To: Washington State Department of Enterprise Services

RE: Capitol Lake/Deschutes Estuary workgroup to discuss hybrid options for future management of Capitol Lake

Subject: "Hybrid Berm Option" for consideration of the Capitol Lake/Deschutes Estuary

Respectfully Submitted by:

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In response to the Washington State Department of Enterprise Services (DES) and the Capitol Lake Executive Committee's pro-active approach to public engagement in an effort to reach community agreement on the long-term management of Capitol Lake, we respectfully submit the following comments and summary description of an additional hybrid option to Capitol Lake.

We are aware of the current proposed "hybrid options" that have been submitted for consideration by Enterprise Services and the Capitol Lake/Deschutes Estuary executive workgroup, and would like to submit an additional "compliant hybrid option" solution for your consideration. A "hybrid option" would satisfy both the proponents of preserving a historic reflecting pool at the north end of the lake as well as provide an estuary on the western side of the Deschutes River.

Heritage Park Bulkhead Circle – The DELI solution

A third option that has been submitted to DES and the Capitol lake/Deschutes Estuary workgroup is referred to as the **D**ual **E**stuary/**L**ake **I**dea or **DELI**, which is proposed as an additional option to CLIPA and DERT. While DELI reflects some very excellent ideas, it should be noted that DELI recommends the following modifications to existing Olympia road infrastructures:

New Elevated Roadway

The existing 5th Avenue roadway atop the dam should be replaced with an elevated ramp extending west to connect with the Deschutes Parkway and the

roundabout with 4th avenue as previously proposed for estuary restoration. The opening beneath would become the estuary outfall.

Reinforce Deschutes Parkway

The Deschutes Parkway roadbed will be degraded by the leaching action of tidal waters fluctuating against it. Measures to address this issue must be taken if an estuary abuts the roadway. Armoring the flank as previously proposed for estuary restoration should still make the most sense.

While the DELI concept certainly meets the legislative mandate for *"maintaining a historic reflecting pool at the north end of the lake/estuary"*, it fails to address the following:

Costs to Create a New Elevated Roadway of 5th Avenue and to Reinforce Deschutes Parkway

The DELI concept requires removal of the Fifth Avenue dam and a new elevated 5th avenue roadway.

Comment: There are no cost estimates to reflect capital costs of elevating 5th Avenue, and removal of the 5th Avenue dam, nor armoring of the Deschutes Parkway.

While the DELI third option that has been submitted to DES and the Capitol lake/Deschutes Estuary workgroup merits consideration, there is a modified third option that meets the legislative mandate for multiple hybrid options and for future management of Capitol Lake.

ALTERNATIVE HYBRID BERM SOLUTION:

An alternative hybrid berm solution incorporates many of the concepts embodied in the DELI option, but the hybrid berm would extend from 5th Avenue near the amphitheatre to the east side of the railroad trestle at Marathon Park. This solution would:

- Retains the existing dam on 5th Avenues;
- Eliminates the need and costs for an elevated roadway on 5th Avenue;
- Creates a freshwater reflecting pond on the Eastside of the berm, fed by the natural artisan springs, and a natural saltwater estuary on the Westside of the berm;
- Allows for the building of a wooden walkway from the hybrid berm terminating on the eastern side of the railroad trestle to Marathon Park;
- Regulates the Reflecting Pool's water level through the use of gates in the northern and southern end of the berm that can be designed to "swing" open or "slide" open;
- Retains the natural Deschutes River channel flow in the Westside estuary, and;
- Allows the creation of a larger freshwater reflecting pool, based on the wishes of the community.

