APPENDIX E – COST ESTIMATE
EAST WATERWAY OPERABLE UNIT FEASIBILITY STUDY

Prepared for
Port of Seattle

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1 INTRODUCTION

This appendix contains information supporting the detailed remedial alternatives cost estimate prepared for the East Waterway (EW) Operable Unit (OU) Feasibility Study (FS). The cost estimate was developed in accordance with the U.S. Environmental Protection Agency (EPA) guidance document *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000), and is consistent with estimates prepared for other similar feasibility studies and construction bids for projects similar to the EW.

This cost estimate provides a common basis for comparing the remedial alternatives in the FS and provides a reasonable estimate of anticipated project costs. This appendix summarizes the primary cost assumptions used to complete the estimates for all alternatives, including background on methodology (Section 2), assumptions for estimating construction timeframes (Section 3), a summary of the estimated costs for remedial alternatives (Section 4).

The FS cost estimate contains six tables that are organized as follows:

- Table 1 provides the unit costs for each line item used in the cost estimate and a summary of the basis for each.
- Table 2 presents the production rates and daily cost assumptions behind the unit costs estimates for dredging and placement activities.
- Table 3 presents the monitoring and sampling costs for the alternatives based on the monitoring quantities in Appendix G.
- Table 4 presents the assumption for the construction timeframe calculation for the alternatives.
- Table 5 presents the quantities and costs for the alternatives.
- Table 6 provides an overall summary of the total cost for each alternative.

2 COST ESTIMATING METHODS AND ASSUMPTIONS

The cost estimate was developed by determining the cost items associated with remediation for each of the remedial alternatives, estimating unit costs for these items, and multiplying these unit costs by quantities for each alternative. In developing unit costs, a number of assumptions were made to define the scope of particular unit costs; Table 1 presents the unit costs and the basis for each. The following sources of information were used to estimate unit costs:

- Bids and construction estimates for recent sediment remediation projects
- Best professional judgment based on past experience with similar remedial actions and associated pricing
- Local marine contractor input

In particular, this cost estimate draws heavily from review of recent bid and estimate costs in the greater Pacific Northwest region, where a number of similar sediment remediation projects are currently, or were recently, in design or under construction. Unit costs in Table 1 rely primarily on review of the projects in the following bullets, with the final unit cost determined using the best professional judgement of remediation engineers with knowledge of the EW site. Citations are included for sites with publicly available cost information.

- Lower Duwamish Waterway Feasibility Study. Duwamish River, Seattle, Washington (AECOM 2012)
- Jorgenson Forge Sediment Remediation. Duwamish River, Seattle, Washington (Anchor QEA project experience)
- Slip 4 Early Action Area Cleanup. Duwamish River, Seattle, Washington
- Puget Sound Naval Shipyard Activated Carbon Sediment Amendment Installation. Sinclair Inlet, Bremerton, Washington (Johnston et al. 2013)
- Port of Seattle Terminal 18 (T-18) Maintenance Dredging Project. Seattle, Washington (Anchor QEA project experience)
- Port of Bellingham Whatcom Waterway Remediation. Bellingham Bay, Bellingham, Washington (Anchor QEA project experience)
- Port of Olympia Interim Action Marine Terminal Berth Remediation. Budd Inlet, Olympia, Washington (Anchor QEA project experience)

- Former Scott Mill Sediment Remediation. Anacortes, Washington (Anchor QEA project experience)
- Port of Vancouver Alcoa Facility Sediment Remediation. Vancouver, Washington (Anchor QEA project experience)
- Port of Portland Terminal 4 Sediment Remediation. Lower Willamette River, Portland, Oregon (Anchor QEA project experience)
- Esquimalt Graving Dock Waterlot Remediation Project, Esquimalt Harbour, Esquimalt, British Columbia (Anchor QEA project experience)

The following sections summarize specific key assumptions used to develop individual line items or sections of the cost estimate. Table 1 provides the basis for all unit costs.

2.1 Mobilization, Demobilization, and Other Pre-construction Activities

Mobilization and demobilization include bringing equipment and personnel to the site (mobilization) or removing equipment and personnel (demobilization) to complete the remedial action. This item is assumed to include mobilization and demobilization of removal and placement operations barges, equipment preparation, transload facility, upland equipment, ancillary equipment, procedural costs, insurance, and bonding. Because the scope of unrestricted (i.e., open water) dredging is similar for all remedial alternatives, the base mobilization/demobilization costs are assumed to be the same for all alternatives.

