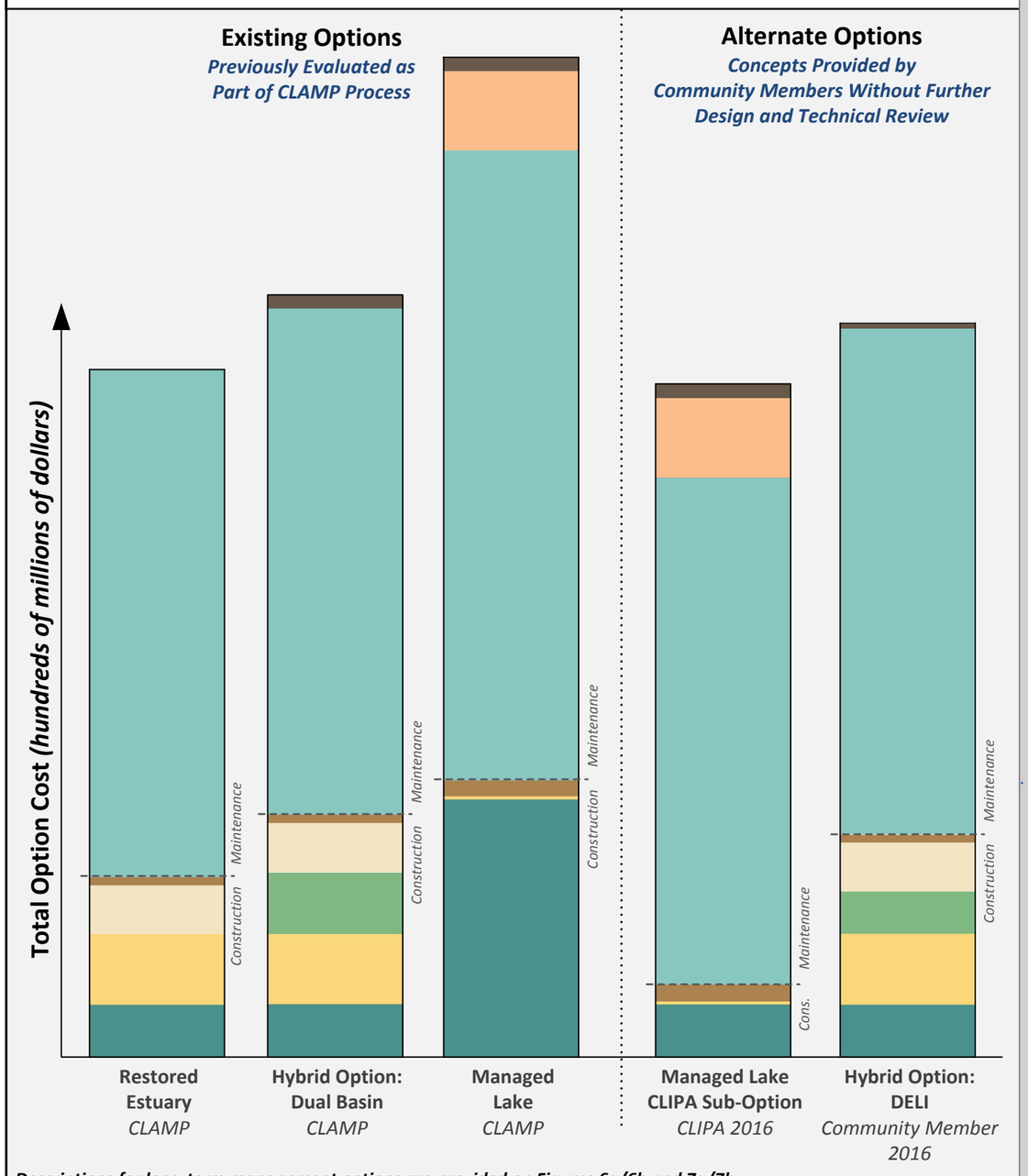
Please review figure notes for relevant information supporting the cost graphic.

