Executive Summary

The City of Seattle (City), through the Seattle Department of Transportation (SDOT), is proposing to construct the Elliott Bay Seawall Project, which would replace the existing seawall along the shoreline of downtown Seattle. The seawall protects adjacent upland areas, including transportation infrastructure (sidewalks, streets, a pedestrian and bicycle trail, a ferry terminal, and a rail line), critical utilities, residences, businesses, and parks. The harbor area in Elliott Bay is used for commerce and transportation by ferries, cruise ships, and commercial vessels, and for recreation by residents and visitors alike. The downtown Seattle waterfront is an important center of commerce and recreation for the entire region.

The existing seawall consists of three types of walls, all built between 1911 and 1936. Over time, these structures have deteriorated as a result of natural and physical processes. The seawall's degraded condition puts it at risk for significant damage from a major storm or seismic event. The new seawall would protect the shoreline and upland areas from erosion and damage due to coastal storms and seismic events. The new seawall would help preserve downtown Seattle and the region's economic competitiveness and quality of life. It would also provide a solid foundation for the downtown Seattle waterfront, including the projects being developed separately as part of the City's overall Waterfront Seattle Program, which would create new public spaces along the waterfront.

Elliott Bay Seawall Project Area

Obtaining the Final Environmental Impact Statement

The Final EIS is available online at *www.seattle.gov/transportation/seawall.htm*.

Compact discs (CDs) of the Final EIS, Draft EIS, and technical appendices, as well as printed copies of the Final EIS, can be obtained by calling 206-618-8584 or by sending an e-mail to seawall@seattle.gov.

Printed copies of the Final EIS are available for $25, copies of the Draft EIS are available for $50, and copies of the technical appendices are available for $25.

Individuals requiring reasonable accommodation of any type, including language translation services, may call 206-618-8584. Individuals who have a hearing impairment may call the Washington State Telecommunications Relay Service (TTY) at 711.

The issuance of this Final Environmental Impact Statement (EIS) completes the Washington State Environmental Policy Act (SEPA) process for the Elliott Bay Seawall Project. The project area evaluated in this Final EIS extends along the downtown Seattle waterfront from S. Washington Street in the south to Broad Street in the north. The eastern boundary is Elliott and Western Avenues, and the western boundary is generally located 400 feet into Elliott Bay but varies depending on the impacts being studied.

What is the project purpose?

The Elliott Bay Seawall Project has been proposed to reduce the risk of damage to critical infrastructure along the downtown Seattle waterfront due to coastal storms and seismic events, to improve public safety, and to protect associated economic activities. The project would also improve the nearshore ecosystem of Elliott Bay in the vicinity of the existing seawall. The seawall holds the waterfront in place and supports Alaskan Way, including the sidewalk and pedestrian and bicycle trail. It also protects utilities located east (landward) of the face of the seawall. Due to deterioration over the past 100 years, the seawall is at the end of its useful life and at risk of failure. Furthermore, the seawall was not designed to withstand earthquakes.

Elliott Bay is an important link for juvenile salmon migrating from the Duwamish River to the Pacific Ocean. Within the project area, vital shallow-water habitat is limited, and migration along the shoreline can be difficult. Improving the degraded nearshore ecosystem would increase plant and animal diversity, enhancing the habitat for salmon and other species.

Why was an EIS prepared?

SEPA requires the City, as the lead agency and project sponsor, to inform the public of the potential effects of the Elliott Bay Seawall Project on the environment, both during and after construction. This Final EIS was prepared in consideration of comments received on the Draft EIS and provides detailed information on the following topics:

- The purpose and the need for the project
- Project alternatives and how they were developed
- The affected environment
- Potential effects of the project alternatives on 14 elements of the natural and built environment during and after construction
- Options for mitigating adverse project-related effects

Public Participation in the Draft EIS

The Draft EIS was issued for review and comment on November 13, 2012, with comments due on December 13, 2012.

Comments could be provided by e-mail, online via the project website, by U.S. mail, and in person at a public open house, which was held on December 5, 2012, at the Bell Harbor Conference Center's Maritime Events Center.

The open house provided the public with project-related information, and project staff was available to answer questions.

A meeting to brief agencies and Native American tribes on the Draft EIS was also held on December 5, 2012.

Public Open House for the Draft EIS

- Potential cumulative effects of the project in conjunction with other projects in the area
- How the project would comply with applicable plans and regulations

The analysis completed for the EIS enabled City decision-makers, with input from the public, regulatory agencies, and Native American tribes, to consider the environmental impacts of the project alternatives in conjunction with factors such as cost, schedule, and feasibility.

What alternatives are evaluated in this Final EIS and what are their features?

The Final EIS, like the Draft EIS, evaluates a No Action Alternative and three build alternatives: Alternatives A, B, and C. As required by SEPA, the three build alternatives represent different ways of achieving the project purpose, but they share certain basic components:

- A new seawall structure
- Habitat enhancements
- Upland improvements and public amenities

Alternative A would rebuild the face of the seawall as close as possible to its current location. Alternative A combines the lowest cost structural option and a cost-effective suite of ecosystem restoration measures and upland improvements.

Alternative B consists of a different type of structural solution and additional ecosystem restoration measures and upland improvements. Alternative B would rebuild the face of the seawall as far landward as practical.

Alternative C was developed as a hybrid of Alternatives A and B. Alternative C uses the structural solution from Alternative A and includes many of the additional ecosystem restoration measures and upland improvements from Alternative B. Alternative C would move the face of the seawall slightly landward.