There is currently one sediment transload facility available near the EW that is located on the Lower Duwamish Waterway (LDW); however, the availability of this transload facility is not assured in the future. This cost estimate assumes that the construction and permitting of a transload facility prior to dredging would be a reasonable, cost-effective approach for this project. This approach would also include costs prior to each construction season to maintain or remobilize the transload facility and renew permits. Tasks involved in developing a new transload facility could include land lease or land purchase, permitting, transload crane, temporary containment vault, water treatment system, amendment delivery system, container loading area (truck or rail), and rail spur or container transload area, depending on the location of the site developed for transloading. If an existing transload facility is used, then the total transload and disposal costs are expected to be similar to those in the FS cost estimate. In this case, the mobilization costs would go down because the transload facility would not need to be constructed specifically for the EW cleanup, but the unit transloading costs would go up to incorporate up-front costs to the entity owning/operating the transload facility for mobilization, permitting, and land lease.

Seasonal construction mobilization/demobilization costs were applied for each year of construction. Therefore, costs are higher for alternatives with more construction seasons. Additional mobilization/demobilization costs were applied to two specific remedial actions: underpier hydraulic dredging, and dredging under the West Seattle Bridge. Diver-assisted hydraulic dredging would require the mobilization of specialized equipment, personnel, and dewatering facilities. Dredging under the West Seattle Bridge would incur additional costs to address access from the uplands and mobilizing smaller equipment capable of working in the limited access area. These were applied to project costs on a construction-season basis (i.e., annually).

Additional pre-construction activities include the preparation of staging areas, stockpile areas, implementation of site controls, land lease, project management labor, office setup, and preparation of pre-construction submittals. These additional mobilization costs were also applied to project costs annually.

2.2 Removal

The unit costs for sediment removal (cost per cubic yard) were estimated based on the sediment removal rates (cubic yards per day) and daily costs (cost per day) associated with construction, as developed in Table 2. For the purpose of providing appropriate unit cost rates, three types of removal scenarios were considered: one for dredging in unrestricted areas (open water), one for dredging under the West Seattle Bridge, and one for diver-assisted hydraulic dredging. The costs for dredging in unrestricted areas were based on recent bids for similar work. The area under the West Seattle Bridge cannot be accessed from the water, but all equipment and materials must be mobilized from the upland. The dredging rate was calculated based on open-water dredging rates, adjusted assuming that the dredge would be used to remove contaminated sediment and to load trucks. The dredging rate also accounts for limited equipment access, limited space for maneuvering equipment, and cost for truck delivery to the transload area. The costs for diver-assisted hydraulic dredging under piers could be highly variable and were estimated based on discussions with local divers and project experience on other projects. Diver-assisted hydraulic dredging in deep water (e.g., 50 feet) is not commonly performed. Costs are difficult to estimate because there are few project examples to reference. Diver-assisted hydraulic dredging was conducted for the Esquimalt Graving Dock Waterlot Remediation Project in Esquimalt, British Columbia, in 2013 to 2014. This dredging occurred in about 20 feet of open water (not underpier). Costs were approximately $1,100/cy. Few other diver-assisted dredging projects have been recently completed in the northwest. Uncertainties around the costs for diver-assisted hydraulic dredging are driven by uncertainty in conditions under piers (e.g., debris), working durations and conditions for divers, treating large quantities of water, and effectiveness of hydraulic dredging equipment.

Water management is a key cost consideration for removal operations, as varying containment and treatment methods can significantly affect final costs and production rates. The cost estimate assumes that dewatering for mechanically dredged material (i.e., material from unrestricted dredging areas) would be performed using gravity to pass water through specified passive filter material and returning water to the dredging area. Gravity dewatering is facilitated through the use of temporary holding barges equipped with weirs or ballasts and filtration systems. Water generated during the dewatering is typically discharged to receiving waters directly after settling and filtration (see Section 7.5.1.1). This method was recently used during maintenance dredge activities for contaminated sediment along T-18 in the EW and was able to meet water quality standards. If water quality standards cannot be achieved using filtration, then alternative treatment methods will need to be considered during remedial design or construction. For the large quantities of water generated by diver-assisted hydraulic dredging, water will likely need to be treated by a water treatment system installed on a barge or in the uplands. Treated water would be returned to the waterway. Water management costs for mechanical dredging are assumed to be part of unit costs for dredging; water treatment costs for hydraulic dredging are included as a separate line item and are based on recent local construction experience and discussions with contractors, considering the conditions of the EW (e.g., deep water, the need for barge-mounted equipment).

