preserves the heavy timber construction and truss system.
8. Allows for some of the pier aprons to be surfaced with timber.
9. Includes the pier number clearly identified on both the street end and water end of the pier shed.
10. Allows for landscaping that is smaller-scale, and related to uses at the wharf level, including colorful seasonal plantings.
11. Provides for lighting that is in keeping with the historic nature of the area.
12. Maintains the existing railing along the Alaskan Way Seawall.

Under all of the alternatives, the three plaques in Waterfront Park commemorating historic events (the S.S. Portland plaque, the Miike Maru plaque, and the Joshua Green Memorial Plaque) would be removed with the demolition of Waterfront Park. These plaques could be relocated in conjunction with the design of a replacement pier or a future Seattle Aquarium expansion.

Several options are available to address the impacts to artworks in the Seattle Municipal Art Collection (Christopher Columbus statue, bronze fountain, and *Piers 62/63),* if it were not possible to relocate them. The Columbus statue could likely be relocated and could be used in the design of a replacement pier or future Seattle Aquarium expansion. The fountain and *Piers 62/63* artworks might not be so easily relocated. For these, the options may include:

1. **Restore/remake.** Under this option, the artwork would be restored. For *Piers 62/63,* given the artwork's present condition, restoration would effectively entail remaking it. Portions of the bronze fountain could perhaps be reused in a new fountain within the design of a pier replacement.
2. **Deaccession original artwork and commission new artwork.** In this option, the original artwork would be deaccessioned (which means that it would be removed permanently from the Seattle Municipal Art Collection) through a formal process delineated in the Office of Arts & Cultural Affairs' Deaccession Policy. The Office of Arts & Cultural Affairs or Parks, in consultation with the Office of Arts & Cultural Affairs, would commission a new artwork fence from either the original artists or other artists.
3. **Deaccession artwork, replace with standard railing**. The artwork would be deaccessioned (removed permanently from the Seattle Municipal Art Collection) through a formal process delineated in the Office of Arts & Cultural Affairs' Deaccession Policy. For *Piers 62/63,* a new railing, not considered artwork, would replace the artwork.

Construction

Likely impacts during construction include noise, traffic disruptions, and limitations on access to the Seattle Aquarium/Pier 59 (City Landmark) and to areas eligible for listing on the National Register. These temporary impacts will be mitigated as outlined in the Noise and Transportation

Sections of this EIS. No further mitigation related to known historical or presently unknown archaeological resources are proposed.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts would be expected under any of the alternatives.

Visual Impacts

The information in this section is based on Technical Appendix D: Visual Impacts.

Affected Environment

The complex of park properties—Waterfront Park, the Seattle Aquarium, and Piers 62/63—considered in this EIS is a critically located and visually prominent element of Seattle's Central Waterfront. The analysis for this EIS considered three categories of view and visual resources:

- **Views from public spaces and rights-of-way**. There are innumerable views of water along the shoreline, the broader Elliott Bay, West Seattle, and the Olympic Mountains to the west that can be seen from a number of public spaces, rights-of-way, and pathways. The principal concern of this section is the potential for each of the alternatives to diminish or eliminate significant public viewing opportunities; primarily of the visual elements named above. The analytical methodology for this section did not evaluate the relative importance of these visual elements and quantitatively score the viewing potential loss or gain of each alternative, but rather prepared before-and-after illustrations of the various alternatives. For the purpose of this study, views were modeled from a representative set of six viewpoints identified in Figure 3-6. Existing views from these locations are shown in Figure 3-7.

  The City has identified 86 Inventoried Public View Sites with views to be protected under SEPA. These sites are identified in Seattle's Environmental Policies governing the review and conditioning of physical development in the City (SMC 25.05.675P). These sites and views represent the extent to which the City historically has considered public views in the review and conditioning of development through the Master Use Permit and SEPA review process.

Steinbrueck Park and Waterfront Park are the only Inventoried Public Views potentially affected by this project.

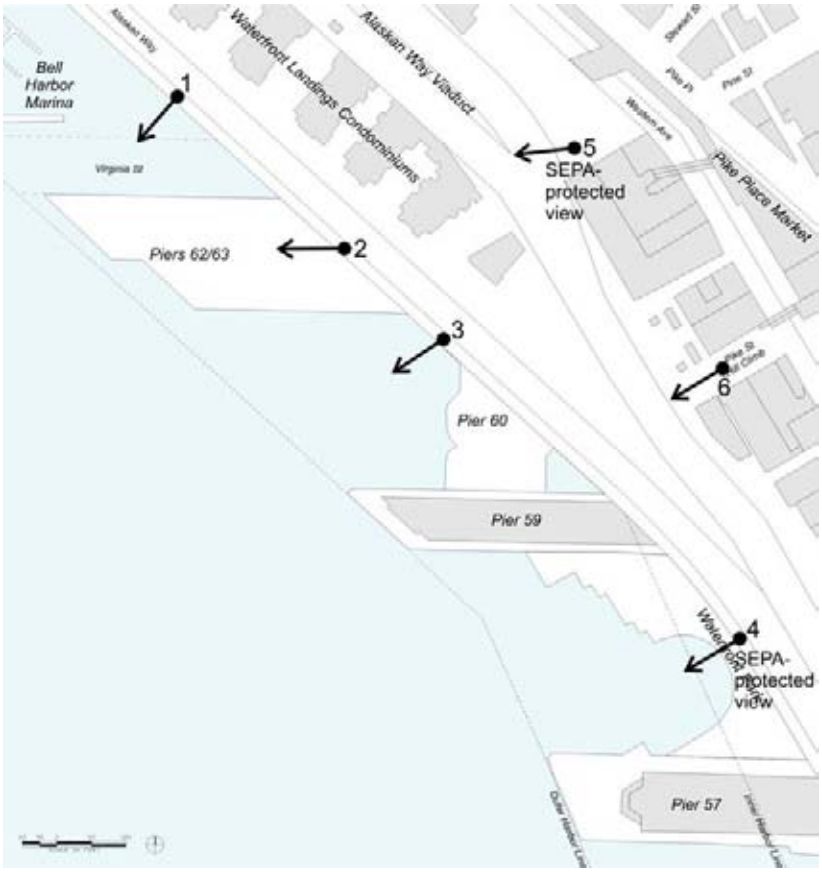


Figure 3-6. Representative Viewpoints for Evaluation

1. View from sidewalk N. Of Pier 62/63
Toward SW

2. View from sidewalk at Pier 62/63
Toward W

3. View North of Aquarium
Toward SW

4. View from Waterfront Park
Toward W

5. View From Steinbrueck Park
Toward W

6. View From Bottom of Pike Street Hill Climb
Toward Aquarium

Figure 3-7. Existing Views

- **Opportunities for appreciating the visual and aesthetic qualities of the Central Waterfront**. This aspect of the visual impacts deals with views *from* the park spaces and access to other aesthetic experiences. The current Waterfront Park is designated an Inventoried Public View Site, as described above, and offers several view opportunities. There are two towers that offer viewpoints above the deck. The major benefit of this is that visitors can look down on the decks of some vessels, such as tugs and barges. The towers also offer dramatic views back at the city skyline and onto the surface of the park itself. The large semicircular esplanade is a unique visual feature on the waterfront, as well. Additionally, the Seattle Aquarium and Piers 62/63 provide excellent views on their western margins.
- **Visual resources of the current park properties themselves, such as the art and fountain in Waterfront Park**. In addition to views, the parks include several visual resources of note. Parks properties include a 1991 public arts project titled *Piers 62/63*. This project is a wire mesh fence around the piers' perimeter with a series of questions painted on it in red, which appear and disappear depending on the viewer's position and the conditions of light, sky, and water. This artwork, which has deteriorated and is now barely visible, may be protected by various rights and copyrights, including the Visual Artist Rights Act, and may require release from the designers/artists to deaccession and remove the work. Waterfront Park includes a statue of Christopher Columbus, which could be relocated to another site, and a centrally located fountain.

Operational Impacts

Impacts to Views from Public Spaces

The impacts to views from the selected Inventoried Public View Sites are summarized in Table 3-7. The notes describe the type and extent of the impact where the construction or demolition of a pier would substantially modify the view. Computer-generated simulations of views from the viewpoints identified in Figure 3-6 were generated for the Aqua Link (Figure 3-8), Connector (Figure 3-9), and Multi-Purpose Pier (Figure 3-10) Alternatives. The simulation for the Rebuild/Preservation Alternative would be similar to the existing view (see Figure 3-7).

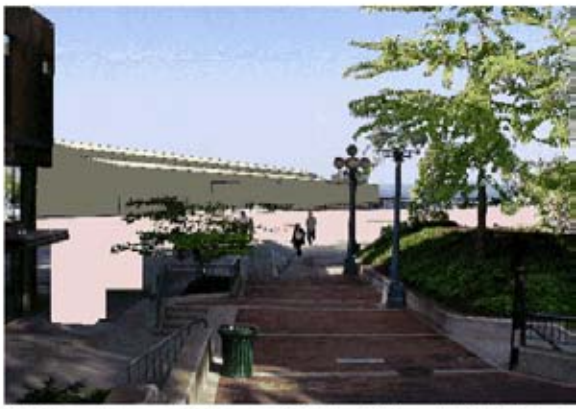
1. View from sidewalk N. Of Pier 62/63
Toward SW

2. View from sidewalk at Pier 62/63
Toward W

3. View North of Aquarium
Toward SW

4. View from Waterfront Park
Toward W

5. View From Steinbrueck Park
Toward W



6. View From Bottom of Pike Street Hill Climb
Toward Aquarium

Figure 3-8. Views from the Aqua Link Alternative

1. View from sidewalk N. Of Pier 62/63
Toward SW

2. View from sidewalk at Pier 62/63
Toward W

3. View North of Aquarium
Toward SW

4. View from Waterfront Park
Toward W

5. View From Steinbrueck Park
Toward W

6. View From Bottom of Pike Street Hill Climb
Toward Aquarium

Figure 3-9. Views from the Connector Alternative

1. View from sidewalk N. Of Pier 62/63
Toward SW

2. View from sidewalk at Pier 62/63
Toward W

3. View North of Aquarium
Toward SW

4. View from Waterfront Park
Toward W

5. View From Steinbrueck Park
Toward W

6. View From Bottom of Pike Street Hill Climb
Toward Aquarium

Figure 3-10. Views from the Multi-Purpose Pier Alternative

Table 3-7. Operational Impacts to Views from Public Spaces

	VIEWPOINT (FROM FIGURE 3-6)					
	1	*2*	*3*	*4*	*5*	*6*
No Action/No Build Alternative	**R**	**R**	**R**	**R**	**R**	**N**
Rebuild/Preservation Alternative	**N**	**N**	**N**	**N**	**N**	**N**
Aqua Link Alternative	**R**	**R**	**A**[a]	**A**[b]	**R**	**A**[c]
Connector Alternative	**N**	**N**	**A**[d]	**R**[e]	**N**	**A**[c]
Multi-Purpose Pier Alternative	**R**	**R**	**A**[f]	**R**[e]	**N**	**A**[c]

R Removes a structure
A Adds a structure
N No change

Notes:

a. The Aqua Link Alternative would include a new deck between Viewpoint 3 and Elliott Bay but would provide a better view site waterward of the current viewpoint.

b. The Aqua Link Alternative would remove the current viewpoints in Waterfront Park and replace them with a deck at the Outer Harbor Line. Views of open water from the sidewalk would be diminished.

c. The proposed Seattle Aquarium expansion wings would be visible, but there are no existing vistas of the water from this point.

d. The Connector Alternative would include a pedestrian bridge. This structure is envisioned as a delicate structure with a landmark character that would frame the view rather than obscure it. It would enclose the water area and could diminish the view's expansiveness. This would be counterbalanced by the exciting view experience intended by the over-water walkway between the Seattle Aquarium and Piers 62/63.

e. Demolition of the current Waterfront Park will remove viewing opportunities from this designated view site. However, there will be additional park view sites with equal or improved viewing characteristics.

f. The Multi-Purpose Pier Alternative would be built between the Alaskan Way sidewalk area and Elliott Bay so that views of the nearshore water would be obscured. The deck is intended to be large enough for public events such as festivals, concerts, and displays. Events that require a larger structure, such as a stage backdrop or large tent, would potentially block views from the sidewalk. Unlike

conditions at Piers 62/63, which required that the whole structure be closed to the public during the event season, the reconfigured Multi-Purpose Pier is intended to allow the public to walk the perimeter of the piers during that time. There would be a corresponding opening of views from the sidewalk, immediately to the north, between the Multi-Purpose Pier and Bell Harbor Marina.