The **No Action Alternative** provides a baseline for comparison to the potential effects of the build alternatives and is projected over the next 50 years. The scenarios evaluated under this alternative include minimal damage, loss of functionality and collapse of the seawall.

	Seawall Face Placement	Construction Method	Central Seawall Construction Duration	North Seawall Construction Duration
Alternative A	**Landward & Waterward** (3 ft waterward to 15 ft landward)	**Soil improvement** (jet grouting)	**3** construction seasons/ **2** summer shutdowns	**4** construction seasons/ **3** summer shutdowns
Alternative B	**Landward** (varied 10 to 75 ft)	**Braced soldier pile** (drilled shaft)	**5** construction seasons/ **4** summer shutdowns	**4** construction seasons/ **3** summer shutdowns
Alternative C - Preferred Alternative	**Landward** (consistently 10 to 15 ft)	**Soil improvement** (jet grouting and deep soil mixing)	**3** construction seasons/ **2** summer shutdowns	**4** construction seasons/ **3** summer shutdowns

Construction comparison of build alternatives A, B, and C

What is the City's preferred alternative?

The City's preferred alternative is Alternative C, which combines the most beneficial features of Alternative A (such as shorter construction duration) and Alternative B (greater habitat enhancements and upland improvements) into a hybrid and cost-effective alternative that minimizes environmental impacts.

Alternative C would provide protection against coastal storms and seismic events by means of a new seawall using soil improvement, the most cost-effective and least disruptive construction method evaluated. Alternative C would require the fewest construction seasons (like Alternative A), reducing the impacts on local businesses, residents, and the aquatic environment compared to Alternative B.

By moving the seawall landward along its entire length, Alternative C would provide greater opportunities for ecosystem restoration than Alternative A, including a wider habitat bench to support salmon migration, continuous light-penetrating surfaces, and more extensive nearshore enhancements south of Colman Dock. Alternative C would provide some of the upland enhancements of Alternative B, including options to expand viewing areas and create new viewpoints between the piers. Lastly, Alternative C would also construct an additional northbound lane on Alaskan Way from S. Washington Street to Spring Street.

What new information is provided in the Final EIS?

The Draft EIS was circulated for a 30-day public comment period beginning November 13, 2012. The Final EIS includes the information that was included in the Draft EIS, as well as all of the comments on the Draft EIS that were received from regulatory agencies, Native American tribes, organizations, businesses, and the public, and the City's responses to those comments (Appendix P). It also includes

updates prepared as a result of the Draft EIS comments and additional details that have been developed since the Draft EIS was issued, such as final mitigation commitments (Chapter 8). In addition to Appendix P, the Final EIS includes a revised cultural resources assessment (Appendix F) and a Discipline Report Errata section that notes changes made to specific discipline reports that were issued as part of the Draft EIS. The discipline reports in their original form are included as technical appendices to the Final EIS.

How were members of the public, regulatory agencies, and Native American tribes involved in the EIS process?

Ongoing conversations and collaboration with the public, project stakeholders, Native American tribes and federal, state, and local regulatory agencies have informed the development of the alternatives evaluated in the EIS. This collaboration began with the environmental scoping process and has continued through the design and environmental analysis.

The scoping process, conducted in summer 2010, allowed interested parties to share concerns about the project and provide suggestions on the scope and content of the environmental analysis. All affected federal, state, and local agencies, Native American tribes, private organizations, and the public (including adjacent property owners) were invited to comment. The comments received from 39 individuals and 17 organizations were shared with the project staff and incorporated into the project as the environmental analysis and design proceeded.

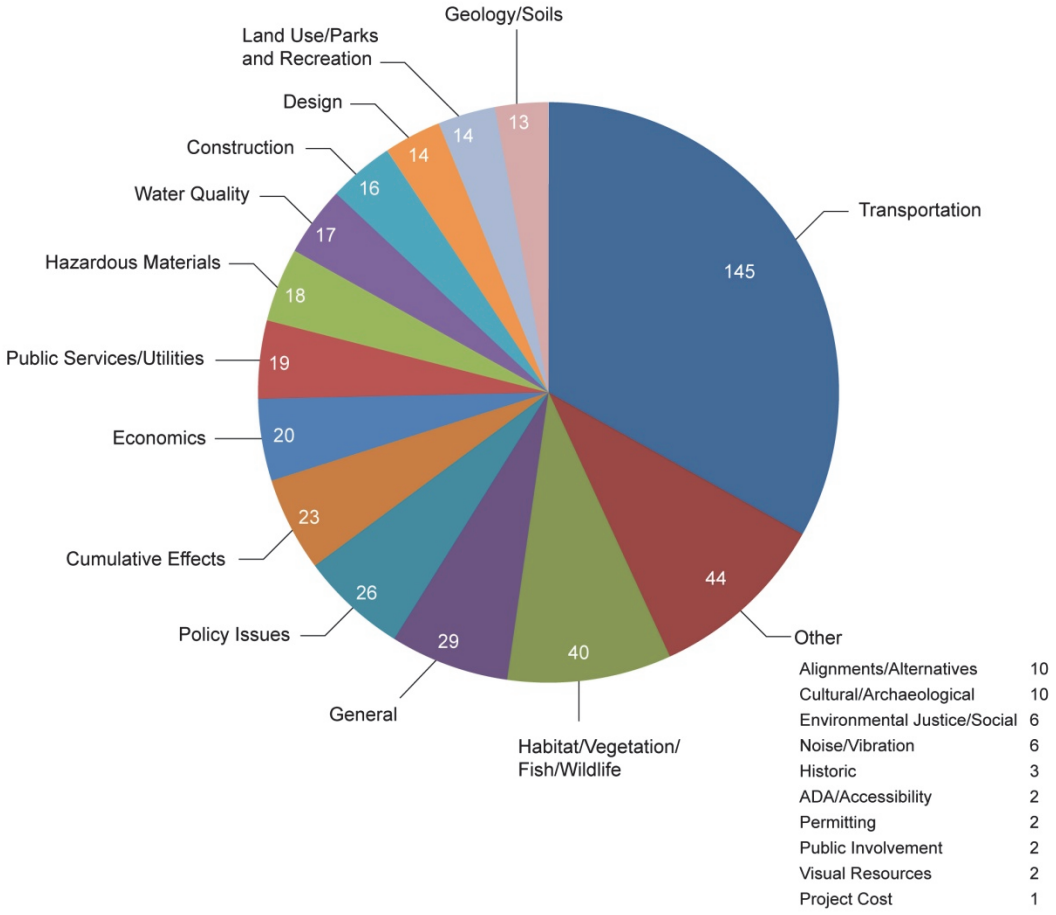
Throughout the development of the project alternatives and the preparation of the Draft EIS, project staff met regularly with an interagency and tribal team, a City interdepartmental team, and a stakeholder group to obtain diverse perspectives and recommendations on the development of alternatives and project design. The stakeholder group includes waterfront business owners and tenants, professionals from the design and environmental fields, staff of the Port of Seattle and the Washington State Department of Transportation, and members of the downtown community. The project team also received comments on the Draft EIS and engaged in hundreds of project briefings and meetings with the public, community groups and organizations, and property owners in the project area.