Transloading, transportation, and disposal costs are based on recent project costs in Seattle, Washington. Transportation to the disposal facility would occur by rail car directly from the transloading facility to a facility permitted to receive contaminated sediment.

2.3 Material Placement

Material placement activities include placement materials required for engineered cap, dredging residuals management cover (RMC), dredge backfill to restore elevations in required locations, enhanced natural recovery (ENR), and in situ treatment. Unit costs for furnishing materials include costs for sand (cap isolation material, RMC, backfill, and ENR), gravel (cap filter material), cap armor (assumed to be 6-inch stone), and in situ treatment material (assumed to be a mixture of powdered activated carbon, binding material, and a substrate material such as sand or gravel). Unit costs for material acquisition are based on recent bids and discussions with local suppliers (e.g., CalPortland).

Placement of materials is assumed to occur with dredging equipment in open-water areas, and with other techniques such as a Telebelt in restricted access areas (e.g., under piers and low bridges). The assumptions used to develop the unit costs for placement are provided in Table 2 and are consistent with recent bids. Unit costs for placement in restricted areas are based on the recent underpier in situ treatment pilot study at Bremerton Naval Shipyard (Johnston et al. 2013).

2.4 Contingency, Management, Oversight, and Non-construction Costs

The assumptions for contingency, management, oversight, and non-construction costs are shown in Table 1.

EPA FS cost guidance (EPA 2000) suggests that contingency be factored into a cost estimate to cover unknowns, unforeseen circumstances, and unanticipated conditions reducing the overall risk of cost overruns. For this project, 30% has been applied to the construction costs to cover potential scope and bid contingency costs. This value is in the mid-range of the values specified in the EPA cost guidance document (EPA 2000), is a typical conceptual-level contingency for similar projects.

Pre-construction costs include remedial design (including sampling) and permitting, pre-construction baseline monitoring, project management, and agency review and oversight. Design and permitting are estimated to be 5% of the total construction costs. Pre-construction baseline sampling costs are based on the sampling scope and unit costs provided in Table 3. The basis for the monitoring scope is addressed in Appendix G. Project management is assumed to be 1% of the total construction costs, and agency review and oversight are estimated to be $500,000/year.

Indirect construction costs during construction include construction management support, environmental compliance, project management, and agency review and oversight and are estimated based on project experience and best professional judgement. Construction management support is estimated to be 10% of total construction costs. Water quality monitoring is based on estimated costs per construction day. Confirmational sampling is based on alternative-specific assumptions in Table 3. Project management is estimated to be 4% of the total construction costs, and agency review and oversight are estimated to be $500,000/year during this phase of the project.

Post-construction costs include operations and maintenance and long-term monitoring costs, costs for potential adaptive management actions (contingency remedial actions), project management, and agency review and oversight. Costs for operations and maintenance and long-term monitoring are based on alternative-specific estimates in Table 3. Costs for adaptive management are based on per-acre unit costs for remediation, roughly equivalent to dredging unit capital costs either in open-water or underpier areas. Contingency remediation is assumed to be needed in 15% of MNR, ENR, and in situ treatment areas. Project management is estimated to be 1% of the total construction costs, and agency review and oversight costs are estimated to be $120,000/year during this phase of the project (equivalent to $200,000/year during 5-year reviews and $100,000 between 5-year reviews).