Impacts to Opportunities to Appreciate the Visual Qualities of the Central Waterfront

The potential impacts to viewing opportunities from Parks properties are summarized in Table 3-8.

Table 3-8. Operational Impacts to Opportunities to Appreciate the Visual Qualities on Park Property

	POSITIVE POTENTIAL CHANGES	NEGATIVE POTENTIAL CHANGES
No Action/No Build Alternative	No change	Would remove all visual assets and viewing opportunities from Seattle Parks property (and the Central Waterfront), except along Alaskan Way and its sidewalk
Rebuild/Preservation Alternative	No change	No change
Aqua Link Alternative	Provides a continuous esplanade waterward of the Seattle Aquarium with panoramic views	Removes Waterfront Park, an Inventoried Public View Site
Connector Alternative	Adds a signature bridge structure that would provide unique views from a raised structure	The bridge could be considered to be a view obstruction and would tend to visually enclose the water area between the Seattle Aquarium and the reconstructed Piers 62/63 Removes Waterfront Park, an Inventoried Public View Site
Multi-Purpose Pier Alternative	Depending on the event, the pier may be seen as a visual amenity itself, filled with people, color, and activity	Removes Waterfront Park, an Inventoried Public View Site

Impacts to Other Visual Resources

The potential impacts and additions to visual resources are summarized in Table 3-9.

The Aqua Link, Connector, and Multi-Purpose Pier Alternatives all include aquatic habitat enhancements in the form of a cobble beach and a protected intertidal habitat that would be visible most of the time. The cobble beach might include native vegetation, driftwood, and other features found on natural beaches. The protected intertidal habitat would appear like a mud flat, salt marsh, or tide pool. Such a habitat's ecological function is to provide a sheltered environment for the micro-organisms at the bottom of the food chain that support larger aquatic life. This would provide a rich feeding and resting environment for migrating juvenile salmon and other small fish. However, because of the lack of wave action to scour the gravel or sand surface, the area would generally be covered by seaweed, micro-algae, or other organisms. Whether this habitat enhancement is considered visually positive or negative will depend on the sensibilities of the viewer and, to some extent, on the constructed design.

During the feasibility study review and comment process, reviewers expressed differing viewpoints on the desirability (from a visual amenity standpoint) of constructing highly visible natural looking habitat enhancements.

Table 3-9. Operational Impacts to Visual Resources on Parks Properties

	POSITIVE POTENTIAL CHANGES	NEGATIVE POTENTIAL CHANGES
No Action/No Build Alternative		All resources at Piers 62/63 and Waterfront Park would be lost
Rebuild/Preservation Alternative	None	None
Aqua Link Alternative	The new cobble beach and protected intertidal habitats would add visual interest and a unique waterfront feature	The Waterfront Park fountain, view towers, and artwork on the fence around existing Piers 62/63 would be removed or relocated
Connector Alternative	The new cobble beach and protected intertidal habitats would add visual interest, although the beach would not be as long as that of the Aqua Link Alternative The new pedestrian bridge would add a dramatic waterfront landmark	The Waterfront Park fountain and view towers would be removed or relocated
Multi-Purpose Pier Alternative	The new cobble beach would add visual interest This alternative provides the most opportunities for displays and other activities to add visual interest	The Waterfront Park fountain, view towers, and artwork on the fence around the existing Piers 62/63 would be removed or relocated

Construction Impacts

All alternatives except the No Action/No Build Alternative would require extensive in-water construction over an approximately 2-year period for Phase I (removal and construction of Piers 62/63) and approximately 4 years for Phase II (removal of Waterfront Park and construction of the Aquarium addition). During these periods, there is the potential that views would be blocked. Additionally, the particular part of the park complex being demolished or constructed would be closed.

By far the most severe construction period impact would be the No Action/No Build Alternative because Piers 62/63 and

Waterfront Park would fall into a state of disrepair until they are removed.

Mitigation

Since all of the alternatives except the No Action/No Build Alternative either increase or maintain current visual resources as described above, no mitigation is warranted for these alternatives.

The No Action/No Build Alternative's potentially significant operational impact is that it would remove all of the Central Waterfront's parks except for the apron around the Seattle Aquarium. The only mitigation for this impact would be the construction of a similar facility elsewhere, but there is no clear location for such a new facility that would serve this portion of the waterfront as well.

The potentially significant construction impact of the No Action/No Build Alternative is the dilapidated appearance of the piers as they deteriorate prior to removal. Mitigation for this impact would be to remove the structures as soon as they become unsuitable for public use.

Significant Unavoidable Adverse Impacts

The No Action/No Build Alternative would remove Waterfront Park, which is designated as an Inventoried Public View Site protected under SEPA (SMC 25.05.675P).

Plants and Animals

Existing information on aquatic animals, vegetation, and birds in the project vicinity was collected by reviewing available literature, performing internet searches, and communicating with biologists familiar with the project area. The available literature included the Seattle Central Waterfront Park Planning Feasibility Study (MAKERS 2005), technical documents prepared for the Alaskan Way Viaduct and Seawall Replacement Project Draft EIS (Parametrix 2004), and technical and permitting documents for maintenance and Master Planning at the Seattle Aquarium. The full list of available literature and a detailed analysis of the effects of the proposed alternatives on aquatic animals, vegetation, and birds is provided in Technical Appendix E.

Affected Environment

Existing Conditions

The project area is located in the middle of the 1.5-mile-long Alaskan Way Seawall along the Seattle Central Waterfront. The seawall in the project area is a vertical concrete wall with a buttress of large angular rock (riprap). The project area shoreline faces due west. This area can be exposed to high energy conditions during storms, although it is protected from the highest wind and wave energy by the Duwamish Head and Alki Point that form the southwest margin of Elliott Bay.

Like much of the downtown Seattle waterfront, the project area has large overwater structures extending offshore to the Outer Harbor Line (Figure 2-1). In the southern third of the project area, Waterfront Park extends over the water between Pier 57 and the Seattle Aquarium in an arc that is widest (extending approximately 200 feet offshore from the seawall) next to the adjacent piers and most narrow (extending approximately 20 feet offshore from the seawall) at the midpoint between piers. The Seattle Aquarium and Piers 62/63 extend offshore more than 400 feet to the Outer Harbor Line.

Bathymetry

Bathymetry in the project area displays an undulating pattern along the seawall, owing to the history of filling for construction of the piers and dredging adjacent to piers. Throughout the project area, the base of the seawall and rock buttress are underwater during all tides, except a few of the lowest tides of the year. In this way, there is no intertidal beach in the project area. In the 10.4 acre project area, 9.1 acres are at deeper than -10 feet mean lower low water (MLLW). Table 3-10 summarizes the existing elevations of habitat relative to overwater structures in the project area. Existing bottom elevations range from approximately +4 feet MLLW to -70 feet MLLW. Offshore from the project area, water depths continue to get deeper. Landward, the vertical seawall along the shoreline forms a clear transition to the upland area.

Table 3-10. Summary of Existing Habitat Elevations Related to Overwater Structures

Elevation Range	Not Under Pier (acres)	Under Pier (acres)
Supratidal (above +12 feet MLLW)	0.0	0.0
Intertidal (+12 to -4 feet MLLW)	0.0	0.2
Shallow subtidal (-4 to -10 feet MLLW	0.2	0.8
Deep subtidal (below -10 feet MLLW)	5.2	3.9
Total	5.5	4.9

Substrate and Anthropogenic Debris

The dominant substrate sizes of the project area are sand and silt. Anthropogenic debris is scattered throughout the project area, including a pile of large concrete rubble in the location of the former Pier 61, numerous scattered derelict piles lying horizontal on the seafloor between the piers, and three large structures of steel, wood, and/or concrete that extend several feet off the bottom (Christiansen 2006). Smaller piles of rock, concrete, and soda pop cans occur adjacent to and under the Seattle Aquarium. Small assorted anthropogenic debris that is thrown into the water occurs along the margin of all piers and sidewalks in the project area.

Sediment Chemistry

Limited information is available on sediment chemistry in the project area. The only existing surface sediment data in the immediate vicinity of the project area (two stations in the project area and three stations at or beyond the Outer Harbor Line limit of the project area) were from the 1980s (Ecology 1995). Concentrations of mercury and polycyclic aromatic hydrocarbons (PAHs) exceeded Ecology's Sediment Quality Standards (Ecology 1995). An investigation of the chemistry of material settling out from the water column and landing in the project area detected mercury, bis(2-ethylhexyl)phthalate, pentachlorophenol, benzoic acid, and benzyl alcohol in excess of Sediment Quality Standards. The Ecology (1995) study determined that non-point sources, such as creosote-treated piles and bulkheads are more likely to affect sediment chemistry than point sources, such as combined sewer overflow (CSO) outfalls.

Freshwater Inputs

No natural streams flow into the project area or Seattle's downtown waterfront. One storm drain empties into the project area at the southern margin of Piers 62/63. Another storm drain and a CSO outfall discharge just south of the project area at the southern margin of Pier 57. The storm drains divert flow to the combined sewer system during storms smaller than the 1-year storm event and therefore discharge no flow during smaller storms (Ecology 1995). The storm drains and CSO outfalls are estimated to introduce low levels of total suspended solids, mercury, and PAHs (Ecology 1995), although low levels of other contaminants may be present. The Seattle Steam Company has a NPDES waste discharge outfall that empties into the southern margin of Waterfront Park where it connects to Pier 57. The NPDES permit allows for up to 50,000 gallons per day of water discharge containing a daily maximum of 10 milligrams per liter oil and grease. The Ecology (1995) study determined that point sources (e.g., CSO and NPDES outfalls) were "relatively insignificant source(s) of contaminants" to the Seattle waterfront.