In total, the highest cost option is approximately 32% more than the lowest cost option.



Descriptions for long-term management options are provided on Figures 6a/6b and 7a/7b.

Notes:

1. Previously reported cost estimates for the long-term management options (Moffatt & Nichol 2007; Herrera 2009) have been reviewed and serve as the majority basis for the cost information provided on this figure. However, many of the primary assumptions or conditions have changed and therefore the costs have been modified as appropriate. For example, the primary previous assumptions regarding open water disposal or in-water beneficial use for dredged sediment are affected by the presence of the New Zealand Mudsnail, a changed condition that results in a significant increase to one of the largest cost components (Dredged Material Management Program communication 2012).
2. Due to the conceptual level of the proposed long-term management options, cost estimates could not be generated for all factors or design components related to construction and maintenance (such as stormwater infrastructure, control of invasive and nuisance species, permanent dredge systems, etc.).
3. Preliminary design, technical analyses, and feasibility reviews would occur as part of the future Environmental Impact Statement (EIS) in Phase II. At that time, more detailed cost estimates for construction and maintenance would be developed.
4. The Department of Enterprise Services (DES) cannot confirm the accuracy or validity of the presented long-term management options due to the absence of preliminary design, technical analysis, and feasibility review, which inform the cost estimating process.
5. Completion of an EIS is required before DES can select or implement any long-term management option. Permitting and design would also be required for all options. These costs would be incurred prior to, and separate from, construction and maintenance, and therefore are not reflected on this figure.
6. All long-term management options would require initial dredging. As part of the Managed Lake Options, the dredged sediment would be disposed of at an upland site (likely a landfill) due to the presence of purple loosestrife seeds and the New Zealand Mudsnail. For the Restored Estuary and Hybrid Options, the initial dredge sediment would be used within the system where the New Zealand Mudsnail is already present for the slope armoring and habitat rehabilitation included as part of these previous designs.
7. After maintenance dredging events, the sediment is assumed to go upland, either to a reclamation site or to a landfill, and would not be disposed of in-water. This assumption is applicable to all long-term management options, due to the presence of the New Zealand Mudsnail and/or chemical detections within the dredged sediment. Upland reuse or upland disposal of sediments from maintenance dredging is the conservative approach given that the method to control this invasive species, such as through application of a molluscide, is unknown at this time (Washington Department of Fish and Wildlife communication 2016).
8. Quantities for the initial dredging and maintenance dredging were sourced from the Capitol Lake Alternatives Analysis (Herrera 2009) for the existing long-term management options, as that analysis represents the most current information prepared as part of the DES-led planning effort, and the designs of these options have not been advanced since that time. The dredging quantities for DELI are based on the estimates provided in the CLAMP analysis because the dredging effort would be similar to that of the Dual Basin Option. The initial lake channel dredging of the Managed Lake CLIPA Sub-Option, as presented by the option proponent, has been reduced from the estimated Managed Lake quantity to be comparable to the Restored Estuary and Hybrid Options, and would result in shallower lake conditions. Maintenance dredging under the Managed Lake CLIPA Sub-Option would be focused on the North Basin, with minor dredging in the Middle Basin and Budd Inlet.
9. A 50-year duration has been used to estimate relative maintenance cost factors, with a maintenance dredging frequency of every 5 years for the Restored Estuary and Hybrid Options, and every 10 years for the Managed Lake Options.
10. Mitigation for maintenance dredging is anticipated due to impacts from construction access that would affect upland habitat or park space, and impacts to the lake basin, as indicated in agency discussions that occurred to support the 2013 Permitting Recommendations Report.