What types of comments were received on the Draft EIS?

During the comment period for the Draft EIS, 54 communications (letters or e-mails) were received from 49 commenters:

- Native American tribes, 1 commenter
- State and local agencies, 9 commenters
- Organizations, 11 commenters
- Businesses, 14 commenters
- Individuals, 14 commenters

Within these communications, there were 438 individual comments. A breakdown of these individual comments by topic is provided in the pie chart below:



Several recurring themes were apparent in the comments on the Draft EIS. An overview of common questions and issues raised in the comments, along with a summary of the City's responses, is provided below. A complete record of all of the comments and the City's response to each comment is provided in Appendix P.

Summer Construction Shutdown Period

A number of the commenters requested an extension of the summer construction shutdown period to include September. To minimize impacts during September, which is a busy month for many waterfront businesses, construction mobilization would begin gradually after Labor Day, and an effort would be made to preserve as much parking as possible. For instance, during the first construction season, the contractor could avoid construction directly in front of waterfront businesses in Zone 4 and provide some parking within the construction zone.

Tolling of State Route 99 Tunnel

Several commenters requested additional information and analysis concerning the effects of tolling the State Route (SR) 99 tunnel on downtown traffic conditions during seawall construction. In 2012, the state legislature established the Washington State Department of Transportation's authority to toll the SR 99 tunnel; the Washington State Transportation Commission is responsible for setting the toll rates, which have not yet been established.

Since publication of the Alaskan Way Viaduct Replacement Project Final EIS, studies and modeling related to tolling the bored tunnel have continued. All of these studies indicated that tolling would result in substantial diversion of traffic, with resulting congestion on the downtown Seattle arterial street network. However, there is a high level of uncertainty regarding the amount of the toll (which would need to be approved by the Legislature) as well as the resulting rate of diversion. Intersections along Alaskan Way are also expected to be highly congested with tolling in place. The range of uncertainty regarding the rate of diversion from tolling makes it impractical to quantify the impacts of tolling the bored tunnel on the downtown street network as part of the Elliott Bay Seawall Project analysis.

Status of Elliott/Western Connector during North Seawall Construction

Several commenters requested clarification of the status of the Elliott/Western Connector. The transportation analysis in the Draft EIS assumed that the Elliott/Western Connector would not be in place before the North Seawall construction. This assumption represented a worst-case scenario, because without the connector, more traffic would be directed onto Alaskan Way between Broad and Pine Streets. The availability of the Elliott/Western Connector as a bypass would lower traffic volumes and ease congestion on Alaskan Way in the vicinity of North Seawall construction, with or without tolling of the bored tunnel, although the congestion would likely be worse with tolling in place because more vehicles would divert onto arterial streets. At this time, the City anticipates that the Elliott/Western Connector would be in operation before the North Seawall construction begins.

Pedestrian Routes during Construction

Concerns were raised about safe pedestrian movements during seawall construction. The City will provide continued pedestrian and bicycle access throughout the seawall construction period. The access routes would vary depending on the phase of construction and the time of year, and would include detour signage and wayfinding features.

Specificity of and Commitment to Mitigation Measures

There were a number of requests for more specificity regarding the mitigation measures and commitments to them. The Draft EIS identified mitigation measures for the range of alternatives under consideration. Many of those measures included the development of more detailed plans to address specific impacts. For the Final EIS, the City has developed more specific mitigation commitments that are consolidated in Chapter 8, and will continue to coordinate with stakeholders regarding these commitments.

Parking during Construction

The removal of on-street parking during seawall construction was a concern raised by many commenters. The EIS presents a worst-case scenario in terms of loss of parking within the project area. The City is committed to minimizing parking impacts as much as possible and will optimize parking availability during construction periods as well as during the summer shutdown period, the period of highest demand along the waterfront. To reduce effects during September, which is a busy month for many waterfront businesses, construction would begin gradually after Labor Day, with an effort to preserve as much parking as possible. The City will continue to coordinate with the local business community on parking and vehicular access concerns throughout final design and construction.