Biological Resources

Many groups of biota use the shoreline and aquatic habitats in the project area. To support the goals of the EIS and consultation with resource agencies, this report highlights those biota with special consideration under the ESA and under other legislation such as the Magnuson-Stevens Fishery Conservation Act (Magnuson-Stevens Act).

Fish

Elliott Bay supports a rich community of resident and transient fish species, including several species and stocks of anadromous salmonids. Resident fish species commonly observed in the shoreline area along the seawall include surfperch, bay pipefish, shiner perch, sculpin, greenling, various flatfishes, and a limited number of lingcod (Parametrix 2004). Elliott Bay is a migratory route for large numbers of anadromous salmonids originating from the Green/Duwamish River Watershed, which flows into the bay (City of Seattle 2003). Salmonids originating in other basins (e.g., Lake Washington/Cedar River, Puyallup River, and Snohomish River) may also migrate into Elliott Bay and through the project area (Brennan et al. 2004).

Juvenile salmonids typically rear and migrate through the Seattle waterfront during spring and early summer. Juvenile

Chinook salmon (*Oncorhynchus tshawytscha*) are present in Elliott Bay as early as January (Nelson et al. 2004) and are in the marine nearshore as late as October (Brennan et al. 2004), although the residence time of individual fish is not expected to be the entire time period. Juvenile salmon are commonly present during the spring and early summer in the surface waters near the seawall. Juvenile coho (*O. kisutch*) are generally present in mid-February to mid-June with some numbers remaining until October (Warner and Fritz 1995; Brennan et al. 2004). Little is known about the migratory habits of bull trout (*Salvelinus confluentus*) in the project area. There have been infrequent and isolated observations of bull trout in Elliott Bay. Based on these observations, it is assumed that bull trout may occur in the project area.

Adult salmon migrating through Elliott Bay would be in the deeper portions of the project area. Chinook adults migrate along the Seattle shoreline from late June through mid-November, peaking between late September and late October (Grette and Salo 1986; Williams et al. 2001). Coho adults are present from early August to late January (Taylor Associates 1995; Warner and Fritz 1995).

No forage fish spawning has been documented in Elliott Bay (WDFW 2005).

Federal and State Protected Species

Chinook salmon in the Puget Sound Evolutionarily Significant Unit (ESU) and bull trout are listed as threatened under ESA. The National Marine Fisheries Service (NMFS) has proposed steelhead (*O. myk*iss) for listing as threatened under ESA. Coho salmon in the Puget Sound/Strait of Georgia ESU are an ESA species of concern.

Essential Fish Habitat

The Magnuson-Stevens Act requires federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). The Magnuson-Stevens Act defines EFH “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (NMFS 1999). Within the project area, NMFS has defined EFH for the Pacific Coast Groundfish and Coastal Pelagic Species assemblages present in coastal waters of Washington.

Pacific Coast Groundfish

The Magnuson-Stevens Act includes protection of EFH for 83 groundfish species, 56 of which were identified as potentially occurring in Elliott Bay (Parametrix 2004). Common groundfish that may occur in Elliott Bay include skates, rockfish, and flatfish. EFH for groundfish includes the entire project area up to mean higher high water. Where Pacific Coast Groundfish may occur in the project area, the sandy substrate in the shallow (-4 to -10 feet MLLW) and deep subtidal (deeper than -10 feet MLLW) areas provide habitat for flatfish and skates. Deep subtidal areas with structure such as pier piles, debris, and aquatic vegetation provide habitat typically associated with rockfish.

Coastal Pelagic Species

The Coastal Pelagic Species grouping includes four finfish (Pacific sardine [*Sardinops sagax*], Pacific (chub) mackerel [*Scomber japonicus*], northern anchovy [*Engraulis mordax*], and jack mackerel [*Trachurus symmetricus*]) and the invertebrate market squid (*Loligo opalescens*). NMFS classifies these five in the same species complex because of similar life histories and habitat requirements (NMFS 1999). Coastal Pelagic Species finfish are pelagic and are not generally associated with substrate. Market squid are the only Coastal Pelagic Species likely to be found in the project area because they spawn in shallow subtidal areas and attach egg casings to hard objects within areas of sand or silt.

Marine Invertebrates

In a video diver survey, Taylor Associates (1995) identified a number of invertebrates of the typical Puget Sound assemblage as present in the benthic substrates of the project area. Crabs, shrimp, and octopus would be expected to be found in and near protected areas with holes for refuge, while sea stars and anemones would be expected to be present on piles and on the benthic substrate.

Marine Mammals

Mammal species found in Elliott Bay that could potentially be found in the project area shoreline include harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*). Their diet may occasionally include adult or juvenile salmon, although they typically feed on the groundfish, squid, and octopus of the benthic zone (Osborne et al. 1988).

Additional marine mammal species that may occur in Puget Sound, but are considered unlikely to enter Elliott Bay, include orca whale (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*), Steller sea lion (*Eumetopias jubatus*), and leatherback sea turtle (*Dermochelys coriacea*). All four of these species are listed as threatened or endangered under the ESA. These species rarely enter Elliott Bay and are not expected in the project vicinity.

Birds

Bald eagles (*Haliaeetus leucocephalus*), ospreys (*Pandion haliaetus*), and peregrine falcons (*Falco peregrinus*), have been observed along the Seattle waterfront, although no active nests are documented within 1 mile of the project area (WDFW 2005). Several other species of birds may occur in the immediate vicinity of the project area and utilize the nearby street trees and urban shoreline for perching, foraging, roosting, and nesting. Birds expected to be commonly found along the Seattle project area shoreline include a variety of gulls, crows, sparrows, and songbirds. A variety of waterfowl use the nearshore habitat of Elliott Bay and may utilize the project area, including loons, grebes, cormorants, merganser, and scoters (Parametrix 2004).

Aquatic Vegetation

Aquatic vegetation (macroalgae) occurs in the project area in those locations with suitably large substrate to attach to and suitable light intensity (e.g., approximately less than -30 feet MLLW). Red, green, and brown macroalgae representing typical Puget Sound assemblages are present in the project vicinity (Taylor Associates 1995; Parametrix 2004). The suitable areas for macroalgae include the concrete rubble of the former Pier 61 where a dense community of aquatic vegetation, including bull kelp, grows on the rubble to depths of approximately -30 feet MLLW. Some macroalgae growth also occurs along the outer row of piles forming piers and on miscellaneous debris in the project area. The seawall and adjacent riprap support some macroalgae growth.

Riparian Vegetation

Riparian vegetation is sparse to absent in the project area; terrestrial vegetation is limited to existing street trees in planting structures lining Alaskan Way from the southern end of Pier 63 to the southern boundary of the project area.

Operational Impacts and Mitigation

The potential effects of the proposed project on aquatic animals, vegetation, and birds were identified for each alternative. Additional detailed analysis of the effects of the proposed alternatives on aquatic animals, vegetation, and birds is provided in Appendix E.

Operational Effects Common to All Alternatives

Change in Overwater Structures

All alternatives will result in a change in overwater structures occurring in the project area. In the No Action/No Build Alternative, this change will occur through the eventual deterioration of Piers 62/63 and Waterfront Park. The timeframe for such deterioration is unknown, but it is assumed that as the piers become structurally unsound they will be demolished. All other alternatives would partially or fully demolish Piers 62/63 and Waterfront Park and replace them with a reconfigured pier design. The Seattle Aquarium expansion and associated demolition of Waterfront Park would slightly reduce the amount of overwater structure from 2.42 acres to 2.40 acres and would move the overwater structure further offshore from the seawall.

Overwater structures have several effects on the quality of habitat for aquatic animals and vegetation. Overwater structures such as the large piers in the project area prevent light penetration through the water column, which restricts aquatic vegetation growth, reduces production of prey resources (epibenthic invertebrates) commonly consumed by juvenile salmon (Haas et al. 2002), and has been shown to often change juvenile salmonid behavior when they encounter the darkened waters (Pentec 1997; Weitkamp and Schadt 1982; Weitkamp 1991; Nightingale and Simenstad 2001).

Due to insufficient light, areas under large piers are often unvegetated. Areas that are shaded by the piers for long portions of the day can also be expected to have less aquatic vegetation than would normally occur. This absence of aquatic vegetation reduces nearshore habitat quality because aquatic vegetation is a fundamental structural component of the nearshore ecosystem that provides the following functions:

- Supports the start of the food chain that supports the entire Puget Sound ecosystem

- Provides structure off the seafloor (substrate) that gives fish, crabs, and other animals a place to hide from potential predators.
- Reduces wave energy. (This is especially true of bull kelp that grows all the way to the water surface.)

The effects of overwater structures on juvenile salmon movements have been a significant topic of interest because the ESA-listed juvenile Chinook salmon extensively utilize the shallow nearshore areas upon entering Puget Sound. Juvenile salmon movements are varied when a large overwater structure is encountered, as some individuals will readily pass under overwater structures, while others may delay before going around or going under (Nightingale and Simenstad 2001). Studies have suggested that juvenile salmon that move offshore to go around an overwater structure may become more susceptible to predation from birds, mammals, and other fish; however, there is insufficient information to conclude that such movements result in increased predation on juvenile salmonids (NMFS and USFWS 2005).

Modifications to the overwater structures include the removal of existing piles and will therefore remove the existing community of sessile (stationary) aquatic animals and vegetation and remove habitat for mobile animals that inhabit the piles. New piers constructed in all alternatives except the No Action/No Build Alternative would be built using fewer piles. These piles would be steel or concrete which may not be as suitable for supporting communities because their smooth surface can be difficult for animals to attach to. From the overall perspective of the Seattle waterfront, the reduced amount of available habitat for pile communities would have only minimal effect since it is not a natural habitat type and numerous timber piles remain throughout the Seattle waterfront to support such communities. However, the design of any new piers could include methods to roughen the surface of new piles. This type of design consideration is supported by Seattle's Draft Central Waterfront Concept Plan (Seattle DPD 2005). Replacement habitat for the piling community could be provided by grouted tidal pools that are part of the foreshore beaches included in the Aqua Link, Connector, and Multi-Purpose Pier Alternatives.

Each of the proposed alternatives, except the No Action/No Build Alternative, includes rebuilding piers and therefore would

continue to limit nearshore habitat quality; however, all four of the proposed build alternatives would move the pier decks offshore in order to provide a corridor of light along the seawall with little or no overwater structure. By doing so, the four alternatives would improve habitat quality along the seawall for the numerous aquatic animals and vegetation in the nearshore, including migrating and rearing juvenile salmon, and. This type of change to the nearshore is highlighted in the Seattle's Draft Central Waterfront Concept Plan (Seattle DPD 2005) as a desirable element to improve habitat conditions.