Abbreviations: CLAMP = Capitol Lake Adaptive Management Plan, CLIPA = Capitol Lake Improvement and Protection Association

Legend

Construction Cost Factors

- **Initial Lake Channel Pre-Dredging** *(~ 7 to 26% of total option costs)*
- **5th Ave Dam Removal/Bridge Construction or Dam Repair** *(~ 0.5 to 10% of total option costs)*
- **Reflecting Pool Barrier Construction** *(~ 5 to 8% of total option costs)*
- **Scour Protection and Deschutes Parkway Stabilization** *(~ 6 to 7% of total option costs)*
- **Mitigation for Construction Impacts** *(~ 1 to 2% of total option costs)*

Maintenance Cost Factors (over a period of 50 years)

- **Maintenance Dredging and Sediment Disposal** *(~ 62 to 73% of total option costs)*
- **Mitigation for Maintenance Dredging Impacts** *(~ 8% of total option costs)*
- **Maintenance of Reflecting Pool and Barrier Wall or Fifth Avenue Dam** *(~ 0.5 to 2% of total option costs)*

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Figure 8
Relative Cost Comparison
for Long-Term Management Options

Black and white printing can affect interpretation of this histogram.

Updated 10/21/2016 to reflect feedback from the Funding and Governance Committee.

Please review figure notes for relevant information.

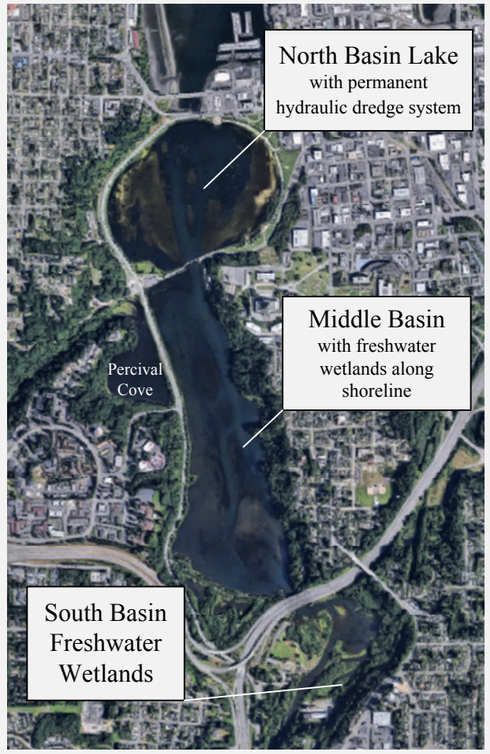
Managed Lake CLIPA Sub-Option

Similar to existing conditions, with additional management strategies for sediment accumulation. Maintains the historic reflecting pool and the Capitol Lake Basin. Fish and wildlife habitat would not substantially change compared to existing conditions, but a freshwater emergent wetland would naturally develop in the South Basin.

Additional components:

- Retains existing Fifth Avenue dam and tide gate in its existing configuration
- Initial dredging in the North Basin and river channel of Middle Basin, with maintenance dredging in the North Basin
- Cleanup dredging in Budd Inlet to ensure that recreational, commercial, and community uses for open water boating will be available
- Use of Capitol Lake for public swimming and other freshwater recreation

Note:
The primary difference between the Managed Lake CLIPA Sub-Option and the Managed Lake Option from CLAMP is related to dredging quantities and transitioning the Middle Basin to a freshwater wetland. The Managed Lake CLIPA Sub-Option proposes significantly less initial dredging, comparable to the quantity estimated for the Restored Estuary.



Alternate Option: CLIPA 2016

Image: Entranco, Inc., et al. 1999

Hybrid Option: Dual Estuary/Lake Idea (DELI)

Adaptively Manages the basin by establishing a tidal estuary in the western portion of the north basin, and throughout the middle and south basins. Maintains a 48-acre freshwater Reflecting Pool at the north end of the basin through construction of a rock containment wall. Improves Fish and Wildlife Habitat and Ecosystem Functions through natural reestablishment of saltwater plants within the estuary and management of invasive species.