3 CONSTRUCTION TIMEFRAME

Construction timeframe was calculated as part of this cost estimate to determine applicable durations for project elements (Table 4). The construction timeframe was calculated for six separate construction activities based on varying production rates, including the following:

- Removal
  - Open water (unrestricted access)
  - Limited access (under the West Seattle Bridge)
  - Underpier (diver-assisted hydraulic dredging)
- Placement
  - Open-water sand or gravel (applies to engineered cap isolation and filter layers, dredge backfill, ENR)
  - Open-water engineered cap armor layer material
  - Restricted access (underpier and low bridges; in situ treatment or ENR)
  - Open-water residual management cover (assumed to occur after dredging)

For each of these areas, the total number of construction days was calculated based on the volumes to be removed or placed for each alternative and an estimated production rate for each activity. The estimated production rates include an efficiency factor of 70% that accounts for project downtime due to weather delays, equipment maintenance or repair, water quality exceedances, or other reasons (Table 2). The total number of construction days was estimated assuming that one open-water operation, one underpier operation, and one restricted access operation would occur concurrently. Following several seasons of removal, this construction timeframe estimate assumes that placement operations (capping, ENR, or in situ treatment) would happen concurrently with dredging operations, with sufficient distance and controls to avoid contamination from dredging residuals (e.g., if dredging operations start in the south part of the site and move northward, then capping could occur in the south portion of the site while dredging occurs in the north portion of the site). However, the ability to perform concurrent operations while limiting recontamination of placed material is a source of uncertainty in this construction timeframe estimate. Finally, residuals management placement is assumed to occur following all dredging and other placement operations. Detailed phasing for the EW cleanup will be determined in remedial design.

The number of construction seasons was estimated at 100 work days per season. This corresponds to an approximate construction season (i.e., fish window) from October 1 through February 15, with holidays and weekends removed, assuming a mix of 5- and 6-day work weeks (12-hour days) to allow some contractor flexibility. Estimated construction times range from 8 to 12 years for the alternatives.

If the construction season was expanded to the Elliott Bay in-water construction window that formally applies in the EW from July 16 to February 15, the upper end of the number of work days in a construction season could increase up to around 150 days per season; however, the construction rate is expected to be slower during this time due to potential delays from active tribal fisheries. The extended construction window is estimated to reduce the total number of years of construction by about two construction seasons, consistently across the action alternatives (Table 4). Reducing the number of construction years has a small impact on costs because the number of total construction days would remain unchanged. Annual costs (e.g., annual mobilization and demobilization) would be reduced by about 20%, and all other costs would remain the same.

4 SUMMARY AND ACCURACY

Table 5 presents the detailed costs and Table 6 summarizes the total costs for the remedial alternatives. Costs for the action alternatives range from approximately $256 to $435 million, and are provided in 2016 dollars. Total costs include all contractor costs to complete construction, sales tax, contingency, and allowances for engineering design, permitting, construction monitoring, and agency review.

The *Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000) recommends that a discount rate of 7% be used for estimating the net present value of cleanups conducted by non-federal parties. The present value is the amount of money that would need to be set aside at an initial point in time so that funds for implementing cleanup would be available in the future. The real discount rate approximates the marginal pre-tax rate of return on average investment adjusted to eliminate the effect of expected inflation. The net present value costs are not appropriate for the EW cleanup for the following two reasons:

1. First, three of the potentially responsible parties are public entities and have different capital costs than the private sector. Public entities may not be able to set aside sufficient funds for investment without incurring additional costs of bonding or borrowing and, therefore, would not be able to take advantage of the interest accumulation assumption implied by the net present value calculation.
2. Second, the lending environment has changed significantly since the EPA guidance was published in 2000. The current recommendations in the Office of Management and Budget Circular A-94 Appendix C, revised November 2016, indicates that the discount rate ranges from -0.5% for a 3-year investment to 0.7% for a 30-year investment.

Because many of the entities involved in the EW cleanup are public and the current discount rate is low, a 0% discount rate is appropriate to use for comparing the EW remedial alternatives in this FS. This approach is consistent with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance that allows for calculation of project-specific net present value calculations. In this case, the net present value cost is equal to the non-discounted cost (0% discount rate).

The costs provided represent the best estimate total costs for the proposed EW remedial alternatives. The major uncertainties between the cost estimate and the eventual actual cleanup costs include the following:

- Changes in the scope of cleanup due to additional characterization (e.g., changes to dredging volume)
- Changes in the scope of cleanup due to changes in remedial approach or adaptive management (e.g., ENR is considered viable in a larger area)
- Changes in unit costs due to changes in acceptable remediation practices (e.g., changes to dewatering or transloading practices)
- Changes in unit costs due to changes in economic conditions (e.g., cost of fuel, availability of contractors)
- Changes in unit costs due to changes in the rate of construction (e.g., additional delays from working around shipping vessels, or tribal fishing vessels associated with salmon runs. The latter may trigger additional standby costs if work is halted entirely while tribal fishing is conducted within the EW)
- Additional costs that were not considered for this FS, such as economic disruption to the Port of Seattle and fisheries mitigation

EPA guidance, according to CERCLA requirements, notes that the amount and quality of remedial investigation data needed to develop and scope remedial alternatives correspond to an expected accuracy for FS cost estimates of approximately –30 to +50% (EPA 2000). Costs provided within this appendix are intended to fall within this range of accuracy.