Creation of Shallow Water Habitat

All alternatives, except the No Action/No Build Alternative, include the creation of shallow water habitat for the purpose of restoring a more natural and more diverse shoreline. The shallow water habitat would be created by placing several feet of material on top of the existing substrate. The general plan would be to use large volumes of clean material, such as sand that the U.S. Army Corps of Engineers dredges from the Duwamish River Turning Basin, to bring the seafloor elevation up to nearly design elevations. This sand base would be covered by several feet of larger materials to provide structural stability to the constructed habitat. The size of the larger material will be selected based on models predicting the sustainability of keeping materials in place given the wave energy of the project area. In the backshore, a sand substrate would likely be used. In the foreshore beach and habitat bench areas, these materials would likely be a mix of gravel, cobble, and quarry spall. Along the border of the created habitat and extending at a steep slope through the water would be larger material, such as large angular rock riprap, to contain the created habitat and keep it in place. The interstitial spaces of this large riprap would be filled with quarry spall. Riprap and quarry spall provide sufficiently large substrate for larger species of aquatic vegetation, such as bull kelp, to attach to in order to remain in place.

The proposed creation of shallow water habitat would detrimentally affect nearshore habitat quality by adding large substrate (riprap and quarry spall) to the aquatic habitat, reduce the amount of deep subtidal habitat, and potentially create more habitat that is suitable for fish and bird predators of juvenile salmon. The addition of large substrate would replace sand and silt habitat. The larger substrate does not provide suitable habitat for burrowing animals such as clams,

worms, and other types of macroinvertebrates that are typical components of fish diets.

The conversion of deep subtidal sand/silt habitats to shallow subtidal habitats with larger substrate would reduce the amount of habitat in the project area that are used by various species of West Coast Groundfish, particularly flatfish and skates. However, in the overall perspective of the Seattle waterfront, an abundance of deep subtidal sand/silt habitat would continue to be available for groundfish.

The large rock riprap that would be included in the habitat enhancement design creates interstitial (between rock) crevices for potential predators to hide. Quarry spall would be placed on riprap offshore of the habitat bench to reduce the potential interstitial spaces. Many salmon predators, including several that may occur in the project area, are associated with "reef-like" habitats such as may be provided by the riprap and quarry spall, although the quarry spall would reduce the availability of interstitial crevices for large predators to hide.

The creation of shallow water habitat would improve the feeding setting for shorebirds, particularly piscivorous (fish-eating) species. The beach and shallow water setting would provide new foraging areas for these birds.

Beneficial Effects

The proposed changes to overwater structures that are part of all alternatives would provide benefits to many aquatic animals and vegetation species, including juvenile salmon. The creation of shallow water habitat that is a component of all alternatives except the No Action/No Build Alternative would provide additional benefits for the aquatic animals and vegetation along the shoreline. Both of these project components are supported by the Seattle's Draft Central Waterfront Concept Plan (Seattle DPD 2005) as being desirable habitat improvements for the shoreline. The proposed alternatives would provide the following habitat benefits, although the benefits associated with the No Action/No Build Alternative would be more limited and on an uncertain timeframe:

- Increased habitat diversity
- Increased light penetration to support aquatic vegetation
- Open migration corridor

- Shallow, sloping migration corridor for juvenile salmon
- Removal of potential chemical contaminant source
- Burial of contaminated materials
- Addition of riparian vegetation

The habitat created in the Aqua Link, Connector, and Multi-Purpose Pier Alternatives would provide habitat types that are not currently available along the Seattle downtown waterfront and restore a range of habitats that represent a fully functioning ecosystem. The shallow water habitat would include areas of tidal pools to provide a diversity of habitat types along the shoreline that will, in turn, support a diverse range of animals and aquatic vegetation. The deep sand and silt habitat that would be converted to shallow water habitat is abundantly available along the Seattle waterfront, including in the offshore portions of the project area beyond the footprint of the proposed habitat enhancement. Therefore, the proposed creation of shallow water habitats would not replace another habitat type that is otherwise limited in distribution throughout the Seattle downtown waterfront.

The removal of pier structures from along the seawall would expand the portion of the project area that is shallow enough to receive sufficient sunlight to support plant growth. In addition, the design would almost exclusively include substrate sizes that are large enough to allow vegetation to grow. Currently, the sand and silt substrate throughout much of the project area does not support growth of large aquatic vegetation, such as macroalgae or eelgrass. The riprap and quarry spall that would occur along the offshore margin of the created habitat in order to maintain structural stability would provide significant increases in the amount of habitat providing sufficient light and substrate of adequate sizes to support growth of aquatic vegetation, particularly bull kelp. As described in earlier sections, aquatic vegetation contributes multiple beneficial features to the nearshore.

Opening up the shallow areas to create a corridor along the shoreline with little or no overwater structure would be a beneficial habitat improvement that would provide a corridor through much of the project area for juvenile salmon to move through while foraging and migrating. The corridor would alleviate some of the previously identified concerns about potential survival risks associated with pier structures. A diverse community of other aquatic animals would also be

expected to experience foraging and movement benefits resulting from the open corridor.

The creation of shallow sloping habitats, by all alternatives except the No Action/No Build Alternative, would improve migratory corridor conditions for juvenile salmon. Juvenile salmon, particularly fall Chinook and chum, depend upon shallow water habitats to avoid predators and grow rapidly (Fresh and Averill 2005; King County and Washington State Conservation Commission 2000; City of Seattle 2003). Based on juvenile salmon utilization of the nearshore, the naturally sloping low intertidal (-4 feet to +4 feet MLLW) and intertidal (-4 feet to +12 feet MLLW) habitats are considered most likely to be utilized by juvenile salmon. The supratidal habitats (higher than +12 feet MLLW) are beneficial to salmon by increasing the stability of the beach and providing areas to produce terrestrial prey items that would accessible to juvenile salmon during especially high tides.

The 30-foot-wide low intertidal (near 0 feet MLLW) habitat bench proposed in every alternative except the No Action/No Build Alternative would provide a consistent corridor along the shoreline for juvenile salmon to migrate along. The corridor is at an elevation to be accessible to salmon during most tidal cycles while still being shallow for many tidal stages. The low intertidal elevation would also be highly productive for prey production. A mixed gravel and cobble substrate along the habitat bench would support aquatic vegetation, which in turn would support additional salmon prey production (Brennan et al. 2004).

The removal of creosote-treated piles would remove a potential source of chemical contamination to sediments and water. These benefits would be maximized if conducted prior to the advanced deterioration of the piles and would occur in all alternatives except the No Action/No Build Alternative. Creosote is a wood preservative that can impair the environment with several contaminants (Poston 2001). Intact creosote-treated materials release small amounts of creosote into the environment throughout their time in the aquatic environment (Poston 2001). As piles decay with age, the outer layers of wood may wear away or be broken away by contact, and accelerated creosote leaching from the interior can be expected (Hart Crowser 1997). A general estimate for how long a pile will remain structurally intact with little decay is on the order of 30 to 40 years if there is no physically

damaging contact during that time. During this 30 to 40 year timeframe, little creosote may be released; however, the onset of decay can rapidly increase the introduction of PAHs to the environment (Hart Crowser 1997).

The proposed creation of shallow water habitat in all alternatives except the No Action/No Build Alternative would require placing material on top of existing substrates. The limited available information on the sediment chemistry of the existing substrates suggests that chemical concentrations exceed the Ecology Sediment Quality Standards (SQS) in the Sediment Management Standards (Ecology 1995). For this reason, burying the materials with several feet of clean material will remove the contaminated sediment from the biologically active zone and can be considered to effectively address any chemical contamination issues in those portions of the project area.

The placement of clean materials on top of currently contaminated areas would be expected to support increased primary and secondary productivity and thereby improve prey resources for juvenile salmon and other aquatic animals. In addition, it will remove the potential for chemical contamination to enter the food web. If it is determined that sediments in the project area exceed SQS, then the project's approach to handling contaminated sediments (burial is proposed) would require the approval of Ecology, WDNR, and other regulatory agencies.

With the exception of the No Action/No Build Alternative, all alternatives would provide a section of shoreline with riparian vegetation. Insects dropping from terrestrial vegetation would provide prey resources for juvenile salmon. In addition, fallen leaves from trees would contribute organic material that starts the detritus-based food web upon which juvenile salmon feed. The importance of riparian vegetation to the diet of juvenile salmon in the nearshore has been suggested in several recent publications (e.g., Levings and Jamieson 2001; Brennan et al. 2004; Brennan and Culverwell 2004; Toft and Cordell 2006), although there is little information on the degree of contribution that may result from a small section of riparian trees in an urban setting. The riparian vegetation would also provide potential habitat for small birds.

Effects of Individual Alternatives

This section provides an overview of the effects that are specific to the features of each alternative. Key considerations in this effects assessment are the amount of existing habitat that is buried, the amount of shallow water habitat created, and the change in overwater structures (Table 3-11). With the exception of the No Action/No Build Alternative, each alternative includes two phases of action: one phase prior to the redesign of the Seattle Aquarium and a second phase incorporated into the Seattle Aquarium construction.

Table 3-11. Summary of Amount of Habitat Change (Acres) Provided by Each Alternative

		Decrease in Amount of Overwater Structure			Amount of Habitat Converted from Subtidal (below -4 feet MLLW)		
	Amount of Existing Habitat That Would Be Buried	**Phase 1**	**Phase 2**	**Total**	**Phase 1**	**Phase 2**	**Total**
No Action/No Build	0.0	n/a	n/a	3.0	n/a	n/a	0.0
Rebuild/ Preservation	3.2	0.1	0.5	0.6	0.4	1.4	1.9
Aqua Link	5.2	1.0	Adds 0.1	0.9	1.5	1.5	3.0
Connector	5.2	0.1	0.2	0.4	1.4	1.6	3.0
Multi-Purpose Pier	4.2	0.1	0.2	0.3	0.9	1.5	2.4

Comparison of Alternatives

All alternatives reduce the amount of overwater structures in the project area. The deterioration and eventual removal of Piers 62/63 and Waterfront Park in the No Action/No Build Alternative would remove the largest amounts of overwater structure (nearly 3 acres, Table 3-11). However, the continued structure deterioration in the No Action/No Build Alternative would be expected to allow the release of PAHs at an accelerated rate as pile deterioration increases. Among the build alternatives, the Aqua Link Alternative would provide the greatest reduction in overwater structure (approximately 0.9 acres). The Multi-Purpose Pier Alternative would provide the least reduction in overwater structure (0.3 acres).

The Connector and Aqua Link Alternatives would convert the largest amounts (3.0 acres each) of habitat from subtidal to intertidal/supratidal, which would be expected to increase production of potential prey resources for juvenile salmon. These two alternatives also bury the largest amount of existing habitat (5.2 acres each). As described above, burial activities would reduce the amount of deep subtidal habitat available, but would also remove potentially contaminated sediments from the biologically active zone. The No Action/No Build Alternative would not bury any existing habitat nor convert any habitat from subtidal to intertidal/supratidal. Among the build alternatives, the Rebuild/Preservation Alternative would convert the least amount (1.9 acres) of habitat from subtidal to intertidal.

All of the build alternatives have only small access walkways to the new Piers 62/63 that juvenile salmon would have to migrate under to access the central portion of the habitat enhancements. These access walkways should have little or no effect on juvenile salmon movements, as the walkways are less than 20 feet wide and therefore will not create a completely dark area. The Aqua Link Alternative shifts Piers 62/63 furthest south and creates the largest portion of enhanced habitat outside of the piers. The Multi-Purpose Pier Alternative shifts Piers 62/63 slightly south and would also provide a wider open space between the piers and the Bell Harbor Marina than currently exists.