Additional components:

- Construction of a 500-foot opening beneath a reconstructed Fifth Avenue
- Installation of sediment trap with pumping station and annual maintenance dredging
- Construction of new public swimming area and pedestrian walkway on top of containment wall

Note:
The primary difference between DELI Hybrid Option and the Dual Basin Option is related to the reflecting pool. The reflecting pool in the DELI Hybrid Option is approximately 9 acres larger and freshwater input is proposed instead of saltwater.

Alternate Option: Community Member 2016

Image: Community Member 2016

Notes:

1. **These two options and the information included on this figure represent concepts from private citizens. The Department of Enterprise Services cannot confirm its accuracy, feasibility, or validity because these proposed long-term management options have not been through preliminary technical analysis, design, or feasibility review.**
2. All long-term management options will require additional design and technical evaluation. That work will be completed as part of a future Environmental Impact Statement in Phase II for the options that are selected for review in that process.
3. A conceptual hybrid option entitled "Season Hybrid" or "Capitol Lagoon" has been proposed by a member of the Technical Committee, and separately by a Community member. This option would establish a tidal estuary during the fall and winter seasons by lowering a reconstructed Fifth Avenue Dam. During the peak recreational seasons of spring and summer, the dam would be raised to allow for the formation and retention of the reflecting pool. However, the dam could be lowered for recurring short periods, such as nightly, during that time to ensure adequate mixing of freshwater and saltwater.
4. A conceptual sub-option to the Restored Estuary has been proposed by a Community member, and focuses on the protection and expansion of freshwater habitat near the Capitol Lake Interpretive Center once tidal hydrology is restored throughout the basin. This would be achieved by limiting the mixing of marine water to this freshwater habitat (potentially through construction of a retaining wall) and continuing input from the Deschutes River to this area of the lake.
5. A proposed sub-option to the Managed Lake has been proposed by a Community member, and would significantly expand park space on both sides of the reflecting pool through increased fill in the existing Capitol Lake, and additional fill along Deschutes Parkway. The intent of this option is to increase park and outdoor space and recreational activities such as swimming. A bridge between the expanded parks could be constructed for connectivity.
6. Several variations to the DELI hybrid option have also been proposed, including design variations such as maintaining the existing Fifth Avenue Dam to avoid infrastructure costs, increasing the size of the reflecting pool, or constructing additional pedestrian walkways in the north basin.

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Figure 7a
Overview of Alternate Options for Long-Term Management
Concepts Provided by Community Members Without Further Design and Technical Review

Please review figure notes for relevant information.