- Immediate and long term management of Capitol Lake;
- Reduces the need to continually dredge the Reflecting Pool due to silt build up from the Deschutes River;
- Retains the historic reflecting pool at the north end of the lake as well as provide an estuary on the western side of the Deschutes River,
- Enables water level control of the Reflecting Pool through use of "gates" or "slides" on both the northern and southern ends of the berm;
- Provides substantial improvement in fish and wildlife habitat and ecosystem functions,
- Allows for adaptive management strategies, both short term and long term for Capitol Lake/Estuary,
- Provides a comparative cost estimate for the "Compliant Hybrid Option"
- Incorporates Capitol Lake concepts from:
    - The Olympia Yacht Club presentation (Recreational Boating Association of Washington, RBAW);
    - The Deschutes Estuary Restoration Team (DERT)

"Hybrid Berm Option" Benefits:

The "Hybrid Berm" solution meets all of the mandates of the 2015 legislative proviso in the following ways:

- Substantial improvement in fish and wildlife habitat and ecosystem functions, by allowing for an estuary that allows for the Deschutes River to freely flow through their historic channels. This eliminates or substantially minimizes:

    - Invasive plant and aquatic species habitat in the north, middle, south, and Percival basins;

    - Benefits salmon egress and ingress from Budd Bay. Salmon will have non-polluted water to acclimate in when migrating to sea and when returning to spawn;

    - Reduces or eliminates the pollutants and non-native invasive plant growth in the reflecting pool of Capitol Lake;

    - Reduces or eliminates the fecal coli form, as well as the nitrates and phosphates associated with fertilizer run-off and leaking septic tanks.

    - The "Hybrid Berm" concept also allows for adaptive management strategies in terms of "best science" approaches for the fresh water reflecting pool and saltwater estuary.

Additional Benefits: Please see **Appendix 2** for additional benefits of the Hybrid Berm option as presented during the March 30, 2016 Capitol Lake Long-Term Management Project Discussion held with Olympia Assistant City Manager, Jay Burney

"Berm" Concept Currently Being Considered For Budd Bay:

Consideration for the use of a "Berm Solution" is not a new idea. The berm concept for isolating a distinct body of water is already being considered, in part, by The City of

Olympia, the Port of Olympia, and the Squaxin Island Tribe (Tribe), and other public entities, which commissioned a study of Budd Bay in its attempt to evaluate the potential for a West Bay Environmental Restoration project.

This study recommends a berm solution for one of west Budd Bay's reaches, referred to as "The Lagoon".

Following is a description of the berm concept recommended for the West Bay Environmental Restoration project, and how it can be modified to meet the immediate and long term management needs of Capitol Lake:

City of Olympia
West Bay Environmental Restoration Assessment

Final Report

Prepared by:
Coast & Harbor Engineering, a Division of Hatch Mott MacDonald

In Association with:
JA Brennan Associates
GeoEngineers
Davido Consulting Group
Environmental Science Associates

February 26, 2016

Coast & Harbor Engineering (CHE), a division of Hatch Mott MacDonald, prepared this report for the City of Olympia's (City) West Bay Environmental Restoration Assessment. The purpose of the project is to complete a science-based environmental restoration assessment for West Bay, Budd Inlet, located in Olympia, WA. The project will support the implementation of a water quality and habitat restoration strategy, including the prioritization of restoration projects for planning by the City of Olympia, Port of Olympia (Port), Squaxin Island Tribe (Tribe), and other public entities.

The West Bay Environmental Restoration Assessment report has a DIRECT BEARING with the Capitol Lake DES Report that is due January, 2017.

The following information has been extracted from this report in an effort to illustrate how the City of Olympia and Squaxin Island Tribal nation are viewing a berm solution to the West Bay Environmental Restoration effort.

Of importance to the evaluation of a Capitol Lake "Hybrid Berm" in the north basin of Capitol Lake is the analysis in the report submitted to the City of Olympia regarding Reach 1 Lagoon of Budd Bay

3.1.2.1 Reach 1 – Lagoon

The Lagoon reach is located at the southern extent of the study area and is characterized by a former railroad trestle and presumed gravel berm that separates the shallow lagoon

from West Bay. The west shore contains steep slopes and relatively intact riparian areas, fronted by sparse salt marsh. Tidal communication between West Bay and the lagoon currently occurs via two openings in the berm. Property ownership includes the Port, City, and private landowners.

Primary opportunities for restoration include removal of historic fill to improve tidal circulation and flushing, beach creation, salt marsh creation, and storm water quality improvements. The Shoreline Restoration Plan (City of Olympia 2012) identifies West Bay Project No. 9 in this reach as potential restoration of functional riparian area along the existing berm.