To the south of the Seattle Aquarium, the Aqua Link Alternative's proposed habitat enhancement would be the least accessible of all alternatives because it would be

bordered by wide areas of overwater structure that may be avoided by juvenile salmon. The Aqua Link and Connector Alternatives include wave attenuation structures in the habitat enhancement design south of the Aquarium. These wave attenuators will provide lower energy habitat more suitable for juvenile salmon rearing than is provided in the other alternatives.

All of the build alternatives would provide some beach with a backshore. The Aqua Link Alternative would provide the longest backshore beach section. The Aqua Link, Connector, and Multi-Purpose Pier Alternatives would create intertidal tidepools.

Construction Impacts and Mitigation

Potential construction effects could occur during a multiple year construction schedule. The construction of every alternative, except the No Action/No Build Alternative includes two phases of work. It is assumed that the first phase of work on Piers 62/63 would take 2 years to construct, with the first year focusing on demolition and removal of the existing structure. The second year would entail building the new pier. The second phase of work would take approximately 4 years to complete given the significant amount of work planned in redesigning the Seattle Aquarium.

Pier demolition may have land-based and barge-based components. Demolition materials may be moved from the project area by truck, rail, or barge. One or more of these methods may also deliver construction materials for the new structures.

Planned construction of the in-water components of the demolition and construction would occur during the approved work window for Elliott Bay between July 16 and February 15. Although the NMFS and U.S. Fish and Wildlife Service (USFWS) report that juvenile Chinook salmon and sub-adult and adult bull trout may be in the project area throughout the year, this work window for in-water work is standard for Elliott Bay and was recently used in the Piling Replacement Project at the Aquarium (NMFS and USFWS 2005).

Effects Common to All Alternatives

Under all alternatives, construction activities could result in temporary effects to fish and aquatic resources from activity

disturbance and sound pressure. The following potential construction related effects were identified:

- Increased turbidity
- Excessive noise (sound pressure)
- Burial of existing aquatic resources
- Release of chemical contaminants
- Potential introduction of temporary overwater structures

Construction activities could result in temporary effects to aquatic resources from temporary water quality effects associated with localized turbidity from pile removal, pile installation, and placement of fill material to create shallow water habitat. The effects to aquatic resources from suspended sediments would be a function of the amount of time sediments are suspended (Newcomb and MacDonald 1991) and the frequency of sediment exposure (Shaw and Richardson 2001).

The noise produced during pile removal activities could cause aquatic animals and birds to avoid the project vicinity. None of the removal methods produces a noise loud enough to cause a pressure wave that would harm these resources.

Based on the size of the construction footprint, specifically the new Piers 62/63; the magnitude of temporary construction effects; and the associated level of disturbance, effects to fish from sound pressure (if only steel piles are used), and effects to aquatic resources from temporary increases in turbidity would be greatest for the Multi-Purpose Pier and Connector Alternatives. The Rebuild/Preservation and Aqua Link Alternatives would be expected to have slightly fewer effects because less overwater structure would be constructed. The No Action/No Build Alternative would have the fewest temporary construction effects.

All alternatives except the No Action/No Build Alternative would include the installation of hollow steel or hollow concrete piles as part of construction of new piers. There are two methods commonly used to install piles: vibratory hammer and impact hammer. Vibratory hammers are generally considered the more preferable method in the aquatic environment; however, driving a pile through particularly dense material and completion (proofing) of steel pile installations necessitate using impact hammers. Vibratory hammers drive piles into the

substrate by vibration. Impact hammers repeatedly strike the top of the steel pile to drive it into the substrate. Impact hammers create a pressure wave that extends out from the pile. The sound pressure generated during pile driving steel piles over 24 inches in diameter has the potential to injure or kill fish in the immediate vicinity of project activities. Fish kills have been documented along the West Coast using impact hammers, although a fish kill does not always occur. It is uncertain why some pile-driving projects result in fish kills and other, similar pile-driving projects do not. Sound attenuation systems, such as bubble curtains, can be installed around the pile to be installed and effectively minimize the potentially harmful pressure waves produced upon impact. Vibratory hammers do not produce the pressure waves that can be harmful to fish.

The placement of material to create the shallow water habitat will bury all existing communities within the footprint of the material placement. Although there are some differences between alternatives, in general, the areas that would be buried are currently between -5 feet and -40 feet MLLW and are predominantly a mix of sand and silt. These areas currently support a community of benthic and epibenthic organisms such as clams, crabs, sea stars, worms, and numerous smaller animals (macroinvertebrates) that are important food resources for juvenile salmon and other fish. These subtidal habitats are used by various groundfish species, such as skates, rockfish, and flatfish, which would be displaced.

In other portions of the areas that would be buried, larger substrate such as riprap, concrete slabs, derelict piles, or other miscellaneous debris provides material for aquatic vegetation and sessile animals to grow on. In this portion of Elliott Bay, rich communities of aquatic vegetation, including red, brown, and green macroalgae, will grow on all suitable substrates (Christiansen 2006). Recolonization of these areas by plants and aquatic vegetation from adjacent areas and/or settling out from the water column is expected to be rapid (see e.g., Thom et al. 1986; Simenstad and Thom 1996).

The removal of the creosote-treated piles would be expected to result in the release of PAHs into the environment. NMFS and USFWS (2005) identified two potential ways for increased long-term contamination that could result from the removal creosote-treated piles. One way is through the re-exposure of

the buried portion of piles during their removal. The second way is through the potential release of droplets of fresh creosote from the piles as piles are being pulled. The removal of piles would also produce localized and temporary disturbances of potentially contaminated sediments.

The demolition and construction activities may include the use of barges for staging, stockpiling, and placing of materials. These barges would create additional temporary overwater structure and expand the footprint of dark areas for juvenile salmon to navigate around or under. The barge effects would be expected to differ from pier effects because the barges extend into the water column and would not allow juvenile salmon to migrate near the surface as they typically do. As a result, juvenile salmon would be more likely to travel around the dark areas (rather than through) by moving to the deeper offshore areas where they may become more susceptible to predation from birds, mammals, and other fish. This effect would be minimized substantially by conducting the in-water construction outside the time that juvenile salmonids migrate through the project area, which occurs principally in spring and early summer. Some juvenile salmonids, however, may remain in the project area until October (Warner and Fritz 1995; Brennan et al. 2004). Typical work restrictions occur between February 15 and July 15, so some overlap of juvenile salmonids and work using barges could occur in the later part of summer and early fall.

An extended presence of barges may affect aquatic vegetation under and adjacent to the barges by reducing light penetration. This could reduce the amount of habitat available for fish and invertebrates in the project area. This effect could be substantially avoided by not using barges during the spring and summer months.

Construction BMPs

Numerous BMPs that can be implemented to minimize potential construction effects on fish and aquatic resources would be incorporated into the construction methodology. A list of potential BMPs is provided in Appendix E. Additional measures may be taken as required by the agencies. A primary BMP will be to avoid working in the water during those times when juvenile salmonids are most likely to be present. In accordance with in-water work restrictions from NMFS and USFWS, no construction activities would occur between February 15 and July 15.

Effects of Individual Alternatives

No Action/No Build Alternative

The No Action/No Build Alternative would delay all construction activities until Piers 62/63 and/or Waterfront Park are structurally unsound and require removal for safety purposes. The demolition of the decayed piers could be a more significant effort than a demolition effort conducted while much of the pier materials are structurally intact. The demolition of the decayed piers could also release more PAHs to the environment than has been generally described above in the section on Construction Impacts and Mitigation. Removal of the decayed, creosote-treated wood in the pier decks and piles may result in the splintering of the wood and subsequent release of numerous wood fragments and chemical contaminants (e.g., PAHs) to the environment.

BMPs during construction could help minimize these potential effects. Placement and maintenance of a silt curtain around the work area would reduce the transport of wood fragments. The effectiveness of a silt curtain would be enhanced by having floating wood fragments removed from the work area, especially along the silt curtain, on a regular basis.

Comparison of Alternatives

The No Action/No Build Alternative would have the fewest construction-related impacts of all alternatives, since no overwater structure would be rebuilt. The No Action/No Build Alternative would provide the greatest potential for release of chemical contaminants into the environment if pier removal is not conducted until the structural integrity of the piles is significantly depleted.

The Multi-Purpose Pier and Connector Alternatives would include the largest new pier structures and would therefore have the greatest potential for impacts related to pile driving. The Aqua Link and Connector alternatives would create the largest habitat enhancement areas and would therefore have the greatest potential for effects related to sediment re-suspension.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to plants and animals have been identified.

Earth

Affected Environment

The following descriptions are based principally on the following:

- Amendment to the Central Waterfront Master Plan: Pacific Northwest Aquarium and Waterfront Park, SEPA Environmental Checklist (Parks 2004)
- Seattle Aquarium Pier 59 Piling Superstructure Maintenance, SEPA Environmental Checklist (Parks 2003)

Topography and Bathymetry. The project area upon which the existing Piers 62/63, Seattle Aquarium, and Waterfront Park exist are submerged, intertidal, and shallow subtidal land. The project area is bounded at the shore, along the northeast side, by the Alaskan Way Seawall. Concrete riprap extends along the base of the seawall, in the intertidal zone, from approximately +2 to -3 feet (Seattle datum). From the seawall, the bathymetry slopes down southwestward to a level of between -60 and -72 feet at the Outer Harbor Line (i.e., a depth of between 47.5 feet and 59.5 feet at MLLW), an average slope of about 17.5 percent. The steepest slopes probably do not exceed 20 percent.

Concrete rubble and other debris is scattered on the bedlands north of the Seattle Aquarium from the demolition of Pier 61, the partial collapse of Pier 64 in 1987, and the reconditioning of Piers 62 and 63. Also accumulated on the site is other anthropogenic (materials from human activities) waterfront debris such as old piles, metal debris, building materials, bottles, and cans.

The bathymetry along the Central Waterfront is slightly undulating, and reflects the original dredging for pier construction and operation. The slips for ships were dredged alongside the pier locations and the excavated material was heaped beneath the piers. Structures along the waterfront are built on pilings with land in the immediate area having been extensively filled and regraded starting in the later half of the 19th century. The site is overlooked by a steep hill (greater than 40 percent) to the northeast. The piers are set in Elliott Bay sediment. A layer of fill material covers the original bottom.

Geologic Hazards. Although much of the project area has experienced dredging and filling over the last 100 years and the adjacent right-of-ways and other upland properties are composed of fill, there is no known history of unstable soils on-site or in the immediate vicinity. However, earthquake damage from the Nisqually Earthquake has been documented nearby for the Alaskan Way Viaduct and the City of Seattle *Environmentally Critical Areas* maps identify the project area as part of a "Liquefaction-prone Area."

Sediments and Contamination. According to the Draft EIS for construction of the original Aquarium (as referenced in Parks 2004), subsurface soil conditions are a generally competent sequence of glacial materials beneath an upper mantle of soft harbor muck. The thickness of the harbor muck thins from approximately 15 feet near the Alaskan Way seawall to less than 3 feet near the Outer Harbor Line.