5 REFERENCES

AECOM, 2012. Feasibility Study, Lower Duwamish Waterway, Seattle, Washington. Final Report. Prepared for Lower Duwamish Waterway Group. October 2012.

EPA (U.S. Environmental Protection Agency), 2000. A Guide to Developing and Documenting Cost Estimates during the Feasibility Study. July 2000.

Johnston, R.K., V.J. Kirtay, D.B. Chadwick, G.H. Rosen, J.M. Guerrero, J. Collins, C. Ortega, R. Webb, R. May, J. Germano, D. Browning, E. Beaver, M. Wicklein, J. Pittz, D.E. Leisle, L. Doyle, and L. Hsu. Installing an Activated Carbon Sediment Amendment at the Puget Sound Naval Shipyard & Intermediate Maintenance Facility, Bremerton, WA. 2013.

TABLES

Table 5
Quantities and Costs for Alternatives

Item No.	Item Description	Cost by Alternative																
		No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Indirect Construction Costs																		
8	**Pre-construction**																	
8a	Design and Permitting	$ -	$ 9,812,615	$ 10,126,335	$ 10,713,476	$ 10,749,488	$ 11,063,208	$ 11,600,249	$ 11,650,360	$ 11,632,445	$ 12,218,753	$ 15,303,116	$ 12,812,667	$ 13,162,747	$ 16,656,109	$ 13,600,269	$ 17,330,684	$ 17,676,683
8b	Pre-Construction Base-line Monitoring	$ -	$ 337,340	$ 512,016	$ 512,016	$ 328,908	$ 503,584	$ 479,603	$ 503,584	$ 499,368	$ 499,368	$ 312,045	$ 499,368	$ 495,152	$ 495,152	$ 514,521	$ 309,937	$ 510,305
8c	Project Management (Owners)	$ -	$ 1,962,523	$ 2,025,267	$ 2,142,695	$ 2,149,898	$ 2,212,642	$ 2,320,050	$ 2,330,072	$ 2,326,489	$ 2,443,751	$ 3,060,623	$ 2,562,533	$ 2,632,549	$ 3,331,222	$ 2,720,054	$ 3,466,137	$ 3,535,337
8d	Agency Review and Oversight	$ -	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
9	**During Construction**																	
9a	Construction Management Support	$ -	$ 12,566,603	$ 13,007,377	$ 13,782,302	$ 13,752,898	$ 14,193,672	$ 14,898,207	$ 14,968,613	$ 14,943,442	$ 15,717,197	$ 19,435,691	$ 16,471,639	$ 16,913,498	$ 21,311,628	$ 17,448,210	$ 22,104,398	$ 22,590,523
9b	**Environmental Compliance**																	
9bi	Water Quality Monitoring	$ -	$ 2,500,301	$ 2,500,301	$ 2,500,301	$ 2,799,965	$ 2,799,965	$ 2,799,965	$ 2,799,965	$ 2,916,023	$ 2,916,023	$ 3,652,097	$ 3,126,215	$ 3,166,637	$ 3,860,604	$ 3,343,715	$ 4,084,316	$ 4,084,316
9bii	Confirmational Sampling	$ -	$ 287,826	$ 462,502	$ 462,502	$ 279,394	$ 454,070	$ 430,089	$ 454,070	$ 449,854	$ 449,854	$ 262,531	$ 449,854	$ 445,638	$ 447,746	$ 465,007	$ 260,423	$ 460,791
9c	Project Management (Owners)	$ -	$ 7,850,092	$ 8,101,068	$ 8,570,781	$ 8,599,590	$ 8,850,567	$ 9,280,199	$ 9,320,288	$ 9,305,956	$ 9,775,002	$ 12,242,493	$ 10,250,133	$ 10,530,198	$ 13,324,887	$ 10,880,215	$ 13,864,547	$ 14,141,347
9d	Agency Review and Oversight	$ -	$ 4,500,000	$ 4,500,000	$ 4,500,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 6,500,000	$ 5,500,000	$ 5,500,000	$ 6,500,000	$ 6,000,000	$ 7,000,000	$ 7,000,000