Cumulative Effects

A number of commenters requested additional detail on coordination among projects occurring simultaneously in the project area, especially related to the North Seawall. The cumulative effects analysis looked at over 25 projects that have been completed, are in progress, or are reasonably foreseeable in and near the seawall project area. Close coordination among these projects is clearly an important component of minimizing cumulative effects and is included in the mitigation measures in the Final EIS (see Chapter 8). In addition, SDOT has been, and will continue to be, involved in traffic management in the greater downtown area, particularly regarding traffic changes associated with the seawall and other projects. When funding for the North Seawall construction becomes available, the City will evaluate then-current conditions to determine whether additional analysis is warranted to address cumulative effects.

Truck Movements and Access during Construction

Several comments related to the ability of trucks to maneuver through the construction zone, access businesses, and access the ferry terminal at Colman Dock. SDOT has determined that trucks with a 67-foot wheelbase would be able to safely maneuver to, through, and within the project area along the temporary roadway during construction.

Details and Monitoring of Habitat Improvements

Commenters requested additional details on habitat improvements and post-construction monitoring. Additional detail on the dimensions and specific locations of each habitat feature has been provided in the Discipline Report Errata. The City will implement a monitoring and adaptive management plan, in consultation with regulatory agencies and Native American tribes, to evaluate whether habitat features provide the functions proposed and to take further actions, if needed. The City anticipates the need for ongoing maintenance, such as renourishment of the substrates.

Effects of Jet Grouting

Concerns were raised about the use of jet grout, particularly in relation to the possible release of material into Elliott Bay. In response to these comments, the EIS describes design and containment measures to minimize the potential for releases. In addition to the installation of a temporary containment wall, these measures include directing the jet grout nozzles away from the shoreline and filling voids in the existing seawall where feasible. Once solidified, jet grout has properties similar to those of cement and forms a non-liquefiable and stable block.

What would the No Action Alternative look like?

Since its completion in 1936, the Elliott Bay Seawall has been subjected to decades of tidal action and coastal storms. It has also been damaged by a number of earthquakes, including the 2001 Nisqually earthquake. Regular seawall maintenance has prolonged its useful life; however, the risk of failure is high even with continued maintenance. If the seawall were to fail, the Alaskan Way Viaduct would collapse, and access to the waterfront piers and buildings on the east side of Alaskan Way would be lost or severely compromised.

Seawall failure would also affect access to Colman Dock, Fire Station No. 5 (Seattle's busiest fire station), and the Port of Seattle. Major utility disturbances would disrupt power to downtown Seattle and the entire western seaboard. Alaskan Way, the major thoroughfare along the waterfront and a designated route for overlegal trucks and hazardous materials, would have to be closed or operated with restricted access for a prolonged period.

What features are common to all three build alternatives?

Seawall

The primary function of the new seawall would be to protect the waterfront and critical infrastructure from damage due to coastal storms, wave action, floating objects, and seismic events. For at least 75 years, the seawall would provide a high degree of protection from both tidal forces and the pressures of soil that liquefies during a seismic event.

Habitat Enhancements

Rebuilding the seawall would provide the opportunity to improve the aquatic habitat in the project area. The poor quality of the current habitat, paired with deep water and limited natural light, creates challenging conditions for migrating juvenile salmon. Improvements to the migration corridor would include an intertidal habitat bench to create shallow water along the seawall face, and light-penetrating surfaces in the cantilevered sidewalk to allow light to reach the water. A textured seawall face would encourage the attachment of aquatic organisms, and the addition of coarse substrate farther from the shore would support a more diverse nearshore marine community.

Upland Improvements and Public Amenities

After the seawall construction, the Alaskan Way surface street, multi-use trail, and parking spaces would be restored. A sidewalk approximately 15 to 20 feet wide would be constructed along the waterfront, with street plantings in areas of adequate width. Stormwater drainage pipes in the project area would be reconstructed to provide treatment for surface water runoff from Alaskan Way, removing most of the suspended solids, oils, and greases. Depending on the options selected, new seating areas could be provided at viewpoints along the corridor and at select points along the waterfront. Additional upland improvements would include restoration of the Washington Street Boat Landing, new or restored railings, public art, historic elements, wayfinding features, and lighting.

Construction Sequencing and Seasons

The seawall would be constructed in two phases: Central Seawall and North Seawall. Construction of the Central Seawall is expected to begin in fall 2013, with limited early work activities, such as utility relocations, taking place in spring and summer 2013. Work associated with the Central Seawall is expected to generally occur from north to south, beginning in Zone 4 and progressing southward. To take advantage of the current closure of Alaskan Way for the bored tunnel south portal construction, work in Zone 1 may be done concurrently with Zone 4 during the first construction season. The North Seawall construction would begin some time after the Central Seawall has

been completed. It would likely progress from north to south, beginning at Broad Street and ending at Virginia Street.

The construction season would begin just after Labor Day and continue through Memorial Day to avoid disrupting waterfront activities during the peak summer tourist season. To minimize effects during September, which is a busy month for many waterfront businesses, construction would begin gradually after Labor Day, with an effort to preserve as much parking as possible. In-water construction would occur within an agency-approved in-water work window to protect migrating fish.

What are the differences in the features of the build alternatives?

The primary differences between Alternatives A, B, and C—in terms of the seawall structure, habitat enhancements, upland improvements and public amenities, and construction method and duration—are described below.

Seawall

Alternative A would construct the new seawall as close as possible to the current alignment, moving the new seawall face 3 feet waterward to 15 feet landward of the existing seawall face. Alternative A would use soil improvement to form the structural support for the new seawall.