The gross sedimentation rate observed near Pier 59 is low and consistent, 0.4 to 0.7 grams per square centimeter per year. Surface sediments in the area consist primarily of clay and silt particles (diameters less than 62 microns), or "fines." Subsurface fines content in the area ranges from 40 percent to more than 70 percent.

Limited information is available on sediment chemistry in the project area. Ecology (1995) compiled available data on sediment chemistry along the Seattle waterfront. The only existing surface sediment data in the immediate vicinity of the project area (two stations in the project area and three stations at or beyond the Outer Harbor Line limit of the project area) were from the 1980s. Concentrations of mercury, low molecular weight PAHs, and high molecular weight PAHs exceeded Ecology's SQS (Ecology 1995). Ecology (1995) conducted additional investigation of the chemistry of material settling out from the water column and landing in the project area detected mercury, bis(2-ethylhexyl)phthalate, pentachlorophenol, benzoic acid, and benzyl alcohol in excess of the SQS.

The Ecology (1995) study determined that point sources, such as outfalls, were "relatively insignificant source(s) of contaminants" to the Seattle waterfront. Instead, Ecology determined that non-point sources, such as small fuel spills, discharges of oily water from vessels, and creosote-treated piles and bulkheads, particularly those in disrepair and

potentially decomposing, may affect sediment chemistry along the waterfront.

Generally, core sampling in the Seattle Central Waterfront area indicates that the highest concentrations of contaminants are found at depth. Peak contaminant levels are generally in the sediment layers deposited in the 1900 to 1960 period, between 21 centimeters (8¼ inches) and 168 centimeters (66 inches), depending on the type of contaminant.

Operational Impacts

No ongoing or long-term impacts have been identified that would adversely affect geologic hazards, slope stability, or sediment erosion or contamination. Project design elements would be needed to address the identified liquefaction potential for pier structures under all of the build alternatives.

Over the long term, coastal processes in the nearshore habitat enhancement areas could result in the movement of sediments placed there by the project. Whether or not ongoing beach nourishment or supplementation would be required is uncertain. More analysis of the stability of the enhancement areas will be needed during the project-level design for all of the build alternatives. Ongoing monitoring and adaptive management strategies would be helpful over the longer term to understand to what extent the habitat enhancements are operating as intended.

Construction Impacts

Several features of project construction would affect slopes and bottom sediments in the project area.

Pile Removal. Under all of the alternatives, demolition of Piers 62/63 and Waterfront Park would involve removing the existing timber piles. Pile removal would disturb bottom sediments in the immediate area of the piles. Because the proposal is a nonproject action, methods for pile removal have not been determined. Piles would be removed by vibratory extraction or direct pulling. A clamshell bucket could be used to remove pile stubs if piles break below the waterline. If piles were too deteriorated to remove with a vibratory extractor or by direct pulling, and sediment conditions did not allow for the use of a clamshell bucket, piles could be cut off below the mudline. A shallow depression would result. Other methods also would leave a shallow void. Over time, perhaps a period

of several months, the depressions would naturally fill in. Placement of fill related to the proposed habitat enhancement would fill over a substantial portion of the pile removal areas.

Pile Installation. Installation of piles for new construction would locally disturb and penetrate bottom sediments. Bottom sediments could also be disturbed if pile installation required the movement of concrete and other debris left on the bottom from the collapse and demolition of Pier 61 and partial collapse of Pier 64. The impacts would be similar for all of the build alternatives, although the locations of the replacement piers in the Connector and Multi-Purpose Pier Alternatives would have a greater potential for conflict with the debris than the Aqua Link and Rebuild/Preservation Alternatives.

Fill Placement for Habitat Enhancement. The proposed habitat enhancements for all of the alternatives, except the No Action/No Build Alternative, would require fill to create shallower nearshore habitat. Substantial quantities of substrate materials would be placed to create shallower and extended intertidal conditions. In some locations, fill would be placed to create backshore beach conditions in addition to an intertidal habitat bench and/or extended foreshore zone. Fill would create an extended slope at no more than a 2:1 slope to where it meets the existing bottom. Larger substrate materials, such as quarry spalls, would be placed on the slope for better stability. Substrate materials in the intertidal areas would be suitable sand, gravel, and cobble materials, depending on the design. These materials would increase the diversity of substrate types and extend flatter slopes in the nearshore of the project area. The effects on the sediments would be temporary and localized.

Sediment Contamination. Additional efforts will be needed during the project-level design phase to better characterize the extent and types of sediment contamination present in the project area. Sediment remediation could be required prior to construction of new facilities. This action would limit re-suspension of potentially contaminated sediments. Sediment contamination, if present at actionable levels, could be contained by designing the habitat enhancements to serve also as sediment caps, thereby limiting the potential for recontamination of clean sediments and the reintroduction of contaminants into the aquatic ecosystem.

Mitigation

Over the long term, coastal processes may move sediments placed in the nearshore for habitat enhancements. Provisions for monitoring and developing adaptive management strategies would be helpful to better understand the success of the habitat enhancements and to provide options to maintain the intended habitat values.

Significant Unavoidable Adverse Impacts

No unavoidable significant adverse impacts are anticipated that would increase geologic hazards, slope stability, or soil contamination.

Water

Affected Environment

The descriptions in this section are based principally on overviews provided in the following documents. These documents included a substantial number of references to other sources. Where appropriate, the discussion in this section cites the most recent summary source.

- Amendment to the Central Waterfront Master Plan: Pacific Northwest Aquarium and Waterfront Park, SEPA Environmental Checklist (Parks 2004)
- Aquarium Pier 59 Piling Superstructure Maintenance, SEPA Environmental Checklist (Parks 2003)
- SR 99: Alaskan Way Viaduct and Seawall Replacement Project, Water Resources Discipline Report (WSDOT 2004)

The project area is located along Seattle's Central Waterfront on Elliott Bay, which forms the eastern portion of central Puget Sound and serves as the estuary to the Duwamish River. The Duwamish River flows into the southern portion of Elliott Bay, south of the project area.

Water in Elliott Bay generally circulates counter-clockwise. Fresh water enters from the Duwamish River, moves north along the Inner Harbor, and then flows out to Puget Sound (Ecology 1995; WSDOT 2004a). Water currents in the Inner Harbor are generally low and oriented parallel to the downtown waterfront pier faces (WSDOT 2004a). Very short-term

current accelerations result from ship wakes from ferries, Port of Seattle harbor traffic, and vessels traveling in the Puget Sound shipping lanes.

Tides in Elliott Bay are mixed semi-diurnal with two high and two low tides of unequal magnitude each day. The tidal range between high and low tide (mean higher high water [MHHW] to MLLW) is 13.7 feet. The water is approximately 7.7 feet below the level of the sidewalk along Alaskan Way at high tide and approximately 19.0 feet below the level of the sidewalk at low tide. The highest tide recorded in Seattle came within 4.2 feet of covering Alaskan Way. The water depth along the seawall varies due to the history of dredging and filling for pier construction. The seawall is buttressed with riprap along its waterward length. The water depth at the end of Piers 62/63 it is about 57.5 feet.

Ecology has designated Elliott Bay as an excellent waterbody for aquatic life uses and primary contact recreational uses. Ecology has also designated the following uses for protection: shellfish harvesting, wildlife habitat, sport fishing, boating, aesthetic enjoyment, and commerce and navigation (WAC 173-201A-210, Table 612). In the most recent 303(d) list (2005a), Ecology designated portions of Elliott Bay north, south, and southwest of the project site, comprising about a quarter of the bay's area, as Category 5 (polluted waters) for fecal coliform bacteria. These same areas meet tested standards for dissolved oxygen, temperature, inorganic arsenic, and ammonia-nitrates (Ecology 2005a).

Elliott Bay nearshore sediments contain high levels of various metals and chemical compounds considered pollutants (WSDOT 2004a). Exceedances of sediment criteria are generally associated with previous industrial activities and stormwater and CSO outfalls.

Operational Impacts

Water quantity and currents will not be substantially changed from existing conditions. Different pier configurations would affect water flows within the project area; however, these effects would be very minor and localized near the new pier locations. Wave activity would be modified somewhat under all of the alternatives in the shallower nearshore created by the habitat enhancements.

Stormwater runoff impacts are not anticipated, as the new over-water structures would not be pollution-generating surfaces, as defined by Ecology's current stormwater manual (2005b). The need for any stormwater collection, containment, or treatment would be determined during project-level design of the project. Some vehicle access to the replacement piers can be anticipated for maintenance or staging for larger civic events, such as concerts. Some risk of unintentional deposition of oil or fuel could accompany such uses.

Several long-term beneficial effects on water quality are related to:

- Reduction of over-water coverage
- Nearshore habitat improvement
- Reduction of creosote in the marine environment
- Potential benefit of burial of contaminated materials

Reduction of Over-Water Coverage. The reduction of over-water coverage would result in increased light availability for aquatic vegetation. Macroalgae can reduce wave energy, especially kelp, which grows all the way to the water surface. This in turn could indirectly reduce turbidity and help to maintain smaller sand and gravel substrates in place.

Some level of reduction in over-water coverage would take place with all five alternatives and would be greatest under the No Action/No Build Alternative.

Nearshore Habitat Improvement. Nearshore habitat improvements would indirectly benefit general water quality as well as aquatic life. Improved substrate for macroalgae attachment, in an area allowing sufficient light for growth, would result in a denser, richer vegetation community that would provide the benefits described above under Reduction of Over-Water Coverage. Nearshore habitat improvements are a component of all four build alternatives, and all four build alternatives would yield a similar total area. Nearshore habitat improvements would not take place under the No Action/No Build Alternative.

Creosote Reduction. The majority of the piles to be removed are treated with creosote, a wood preservative made from coal tar. Creosote slowly leaches PAHs, phenols, and creosols into the aquatic environment over a period of years. These

leached chemicals tend to accumulate in the sediments rather than the water column, as documented in Appendix E). The onset of decay rapidly increases the release of PAHs to the aquatic environment. The removal of these creosote-treated piles would remove a source of chemical contamination. The creosote reduction benefit would be the same for all alternatives; however, the benefit would be greatest if removal were accomplished before the piles reached a state of advanced decay, as noted in Appendix E.

Burial of Contaminated Materials. Creation of shallow-water habitat via placement of clean fill material is proposed for all of the build alternatives. Available information on the sediment chemistry of the existing substrates suggests that chemical concentrations exceed Ecology's SQS for several industrial pollutants, including but not limited to heavy metals and PAHs (see Earth Section – Sediments and Contamination). The placement of several feet of clean materials over contaminated sediments would remove the contaminants from the biologically active zone and indirectly benefit water quality by keeping these materials out of the water column.

The No Action/No Build Alternative does not include creation of shallow-water habitat and these benefits would not be realized under that alternative.

Construction Impacts

No substantial impacts to water quantity or water movements would occur during construction. Operations, such as pile removal and installation, would have temporary, minimal effects on water movements.