Conceptual Long-Term Management Option	Managed Lake CLIPA Sub-Option Source: CLIPA	Hybrid Option: Dual Estuary/Lake Idea (DELI) Source: Community Member
Improve and Support Water Quality	Manages Capitol Lake as a "natural treatment system" for trapping contaminants flowing into the lake; retains Capitol Lake/Tumwater Falls saturated dissolved oxygen levels for lake ecosystem species; annual harvest plants in the Middle Basin	Tidal exchange throughout a majority of the Capitol Lake Basin; supports improvement in dissolved oxygen conditions in Budd Inlet; introduction of artesian groundwater flows to freshwater lake and from lake to restored estuary
Improve and Support Sustainable Ecosystem Functions	Maintains freshwater ecosystem for freshwater aquatic insects, waterfowl, and wildlife populations; links natural urban ecosystem of people and freshwater aquatic species for a healthy ecosystem, education and recreation program amidst 285,000 community members	Restoration of 80% of the Capitol Lake Basin to historic tidal estuary; creates clean freshwater lake for use by water birds
Improve and Support Fish and Wildlife Habitat	Retains 260-acre freshwater habitat to support existing salmon and brown bat population, ducks and species of conservation concern (Olympic mudminnow and freshwater mussels); Middle and South Basins become wildlife reserves in an urban environment	Prefers natural reestablishment of saltwater plants with back-up engineered plantings if necessary
Control Invasive Species	Continued prevention of range extensions for invasive species; prevents introducing the New Zealand Mudsnail to Puget Sound; includes sediment drying bed to minimize spread of mudsnail prior to beneficial reuse of the sediment	Includes efforts to eradicate New Zealand Mudsnail; back-flushing of the new lake with saltwater prior to introduction of artesian flows to control invasive species
Improve and Support Sediment Management	Initial dredging in the North Basin and river channel dredging in Middle Basin; maintenance dredging from fixed hydraulic dredge system; North Basin managed for optimum sediment capture; only minimal dredging of contaminated marine sediment	Initial dredging of Capitol Lake prior to estuary restoration; annual maintenance dredging from sediment trap in south end of the Middle Basin
Manage Flood Risk	Improve stormwater conveyance; retain Capitol Lake's ability to serve as a controllable flood management system during period of high tides when the Deschutes River flood stage and high seawater levels coincide; retains flood waters in marine zone	Includes an improved stormwater conveyance system and enhancement of the Heritage Park berm; construction of retaining wall at an elevation that would accommodate future flood risks
Improve and Support Recreational Opportunities	Enhances water contact recreation throughout urban watershed from Tumwater Falls to Priest Point Park including kayaking, bird and duck watching; returns swimming and small boat recreation in North Basin; avoids recreational boating impacts	Protects Heritage Park; provides 48-acre reflecting pool with sandy lake bottom and public swimming area; includes riverine recreation in South and Middle basins; includes a pedestrian path on the center line retaining wall
Improve and Support Aesthetics and Visual Quality	The State Capitol Campus will be reflected 100 percent of the time; proper maintenance will remove plants and algal growth; swimming beach and junior sailing in North Basin; wildlife habitat watching in Middle and South Basins	Cleaner surface waters of the freshwater pool would be excellent for reflecting the Capitol dome; restored estuary would not be visible from Heritage Park
Support and Maintain Historical and Cultural Resources	Retains historical water access to the Old Brewhouse via boats even at low tides; provides for six cultural and historical sites to develop for community education and use, if desired	Supports salmon habitat and population growth; restoration of historical Tribal values; could provide restored shellfish habitat that could be used similar to historic and cultural harvesting
Avoid Negative Impacts and Maximize Economic Benefits	Allows for construction in phases to maximize the use of State and Federal funds and local financing; enhances the economic vitality of Downtown Olympia and over 100 years of waterfront investments	Separates estuary from Heritage Park; maintains green space and open water area; enhances an outdoor recreational site for public use and potential increased tourism
Minimize Long-Term Costs	Avoids costs of protecting Capitol Lake shoreline and bridges from twice-a-day tidal saltwater flows on urban infrastructure; minimizes sediment control costs; minimizes public expenditures and debt and protects funding for other needs	Small-sized, annual dredging operation in south end of Middle Basin, will maximize minimization of sediment control costs

Notes:
1. **These two options and the information included on this figure represent concepts from private citizens. The Department of Enterprise Services cannot confirm its accuracy, feasibility, or validity because these proposed long-term management options have not been through preliminary technical analysis, design, or feasibility review.**
2. Identified data gaps will be evaluated as part of the future Environmental Impact Statement in Phase II, and do not preclude the long-term management option from consideration or discussion as part of Phase I. In fact, data gaps exist for all long-term management options due to the lack of preliminary or advanced design.
3. Long-term costs will be discussed in a forthcoming effort as part of Phase I, and further analyzed, along with potential economic impacts and benefits from the long-term management options, as part of a future Environmental Impact State in Phase II.

Abbreviation:
CLIPA = Capitol Lake Improvement and Protection Association

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Figure 7b
<u>Alternate Options</u> for Long-Term Management
Reported Consistency with Goals, Based on Opinion of the Proponents and Not Based on Technical Analyses