Alternative B would largely reshape the seawall and the downtown Seattle waterfront by moving the face of the new seawall landward of the existing seawall face as far as practical, from a minimum of 10 feet to a maximum of 75 feet near the Seattle Aquarium. Alternative B would use braced soldier piles to form the new seawall structure.

Alternative C would move the face of the new seawall approximately 10 to 15 feet landward of the existing seawall face. Alternative C would use soil improvement to form the structural support for the new seawall.

Habitat Enhancements

Under Alternative A, habitat enhancements would include the installation of a continuous intertidal migration corridor from Colman Dock to Broad Street, light-penetrating surfaces at the piers, textured seawall face panels, riparian plantings, and substrate improvements in several areas along the seawall.

Under Alternative B, habitat enhancements would include those in Alternative A, but the area of intertidal habitat would be larger. Substantial habitat enhancements would include an intertidal habitat bench and backshore south of Colman Dock that would be bordered by riparian plants, rocks, and drift logs. It would also include expanded habitat benches in all areas along the seawall. Near the Seattle

Aquarium, there would be either expanded upland riparian plantings or additional intertidal habitat.

Under Alternative C, habitat enhancements would include a continuous intertidal habitat bench adjacent to textured seawall face panels. Alternative C would also include an expanded habitat bench and backshore south of Colman Dock. In addition, shoreline enhancements would be provided between pier structures. Installation of light-penetrating surfaces in the cantilevered sidewalk above the habitat bench would allow light to penetrate into the marine environment below.

Under Alternatives B and C, riparian plantings would be installed in an enhanced habitat area in the vicinity of the Washington Street Boat Landing to provide food and nutrients for migrating salmonids, and upland plantings would be installed along the sidewalk where possible.

Upland Improvements and Public Amenities

Alternative A would construct an additional northbound lane on Alaskan Way from S. Washington Street to Spring Street. It would also restore the existing view corridors between piers.

Alternative B would provide the most improvements in public amenities, with additional gathering areas and enhanced viewpoints along the length of the project area. It would provide new decks featuring seating steps between Piers 54 and 55 and between Piers 56 and 57. A new public plaza or a water plaza (with tide pools) would be included near the Seattle Aquarium and would provide opportunities for interpretive, recreational, and cultural features. Alternative B would also provide new visual and physical connections to the water with a short-stay boat moorage at the restored Washington Street Boat Landing.

Alternative C would construct the additional northbound lane described for Alternative A. Preserved, enhanced, or additional viewing opportunities could also be included at Spring Street (between Piers 54 and 55) and University Street (between Piers 56 and 57); however, these public spaces are currently included in Alternative C as optional features.

Construction Methods and Duration

One of the greatest differences between the build alternatives is the construction duration, with Alternative B requiring approximately 2 years longer than Alternatives A and C. The longer construction duration expected for Alternative B is primarily due to the complexity of construction (especially in the area of the Seattle Aquarium and Waterfront Park) and the construction method.

Alternatives A and C would use soil improvement for the primary structural element of the seawall. This method consists of adding a cement mixture, or grout, to existing soils to form a block of improved

soil that extends down to the more solid foundation soil layers. The soil improvement options include jet grouting paired with deep soil mixing for Alternative C. Jet grouting consists of adding to the existing soils by means of a pressurized jet that is inserted into drilled holes. Deep soil mixing uses an auger that penetrates the ground surface to mix and consolidate grout with the underlying soils.

Under both Alternative A and Alternative C, Central Seawall construction would require three construction seasons, with two summer shutdown periods. The North Seawall construction would require approximately four construction seasons, with three summer shutdown periods. Alternative A assumes that excavation of portions of the fill above the existing seawall is necessary before soil improvement can begin. Alternative C assumes that soil improvement would be completed from street level.

Alternative B would use braced soldier piles as the primary structural element of the new seawall. Installing soldier piles consists of drilling large holes that extend into glacial till. During the drilling, the holes are encased with steel cylinders to prevent them from collapsing, and the soil within the casing is excavated. Once the holes have been prepared, a steel reinforcing cage is placed into the interior of the casing, and the casing is filled with concrete. As the work proceeds, the casing is extracted, leaving a reinforced-concrete cylinder, or soldier pile. Soil anchors are then installed to brace or tie back the soldier piles to create the foundation of the new seawall. Under Alternative B, Central Seawall construction would require five construction seasons, with four summer shutdown periods. Construction of the North Seawall would require an additional four construction seasons, with three summer shutdown periods.

What are the construction effects and how would they be mitigated?

The build alternatives would involve construction activity along the downtown Seattle waterfront for a total of 7 to 9 years, depending on the alternative selected. Construction effects would be caused by activities such as excavation, demolition, use of heavy equipment, and pile driving. The project would minimize construction impacts by controlling noise and dust emissions, minimizing effects to parking, maintaining traffic flow and access throughout the waterfront, and protecting water quality. The City would continue to work with stakeholders to tailor these measures to specific construction stages.

No construction effects would result from the No Action Alternative.

Construction Effects Common to the Build Alternatives

Certain construction effects would be similar for all three build alternatives. The common construction effects on transportation; economics; noise and vibration; fish, wildlife, and vegetation; water resources; and contaminated materials are described below.

Transportation

To provide a dedicated construction zone for Central Seawall construction, traffic would be detoured from Alaskan Way to a temporary roadway beneath the Alaskan Way Viaduct. The temporary roadway would provide one through lane in each direction and a center turn lane, which would also be used by emergency vehicles. During North Seawall construction, traffic would continue to operate along Alaskan Way, although the roadway would be reduced to one lane in each direction with a center turn lane. Freight traffic would be accommodated throughout construction.