Short-term construction impacts to water quality would be similar for all of the alternatives. They may include:

- Turbidity from pile removal
- Turbidity from placement of habitat material (not applicable to No Action/No Build Alternative)
- Potential resuspension of contaminated sediments during demolition and construction activities
- Potential accidental spills

Turbidity from Pile Removal. Piles would be removed by vibratory extraction or direct pulling. A clamshell bucket could be used to remove pile stubs if piles broke below the waterline.

If piles were too deteriorated to remove with a vibratory extractor or by direct pulling, and sediment conditions did not allow for the use of a clamshell bucket, piles could be cut off below the mudline. Turbidity impacts would be expected to be localized and temporary.

Turbidity from Pile Installation (not applicable to No Action/No Build Alternative)**.** Hollow steel piles would be installed with a vibratory hammer. The piles would then be filled with concrete. Soil "plugs" are formed when hollow piles are driven into the sediment. If sufficient room remains in the pile to pour the concrete, the soil plugs could be left in place. If a soil plug needed to be removed, it would be removed by suction and placed in containers for proper disposal.

Turbidity from Placement of Habitat Material (not applicable to No Action/No Build Alternative)**.** Placement of material in the water has the potential to increase turbidity, both from suspension of fine materials and from disturbance of underlying substrates during placement. Habitat bench material would consist of sand and gravel, washed to remove silt and clay particles; therefore, suspension of fine materials would be minimal. The majority of turbidity is likely to be from disturbance of the underlying substrate.

Potential Resuspension of Contaminated Sediments. All the construction and demolition activities above have the potential to disturb the bottom substrate and resuspend contaminated sediments into the water column. Implementing BMPs for minimizing turbidity (described below under Mitigation) would also minimize the potential for resuspension of contaminants in the water column.

Potential Accidental Spills. In the event of an accident involving an equipment barge or equipment operating from an existing pier or from Alaskan Way, fuel and lubricant materials could be released into the water. The quantity of such substances would be limited to that normally carried in their fuel tanks and lubricant reservoirs. BMPs to minimize the risk of a spill are described below under Mitigation.

Mitigation

No substantial impacts to water quality are anticipated during operation of the facilities, so no operational mitigation measures are proposed. Limiting vehicular access on the

replacement piers would minimize the potential for inadvertent spills of oil or other hydrocarbons from vehicles.

During construction, the contractor would be required to implement BMPs for the avoidance and minimization of impacts to water quality, such as:

Pile Removal

To reduce turbidity during pile removal:

- Piles and pile stubs would be placed on a barge lined with hay bales or other filtering device to prevent sediments from washing back into Elliott Bay.
- During pile removal with a clamshell bucket:
  - The smallest size bucket required for pile stub removal would be used
  - Lowering unsuccessful bucket attempts (i.e., only sediment, no piles) to the mudline before opening to redeposit the sediment to the seabed
  - If sand is used to backfill depressions, it would be lowered to the bottom in bags.

Structural Demolition

The demolition area would be surrounded by a floating containment boom. Debris that falls from the demolition area and floats would be retrieved using a skiff and a net. Debris that sinks to the bottom would be retrieved by divers.

Pile Installation

- Soil “plugs” created during hollow steel pile driving would be left in place or removed by suction and stored in containers rather than returned to the water.
- Concrete would be sufficiently cured to prevent leaching of contaminants before it contacts the water.

Placement of Habitat Bench Material

Sand and gravel would be placed for the habitat bench using a method that distributes material evenly in place, minimizing or eliminating the need for in-water grading that could disturb existing sediment materials.

Spill Avoidance

- All fueling of barges and equipment would be done at an approved fuel dock away from the project site.
- The contractor would be required to follow an approved Spill Prevention, Containment, and Control (SPCC) Plan, including maintaining spill response materials on site.
- For equipment used in and over water, non-petroleum-based lubricants would be used to the extent feasible.

Significant Unavoidable Adverse Impacts

With the implementation of BMPs during construction, no significant unavoidable adverse impacts to water resources, including water quality, would be expected.

Noise

Affected Environment

The project area is located on the Central Waterfront in an urban, heavily developed part of downtown Seattle. The most common uses of the waterfront are commercial business and maritime industry. North along the shoreline is the Bell Street Pier, which includes public moorage, a multi-use transit shed (warehouse), a maritime museum, a cruise ship terminal, a conference center, a restaurant, and public access. Upland, or east, of the waterfront are several acres of recent development that includes office space, housing, a hotel, and some retail establishments. Uses along the waterfront south of the Seattle Aquarium and Waterfront Park are primarily retail and public service (e.g., Fire Station No. 5 and the Washington State Ferry Terminal). The entire area is separated from the rest of downtown by the Alaskan Way Viaduct, a 2- and 3-lane double deck freeway. Running the length of the site is Alaskan Way, a 4 lane arterial.

In the project area, typical noise sources are traffic along the waterfront and on the Alaskan Way Viaduct, construction, and the usual sounds associated with city living. To provide context on how noise is perceived by humans, sound measurements are often recorded in decibels using the A-frequency weighing scale (dBA). The A-weighted rating of noise is used because it relates to human interpretation of noise. Some examples of commonly experienced noise levels include: normal conversation (60 dBA), average traffic on a

street corner (75 dBA), a ringing telephone (80 dBA), and a stadium football game (117 dBA). An increase of 5 dBA in noise levels is noticeably louder to the human ear, while a decrease of 10 dBA would sound like the noise level has been cut in half.

Traffic from the Alaskan Way Viaduct is the most prominent noise source in the area. Along the corridor, noise levels ranged between 71 and 83 dBA, and typically decreased by 10 dBA between the hours of midnight and 6 a.m. (WSDOT 2004e). Noise measured at the Seattle Aquarium and along the waterfront exceeded the Federal Highway Administration's noise abatement criterion, which is 67 dBA. It is difficult to hold a normal conversation at this noise level.

Noise associated with the existing Piers 62/63, Seattle Aquarium, and Waterfront Park are limited. Construction from pile and deck replacement at the Seattle Aquarium creates temporary noise from construction-related traffic and equipment along the waterfront. Piers 62/63 are being used in the pile and deck replacement project for construction staging. Vehicles used to transport equipment and materials create various construction noises, including alert signals from vehicles backing up and engine noise.

Prior to the construction project, loud sounds from the Parks waterfront spaces have been limited to occasional special events, such as the Summer Nights on the Pier concerts. Music presented over loudspeakers may have created temporary sound levels considered loud by adjacent residents, while enjoyed by others. This concert series has been discontinued due to the inadequate structural condition of Piers 62/63. Other civic events at Piers 62/63 that draw large gatherings of people have been discontinued for the same reason.

Existing, passive uses of Waterfront Park, pedestrians along the waterfront, and pedestrians at Piers 62/63 do not generate substantial noise.

Operational Impacts

Since this a non-project action, detailed design decisions have not been made. However, possible future activities include temporary and seasonal events such as concerts, Salmon Homecoming, farmer's markets, and public rallies. For additional discussion on recreation activities that may occur at

the completed project site, please refer to the Parks and Recreation Section.

For large civic events, such as public gatherings and music concerts that have occurred in past years, elevated sound (noise) levels would be expected. Sound levels for smaller civic gatherings, such as public rallies and small performances, would be lower. These events are temporary and short-term in nature and will not cause a significant impact to residences and businesses adjacent to the pier. Per SMC 25.08.520, an officially sanctioned musical event occurring in a public place may not exceed 95 dBA for 1 minute as measured 50 feet from the source or sources, whether or not the sounds are live or recorded. If noise levels are expected to exceed 95 dBA, a permit or other authorizing document will be required. It is likely that larger civic events could exceed that level and require a permit.

The Multi-Purpose Pier and Rebuild/Preservation Alternatives would provide a large, contiguous pier deck, which could support large events, such as those that have been staged at Piers 62/63 in past years. The Connector Alternative may provide a smaller pier deck, but could support most large events. The Aqua Link and No Action/No Build Alternatives would not be capable of supporting large events because the space would be too small or the pier would be demolished (in the case of the No Action/No Build Alternative).

All of the alternatives, except for the No Action/No Build Alternative, would provide the necessary deck capacity to support smaller public gatherings and informal public access.

Construction Impacts

During construction, short-term noise impacts from construction activities would be expected. Construction noise would be short in duration and intermittent (varying with the time of day and stage of construction). Typical construction noise would be produced by the use of pile drivers, workboats, barges, and other heavy equipment. Trucks, cranes, and similar equipment can generate noise in the range of 67 to 95 dBA at 50 feet. Peak noise from pile drivers can reach 95 to 106 dBA. These short-term noise impacts to the urban environment are expected to be moderate, given the existing ambient noise level.

Mitigation

All construction activities would be conducted in compliance with the City's noise regulations. The contractor would be required to maintain all mechanized equipment in good working order, verifying that mufflers are functioning properly and the equipment is not producing abnormal levels of noise. In addition, construction would typically be limited to daylight hours. If night work were required, an appropriate variance would be needed.

To reduce noise impact to aquatic life, vibrating-style pile driving equipment would be used as much as possible, using impact-style pile driving only when vibration were not practical and for the final proof load. A noise reduction system could be used, such as an air bubble curtain or a fabric barrier system. The construction work would be regulated through permit stipulations.

Parks would work with neighborhood groups or other concerned parties as necessary during design, construction, and operation to ensure that potential noise impacts on local sensitive receptors are prevented or reduced to acceptable levels.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse noise impacts would be expected under any of the alternatives.

Transportation

Affected Environment

Street Network

The street network in the vicinity of the site is generally an extension of the grid pattern of the downtown and Denny Regrade road networks. This pattern is interrupted and modified by the topographic grade change that increases from north to south as the downtown road network climbs from the Pioneer Square area, north to the Denny Regrade. This grade separation precludes east-west through streets between Seneca and Bell Streets. Western Avenue provides the only intermediate street connection starting at the Waterfront in the vicinity of University Street and climbing north to its intersection with Pike Place at Virginia Street.

Alaskan Way is a 4-lane principal arterial that parallels the edge of the Central Waterfront and provides direct access to the Seattle Aquarium, Waterfront Park, and Piers 62/63. This street provides a variety of functions including direct access to waterfront businesses, offices, attractions like the Seattle Aquarium, and the Washington State Ferry and Victoria Clipper terminals. This street is the linear spine linking these Waterfront uses, and a turn-around for one-way streets that terminate at the Waterfront.

Alaskan Way Viaduct is a 2-level (each level serving one direction of traffic), grade-separated, limited access roadway that serves primarily as a through-traffic corridor through the central business district. Underneath the viaduct, a one-way northbound surface street provides metered parking and the parking and loading docks for the businesses east of Alaskan Way on the waterfront grade.

Western Avenue, a two-lane principal arterial with parking on both sides, provides vehicular access between the Central Waterfront and the Pike Place Market. At selected intersections, Western Avenue is widened to include a left-turn lane.

Madison, Marion, Columbia, Cherry, James, and Yesler Streets provide east-west connections between the central business district and the Central Waterfront south of the site. These function as alternating one-way pairs of streets that continue through the central business district to Interstate-5 (I-5) and on to First Hill. They each carry between two and three lanes of traffic.