10	**Post-construction Costs**																	
10a	Operations and Maintenance and Long Term Monitoring 1 through 20 years post-construction	$ 948,541	$ 1,909,058	$ 2,957,113	$ 2,957,113	$ 1,850,037	$ 2,898,092	$ 2,752,097	$ 2,898,092	$ 2,868,581	$ 2,868,581	$ 1,729,886	$ 2,877,013	$ 2,847,502	$ 2,851,718	$ 2,965,819	$ 1,719,347	$ 2,936,308
10b	Contingency Remediation (Adaptive Management) - Open Water	$ -	$ 2,862,169	$ 2,944,686	$ 2,944,686	$ 197,878	$ 280,395	$ 280,395	$ 280,395	$ -	$ -	$ -	$ 313,544	$ -	$ -	$ 313,544	$ -	$ -
10c	Contingency Remediation (Adaptive Management) - Underpier and Low Bridge	$ -	$ 8,450,982	$ 8,143,418	$ 6,950,606	$ 8,450,982	$ 8,143,418	$ 6,950,606	$ 6,950,606	$ 8,143,418	$ 6,950,606	$ 722,446	$ 7,397,631	$ 7,397,631	$ 793,710	$ 7,836,900	$ 793,710	$ 793,710
10d	Project Management (Owners)	$ -	$ 1,962,523	$ 2,025,267	$ 2,142,695	$ 2,149,898	$ 2,212,642	$ 2,320,050	$ 2,330,072	$ 2,326,489	$ 2,443,751	$ 3,060,623	$ 2,562,533	$ 2,632,549	$ 3,331,222	$ 2,720,054	$ 3,466,137	$ 3,535,337
10e	Agency Review and Oversight	$ -	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000
	Subtotal Indirect Construction Costs	**$ 948,541**	**$ 59,502,030**	**$ 61,805,349**	**$ 62,679,172**	**$ 60,808,935**	**$ 63,112,254**	**$ 63,611,510**	**$ 63,986,116**	**$ 64,912,066**	**$ 65,782,886**	**$ 70,781,552**	**$ 69,323,132**	**$ 70,224,103**	**$ 77,403,998**	**$ 73,308,307**	**$ 78,899,637**	**$ 81,764,657**
	Total Cost	**$ 948,541**	**$ 255,754,324**	**$ 264,332,055**	**$ 276,948,693**	**$ 275,798,693**	**$ 284,376,424**	**$ 295,616,491**	**$ 296,993,315**	**$ 297,560,965**	**$ 310,157,941**	**$ 376,843,882**	**$ 325,576,469**	**$ 333,479,050**	**$ 410,526,170**	**$ 345,313,684**	**$ 425,513,320**	**$ 435,298,324**
	Total Cost (rounded)	**$ 950,000**	**$ 256,000,000**	**$ 264,000,000**	**$ 277,000,000**	**$ 276,000,000**	**$ 284,000,000**	**$ 296,000,000**	**$ 297,000,000**	**$ 298,000,000**	**$ 310,000,000**	**$ 377,000,000**	**$ 326,000,000**	**$ 333,000,000**	**$ 411,000,000**	**$ 345,000,000**	**$ 426,000,000**	**$ 435,000,000**

Table 6
Alternatives Cost Summary

Item	Alternative																
	No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Total Cost	$ 948,541	$ 255,754,324	$ 264,332,055	$ 276,948,693	$ 275,798,693	$ 284,376,424	$ 295,616,491	$ 296,993,315	$ 297,560,965	$ 310,157,941	$ 376,843,882	$ 325,576,469	$ 333,479,050	$ 410,526,170	$ 345,313,684	$ 425,513,320	$ 435,298,324
Total Cost (rounded)	$ 950,000	$ 256,000,000	$ 264,000,000	$ 277,000,000	$ 276,000,000	$ 284,000,000	$ 296,000,000	$ 297,000,000	$ 298,000,000	$ 310,000,000	$ 377,000,000	$ 326,000,000	$ 333,000,000	$ 411,000,000	$ 345,000,000	$ 426,000,000	$ 435,000,000