These detours would be in place throughout the construction of each project phase (3 to 5 years for the Central Seawall and 4 years for the North Seawall), increasing traffic congestion. Barges would be used to deliver materials such as precast concrete and habitat materials, thereby reducing the need for truck deliveries and potentially helping to ease congestion to some degree. Response times for emergency service providers may increase, although the center turn lane might improve response times to some locations. During construction, all parking beneath the Alaskan Way Viaduct and along Alaskan Way within the active construction zone would be removed. Where feasible, the City will restore parking spaces in the Alaskan Way right-of-way during the summer construction shutdowns, reducing the impact of lost parking during the tourist season.

Economics

Traffic congestion and other construction effects—such as noise, dust, reduced parking, and access challenges—would affect local businesses. The City will continue to work closely with the waterfront business community to develop ways to minimize these potentially adverse effects.

An important mitigation measure is the summer construction shutdown, from Memorial Day weekend through Labor Day weekend, to avoid major disruption during the peak tourist season. To minimize impacts during September, which is a busy month for many waterfront businesses, construction mobilization would begin gradually after Labor Day, and an effort would be made to preserve as much parking as possible. For instance, during the first construction season, the contractor could avoid construction directly in front of waterfront businesses in Zone 4 and provide some parking within the construction zone.

The seawall construction would also result in beneficial economic effects. Construction activities and the procurement of supplies would temporarily stimulate the local economy and create construction jobs.

Noise and Vibration

The most prevalent source of noise and vibration during construction would be heavy construction and impact equipment, such as the pile drivers used to install temporary and permanent piles. The City regulates construction noise by imposing noise limits based on the type of activity, time of day, and property type. Less noise is allowed near residences than near commercial and industrial properties, and less noise is allowed at night than during the day. Construction noise would temporarily exceed the noise limits specified in the Seattle Noise Ordinance for daytime and nighttime hours. Although the noise would be temporary and would not be concentrated in any one area for the entire duration of construction, it would continue over several years and affect a wide variety of residential and commercial properties.

The City and the project contractor will comply with the City noise regulations and secure noise variances, specifying mitigation measures to reduce construction noise. Examples of mitigation measures include the following: (1) engine idling will be limited to no more than 2 minutes when the vehicle or equipment is not directly engaged in work activity, such as on-site pickup trucks and queued export haul trucks, (2) all backup warning devices used on site will be the least intrusive broadband type, or the contractor will use backup observers as permitted by law, and (3) the use of impact tools such as impact pile drivers will be prohibited between the hours of 10 p.m. and 7 a.m. on weekdays and between 10 p.m. and 9 a.m. on weekends and legal holidays.

Fish, Wildlife, and Vegetation

Construction noise and vibration, such as from installation and removal of the temporary sheet pile containment wall, could adversely affect marine life, including fish and marine mammals. Activities such as the removal of existing vegetation could disturb birds and other upland wildlife. The multiple years of construction are likely to affect migratory birds, as well as wintering and breeding birds; however, they are expected to move from the area and experience little direct effect. Other adverse construction effects on fish and wildlife would be related to water quality. Seawall construction would require the removal of riprap (large rock) waterward of the existing seawall. This may stir up and suspend nearshore sediments that contain low to moderate levels of contaminants. The installation and construction of habitat features could also stir up sediments and any associated contaminants.

Mitigation measures for reducing adverse effects on fish, wildlife, and vegetation will include (1) restricting in-water work to the approved

in-water work window, (2) monitoring to ensure that water quality standards are met, and (3) minimizing construction noise. Construction best management practices for reducing the suspension of sediments in water will also be used.

Water Resources

The potential effects of construction on water resources could include increased turbidity as a result of soils carried into Elliott Bay in stormwater runoff or during in-water work. This adverse effect could be worse during the rainy fall and winter months, when most of the construction would occur. Erosion and sediment control measures will be used in areas where the soils have been disturbed, minimizing the adverse effects of stormwater runoff. Construction work in and next to Elliott Bay will be isolated behind a containment wall and/or curtain to minimize water quality impacts.

Contaminated Materials

Some activities would disturb contaminated soils, sediments, and building materials (such as asbestos). These activities include upland excavation, demolition, seawall construction, aquatic habitat improvements, and use of in-water construction equipment. Mitigation measures will include preconstruction hazardous materials surveys, appropriate handling of any materials from a potentially contaminated source, and isolation of construction activities behind a containment wall and/or curtain.

Construction of habitat features would have beneficial effects by placing clean fill on top of existing sediments, providing new uncontaminated surfaces. Excavation associated with the build alternatives would also have beneficial effects by removing moderately contaminated materials behind the existing seawall.

Construction Effects Distinct to a Build Alternative

The differences between the construction effects of the three build alternatives relate primarily to three aspects:

- Location of the face of the new seawall
- Construction method
- Construction duration

There are few differences between the construction effects of Alternatives A and C.

Alternative A

Access during construction of Alternative A would include a continuous haul road, which would provide an alternate route for overlegal trucks and dedicated space for construction vehicles. Alternative A would involve the least amount of in-water construction for habitat features and other in-water or overwater features. As such,

it has the lowest potential of the three build alternatives to adversely affect water quality and fish and wildlife in Elliott Bay.

Alternative B

Alternative B would result in two more seasons of construction effects than Alternatives A and C. The extended periods of increased noise, traffic congestion and detours, disrupted freight movements, reduced parking supply, and restricted business access would burden local businesses and residents and adversely affect the environment more substantially than Alternatives A and C.