Bell, Wall, Vine, and Broad Streets provide east-west linkages between the Waterfront and the Denny Regrade north of the site. The alternating pattern of one-way pairs continues with these streets, although several of them convert to two-way traffic west of Western Avenue.

Parking

From Columbia Street to Olympic Sculpture Park, there are approximately 5,517 parking spaces along the waterfront (PSRC 2004). The substantial majority of these are paid parking. The Pike Place Market parking garage is located near the project area east of Alaskan Way.

Public Transit

Metro Transit is the public transit provider in the Seattle-King County area. No regularly scheduled bus routes operate along the Central Waterfront at the present time. More than 50 routes in the central business district link downtown with the rest of King County.

Unique to the Central Waterfront is the Waterfront Trolley, which was established in the early 1980s and runs along the east side of Alaskan Way from Myrtle Edwards Park at the north end, to Pioneer Square and the International District on the south. Passengers load and unload at designated platforms. The two platforms closest to the Seattle Aquarium are located just north of Pike and University Streets. The Pike Street Waterfront Streetcar stop is located immediately across Alaskan Way from the entrance to the Seattle Aquarium.

Ongoing improvements to downtown's north waterfront area, including construction of the Olympic Sculpture Park and work on the northern end of the seawall, have necessitated the temporary suspension of the Waterfront Trolley service. Metro Transit is providing replacement service with special Route 99 Waterfront Streetcar Line buses. Bus routing and stop locations do not exactly duplicate the Waterfront Trolley; however, the same neighborhoods are served—the Waterfront, Pioneer Square, and Chinatown/International District.

Non-motorized Transportation

Bike Paths

Bicyclists utilize a pedestrian pathway (the Waterfront Trail) that is located on the east side of Alaskan Way. This path connects to the Elliot Bay Trail at Myrtle Edwards Park (MAKERS 2005).

Pedestrian

The bulk of pedestrians walking along the waterfront do so between Piers 62/63 and Colman Dock (Washington State Ferries Seattle ferry terminal). Most pedestrians approach the waterfront from the Downtown area via Pike Street and through the Pike Place Market. Approximately 140 cruise ships dock at the Pier 66 cruise ships terminal, bringing 500,000 visitors to Seattle’s waterfront each year, primarily during the summer months. Many currently utilize the

pedestrian bridge that connects the pier with Bell Street Park (MAKERS 2005).

Operational Impacts

Under all of the alternatives, access to the site and parking availability would not change from the existing condition. Event traffic for large civic events, such as concerts or rallies, could temporarily increase traffic congestion on Alaskan Way and nearby streets, as well as increase demand for parking. Based on prior experience with such events at Piers 62/63, these impacts appear to be manageable. Adequate parking, such as the Pike Place Market Parking Garage, exists within walking distance to the event site. Also, the use of public transit helps manage the impact on traffic during such events.

Construction Impacts

Construction-related traffic impacts from the proposed action would occur in varying degrees throughout the construction process. The primary sources of construction-related traffic impacts would be construction workers traveling to and from the job site, deliveries of construction supplies and equipment, and hauling of materials (such as soil, aggregate products, and construction and demolition waste) that need to be imported to or exported from the site.

Construction workers would likely arrive at the construction site before the morning peak traffic period and depart from the site prior to the afternoon peak period; construction work shifts typically begin by 7 AM and end by 4 PM, while the corresponding peak traffic periods typically occur an hour or so later. The number of workers at the project site at any one time would vary depending upon the nature and construction phase of the project.

Construction workers temporarily would add to the demand for parking in the immediate project area. Ample parking exists within a short distance of the project area to provide for their demand.

Mitigation

To address traffic impacts during construction, the Contractor will need to develop an approved traffic management plan. The plan will be developed during project-level design.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse transportation impacts would be expected under any of the alternatives.

Public Services and Utilities

Affected Environment

Public Services

Public services and facilities located in the vicinity of the project area include police, fire, and other emergency services, such as rescue services and hospitals. Police services are provided by the Seattle Police Department – West Precinct. The West Precinct's service area is bordered by Puget Sound and Elliot Bay on the west, I-5 on the east, Ship Canal and Lake Union on the north, and Spokane Street on the south (Seattle Police Department 2006). Three fire stations are located within the project vicinity: Station #2 (2334 4th Avenue), Station #5 (925 Alaskan Way), and Station #10 (301 2nd Avenue South) (Seattle Fire Department 2006). Station #5 is the closest fire station and is the base for engines and fireboats. Three hospitals are located on First Hill east of downtown Seattle and are accessible by ambulance service. The 13th Coast Guard district has a facility on Alaskan Way south of the project area. This facility docks both rescue vessels and ocean-going Coast Guard vessels (WSDOT 2004b).

Utility Services

Utility services in the project area are provided by Seattle City Light, Seattle Public Utilities, City of Seattle Drainage and Wastewater Utility, Seattle Disposal, and private industries. Utility services include electricity, telecommunication services, natural gas, water supply, wastewater and stormwater collection, solid waste collection and disposal, and recycling services.

Electric

Electric power in Seattle is provided by Seattle City Light. Electrical service is provided to Waterfront Park, the Seattle Aquarium, and Piers 62/63. Electrical service is used for security lighting, maintenance, and Aquarium operations. Special events, such as the Summer Nights at the Pier concert

series, have required electrical service for concert lighting and sound.

Telephone

Qwest Communications provides local telephone service within Seattle. Telephone lines are typically located in conduits within street rights-of-way. Telephone service is available throughout the project area.

Water Supply

Potable water is supplied to the Seattle Aquarium by Seattle Public Utilities from a 21-inch welded steel water main in the Alaskan Way right-of-way. The water line is a high-pressure flow line. The existing capacity of this line is adequate to serve the needs of the Central Waterfront area, including supplies to the existing Parks facilities in the project area. Waterfront Park uses water for the fountain and maintenance. The Seattle Aquarium uses potable water for its staff and visitors, maintenance, and to service various exhibits.

Seawater for marine exhibits is withdrawn from Elliott Bay through two intakes at a depth of -35 feet MLLW beneath Pier 59, at a rate of 2,000 to 2,400 gallons per minute. This water is reused by means of direct filtration systems at a rate of 1,200 to 1,400 gallons per minute.

Wastewater and Stormwater Collection

Sewage is pumped by three lift stations from the Seattle Aquarium to a 12-inch sanitary-only trunk line in the Alaskan Way right-of-way. This City of Seattle Drainage and Wastewater Utility trunk line connects to an interceptor at Pike Street, from which it is conveyed to the King County West Point Treatment Plant via the Second Avenue tunnel. No CSO and stormwater outfalls are located in the project area between Waterfront Park and Piers 62/63.

Stormwater from pier properties on the west side of Alaskan Way is not collected for treatment. Sheet flow from the deck and roof runoff collected in roof drains discharges directly to Elliott Bay.

Three stormwater outfalls—Pine, S3, and S4—are located in the project area. These outfalls drain directly to Elliott Bay via catch basins and/or small pipes in the seawall.

Seattle Public Utilities maintains a combined storm and sanitary sewer line on the east side of Alaskan Way only. Stormwater and sanitary sewage collected by this line are directed to the West Point Treatment Plant for treatment.

Solid Waste Collection and Disposal and Recycling

The City has a contract with Seattle Disposal for the collection of commercial solid waste from the Seattle Aquarium. A recycling program for glass, aluminum cans, and paper has been implemented for the Seattle Aquarium and along the Central Waterfront.

Operational Impacts

Under the No Action/No Build Alternative, no utilities would be needed except in the short term because Piers 62/63 and Waterfront Park would be demolished and not rebuilt. Utility needs for the build alternatives would be determined during the design phase. For each of the build alternatives, required utilities would likely include electrical service and potable water. The need for other services such as telephone, sanitary sewer, and others would depend on the program of activities and facilities that would be implemented in the ultimately approved plan.

Public Services

Police, Fire, and Medical Services

Implementation of the proposed action would replace the existing civic spaces associated with Piers 62/63 and Waterfront Park with similar sized or smaller spaces. Programmed activities that would use these spaces would be similar to the types of activities that have occurred in the past in these spaces. Demands for public services, including emergency services, would likely be similar to those experienced for recent activities in these spaces, including large civic gatherings, such as concerts. Demands for such services under the Aqua Link Alternative would be somewhat less than for the other build alternatives because it could not support the larger civic events, such as concerts or large rallies.

Expected future increases in Seattle Aquarium visitors would likely increase the use of the adjacent pier spaces, particularly under options such as the Multi-Purpose Pier and Connector Alternatives with contiguous spaces readily accessible from the Seattle Aquarium. Some small level of additional demand

for public services could result from indirect increases in public use of the replacement public spaces.

Waterfront Park would be demolished in the Aqua Link, Connector, Multi-Purpose Pier, and No Action/No Build Alternatives. When the park is demolished, the small, hidden spaces located in the park would be removed. This would enhance visibility and may increase safety and security in the area.

Utility Services

Electric

All of the build alternatives will require electrical service connections for lighting and to support other programmed activities, such as civic gatherings. The Rebuild/Preservation, Connector, and Multi-Purpose Pier Alternatives, which support concerts like the Summer Nights at the Pier events, would require greater electrical services for the sound system and concert lighting than the Aqua Link Alternative, which does not support large civic events. Special event moorage, for example by a Tall Ship, could also require the provision of electrical service to reduce the need for running engines to provide electricity.

The No Action/No Build Alternative would require no electrical service after Piers 62/63 and Waterfront Park were demolished.

The capacity of the existing electrical service to service the replacement facilities will be determined during project-level design and coordination with Seattle City Light.

Water Supply

Potable water requirements for the build alternatives will be determined during project-level design. Potable water would be needed to support some potential program activities that may occur in these spaces. For example, water may be needed for a fountain, moored vessels, landscape plantings, and/or drinking fountains.

Wastewater and Stormwater Collection

For large events, amenities such as restrooms and concessions may be needed. Since events would occur periodically, temporary amenities may be transported in rather than be constructed. The need for wastewater and stormwater

collection will be determined during project-level design and may depend on the alternative selected and the program of activities that the alternative supports.

Construction Impacts

Public Services

Police, fire, and medical services may experience increased response times as a result of increased truck traffic to and from the project site on Alaskan Way. The need for emergency services could increase as a result of construction accidents.

Utilities

Existing utilities would be disconnected during demolition of the existing Piers 62/63 and Waterfront Park for all of the alternatives. None of the alternatives involves construction in Alaskan Way, so none of the utilities located in the street would be affected. The need for new connections will depend on the alternative selected and the program to be supported. This will be determined during project-level design.

Mitigation

Operational

Utility requirements for the selected alternative would be coordinated with utility providers during project-level design.

Construction

Police, fire, and medical services would be given advance notice of construction activities to minimize potential impacts on service or response time. Emergency management plans for both the police and fire departments would be coordinated with Parks for reliable emergency access.

Utility relocation agreements can be established with the involved agencies to specify procedures to be followed during construction along the waterfront. These agreements would coordinate utility relocation, replacement, temporary connections, protection, and monitoring plans during final design development and construction. All utility locations would be checked with existing utility plans and also field-verified before construction to minimize any impacts on existing utilities.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to public services and utilities would be expected under any of the alternatives.