Alternative B also would likely require removing much more groundwater than Alternatives A and C because of the extensive landward shift of the seawall and because the drilled-shaft construction method requires extracting the groundwater from each drilled shaft. The extent of this dewatering would increase the potential for occasional violations of water quality standards in Elliott Bay compared to Alternatives A and C.

Large truck access during construction would be more difficult for Alternative B than for Alternatives A and C because construction staging areas would be located at the north and south ends of the project area instead of alongside the construction zone. Under Alternative B, there would not be a continuous haul road, which would adversely affect the movement of freight during construction. Furthermore, construction vehicles would use the temporary roadway along with other vehicles. This could lead to greater traffic congestion along the temporary roadway (especially during Central Seawall construction), affecting travel times for general traffic and emergency responders.

Alternative B would also require more upland and in-water excavation and more in-water work than Alternatives A and C, increasing the potential for adversely affecting water quality and disturbing fish and wildlife in Elliott Bay.

Preferred Alternative (Alternative C)

Alternative C would include a continuous haul road during construction, which would provide an alternate route for overlegal vehicles and dedicated space for construction vehicles. Under Alternative C, the consistent landward movement of the seawall face would result in slightly different degrees of construction effects on fish, wildlife, and vegetation and water quality. The effects would be slightly more adverse than those of Alternative A but less adverse than those of Alternative B.

Alternative C would require slightly more upland and in-water excavation than Alternative A but much less than Alternative B. Excavation and other types of in-water work would increase the potential for adversely affecting water quality and disturbing fish and wildlife in Elliott Bay.

Discipline	Alternative A	Alternative B	Alternative C - Preferred Alternative
Cultural, Historic, and Archaeological			
Historic	Minor	Minor to Moderate	Minor
Archaeological and Cultural	Moderate	Moderate	Moderate
Economics	Substantial	Substantial	Substantial
Energy Use and Greenhouse Gas Emissions	Minor	Minor	Minor
Land Use, Shorelines, and Parks and Recreation			
Land Use, Shorelines	Minor	Minor	Minor
Parks and Recreation	Moderate	Moderate	Moderate
Noise and Vibration	Moderate to Substantial	Moderate to Substantial	Moderate to Substantial
Public Services and Utilities			
Public Services	Moderate	Moderate	Moderate
Utilities	Moderate	Moderate	Moderate
Social Resources	Minor	Minor	Minor
Transportation	Substantial	Substantial	Substantial
Visual Resources	Moderate	Moderate	Moderate
Air Quality	Minor	Minor	Minor
Contaminated Materials	Minor	Minor	Minor
Fish, Wildlife, and Vegetation	Substantial	Substantial	Substantial
Geology and Soils	Minor	Minor	Minor
Water Resources	Moderate to Substantial	Moderate to Substantial	Moderate to Substantial

Construction effects of the build alternatives by environmental discipline

What are the operational effects and how would they be mitigated?

Under the No Action Alternative, the only operational effects would be those caused by required future maintenance and repairs if the existing seawall fails. Any of the build alternatives would have primarily beneficial operational effects. The seawall and transportation infrastructure are currently in place along the downtown Seattle waterfront, and a new seawall and similar transportation infrastructure would be in place once the project has been completed. Therefore, few operational changes and very few adverse operational effects would result from project implementation.

All three build alternatives would achieve the project purpose; therefore, the net result of project operation would be beneficial due to reduced risk of seismic and storm damages, adequate protection of public infrastructure and economic activities, and improvements to the Elliott Bay ecosystem.

Operational Effects Common to the Build Alternatives

Under all three build alternatives, a new seawall would improve aquatic habitat in the project area. New habitat features would create an intertidal salmon migration corridor adjacent to the seawall and would enhance the nearshore marine food web, improving ecosystem productivity. All three build alternatives would provide new habitat for key species, which would increase their populations or densities. Periodic maintenance of the habitat features (needed for all build alternatives) could cause temporary turbidity and displacement of organisms, but best management practices would be used to avoid and minimize these effects.

The three build alternatives would improve the quality of stormwater runoff in the project area as well. The new seawall would reconstruct stormwater drainage pipes and provide new treatment facilities to remove most suspended solids, oils, and greases from stormwater flowing from the project area. The build alternatives would also remove contaminated materials from within the area of excavation associated with the project.

The three build alternatives also would have beneficial operational effects on the upland area along the seawall. All three build alternatives would provide new amenities such as railings, plantings, seating, bicycle racks, and wayfinding elements. Additionally, the build alternatives would restore the historic Washington Street Boat Landing and reinstall it within the Washington Street right-of-way, benefiting this historic resource.

Although the project would preserve or enhance many environmental elements, it would adversely affect the existing seawall. Each of the three build alternatives would partially demolish portions of this historic structure, entirely replacing its current function.

Operational Effects Distinct to a Build Alternative

The differences between the operational effects of the build alternatives are described below.

Alternative A

Like Alternative C, Alternative A would provide an additional northbound lane on Alaskan Way between S. Washington and Spring Streets to improve traffic flow in the area around Colman Dock.

Alternative B

Alternative B would largely reshape the existing seawall and the downtown waterfront by moving the seawall landward up to 75 feet in some locations. This would allow an expanded area of intertidal habitat, providing additional operational benefits for fish, wildlife, and vegetation. Alternative B would improve water viewing at various locations and provide additional public gathering spaces and enhanced viewing spaces and opportunities for interpretive and recreational features. A short-stay boat moorage would be constructed at the restored Washington Street Boat Landing.

The enhanced viewing area between Piers 54 and 55 would displace The Frankfurter. The kiosk housing the ticket venue for Let's Go Sailing may also be permanently affected. Permanent business displacements would be mitigated by the terms of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Preferred Alternative (Alternative C)

Alternative C would add a northbound lane on Alaskan Way between S. Washington and Spring Streets to improve traffic flow in the area around Colman Dock. The enhanced viewing area between Piers 54 and 55, an optional component of this alternative, would displace The Frankfurter and may also permanently affect the kiosk housing the ticket venue for Let's Go Sailing. Permanent business displacements would be mitigated by the terms of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Discipline	No Action	Alternative A	Alternative B	Alternative C - Preferred Alternative
Cultural, Historic, and Archaeological				
Historic	Adverse *Minor to Substantial*	Adverse *Minor*	Adverse *Moderate*	Adverse *Minor*
Archaeological and Cultural	Adverse *Minor to Substantial*	Beneficial *Minor*	Beneficial *Minor*	Beneficial *Minor*
Economics	Adverse *Minor to Substantial*	Beneficial *Minor*	Beneficial *Moderate*	Adverse and Beneficial *Minor*
Energy Use and Greenhouse Gas Emissions	Adverse *Minor*	Beneficial *Minor*	Beneficial *Minor*	Beneficial *Minor*
Land Use, Shorelines, and Parks and Recreation				
Land Use, Shorelines	Adverse *Minor to Substantial*	Beneficial *Negligible*	Beneficial *Minor*	Beneficial *Minor*
Parks and Recreation	Adverse *Minor to Substantial*	Beneficial *Negligible*	Beneficial *Minor*	Beneficial *Minor*
Noise and Vibration	Adverse *Negligible to Substantial*	None	None	None
Public Services and Utilities				
Public Services	Adverse *Minor to Substantial*	Beneficial *Negligible*	Beneficial *Negligible*	Beneficial *Negligible*
Utilities	Adverse *Minor to Substantial*	Adverse *Minor*	Adverse *Minor*	Adverse *Minor*
Social Resources	Adverse *Minor to Substantial*	Beneficial *Minor*	Beneficial *Moderate*	Beneficial *Minor*
Transportation	Adverse and Beneficial *Minor to Substantial*	Beneficial *Moderate*	Beneficial *Minor*	Beneficial *Moderate*
Visual Resources	Adverse Minor to *Substantial*	Beneficial *Moderate*	Beneficial *Moderate*	Beneficial *Moderate*
Air Quality	Adverse *Negligible to Substantial*	Beneficial *Minor*	Beneficial *Minor*	Beneficial *Minor*
Contaminated Materials	Adverse *Minor to Substantial*	Beneficial *Minor*	Beneficial *Moderate*	Beneficial *Minor to Moderate*
Fish, Wildlife, and Vegetation	Adverse *Minor to Substantial*	Beneficial *Substantial*	Beneficial *Substantial*	Beneficial *Substantial*
Geology and Soils	Adverse *Minor to Substantial*	Beneficial *Moderate*	Beneficial *Moderate*	Beneficial *Moderate*
Water Resources	Adverse or Beneficial *Minor to Substantial*	Beneficial *Minor*	Beneficial *Minor*	Beneficial *Minor*

Operational effects of the build alternatives by environmental discipline

What are the anticipated cumulative effects of the project and how would they be mitigated?

Cumulative effects are project-related environmental effects in combination with the environmental effects of other past, present, and reasonably foreseeable future projects in the vicinity. In other words, they are the combined individual effects of multiple projects over time. The Elliott Bay Seawall Project would be constructed in the midst of a busy waterfront at the same time as other capital projects, including the Alaskan Way Viaduct Replacement Project (through 2016), the City's Waterfront Seattle Program projects (2016 to 2020), and the Seattle Multimodal Terminal at Colman Dock Project (2015 to 2020), among many other ongoing or planned projects.

The construction-related effects of any of the build alternatives for the Elliott Bay Seawall Project would add to the temporary adverse construction effects of these other projects. Construction of Alternative B is expected to take up to 2 years longer than Alternatives A and C, and its construction schedule is more likely to overlap with the construction schedules of other projects in the area. The prolonged period of construction effects associated with Alternative B, although temporary, could constitute an adverse cumulative effect.

The operational effects of the Elliott Bay Seawall Project combined with those of other reasonably foreseeable future actions would result in long-term improvements in the aquatic environment and in economic and transportation conditions along the downtown Seattle waterfront. Therefore, the overall cumulative effect of the Elliott Bay Seawall Project combined with the other planning projects would be beneficial, resulting in a transformed waterfront from S. Washington Street to Broad Street.

How is the Elliott Bay Seawall Project coordinating with other projects in the area?

The Elliott Bay Seawall Project is an independent project that would support existing activities on the downtown Seattle waterfront, as well as the future projects included in the Waterfront Seattle Program. SDOT is coordinating with the Washington State Department of Transportation, the Port of Seattle, the waterfront business community, and other City departments to minimize adverse effects due to the construction and operation of the Elliott Bay Seawall Project, both alone and in combination with other projects in the area. The mitigation measures for construction impacts associated with related projects will be coordinated to the extent feasible. Close coordination among the various projects will ensure that they are completed in a timely manner while minimizing adverse effects.

What are the next steps for the project?

Final design and permitting are expected to be completed by late summer 2013. Construction of the Central Seawall is expected to begin in fall 2013, with limited early work activities, such as utility relocations, taking place in spring and summer 2013. The Central Seawall is planned to be completed by early 2016. North Seawall construction would begin once funding is secured but no earlier than fall 2016.

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