Reach 1 – Budd Bay Lagoon

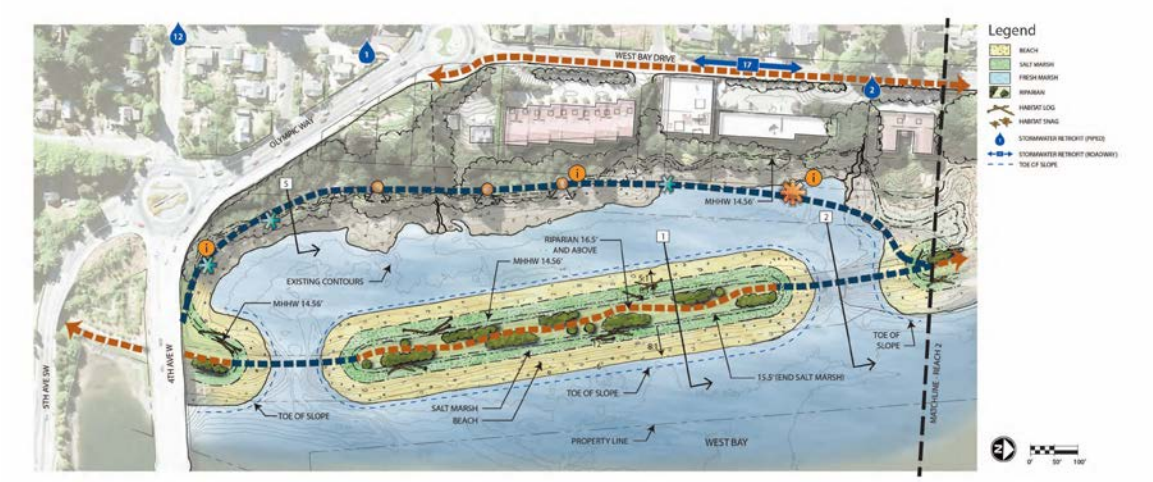
Suggested modifications to the Section 1 Reach 1 Budd Bay Lagoon concept to make a Capitol Lake "Hybrid Berm Solution" for the Reflecting Pool.

Terminates the southern end of the Capitol Lake Reflecting pool to the eastern side of the railroad trestle and the northern end of berm to an area near the amphitheater.

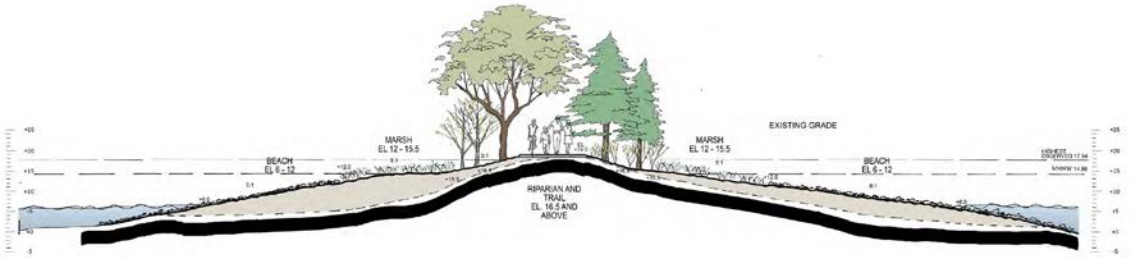
Enables the Deschutes River channel to circulate along the western side of the berm and allows silt to deposit in the western estuary side of the berm.

Negates the need to elevate 5th Avenue and remove the dam, allowing for the existing salmon migration path to and from the sea.

Conceptually, wooden walkways from or near the southern end of the hybrid berm to Marathon Park and to the eastern side of the Capitol Lake walk path could be built. This eliminates the need to walk on the railroad trestle and provides access to the eastern side of the Reflecting Pool's walking path.



Conceptual Berm Section 1 Reach 1 Budd Bay Lagoon



To model the proposed lagoon design alternatives, the existing conditions topographic and bathymetric model was modified to the proposed alternatives. Figure illustrates the geometry that was used to construct the typical beach and marsh profile into the topographic model and subsequently used for hydrodynamic modeling of the proposed alternative lagoon design conditions. The modeled footprints of the proposed riparian, marsh, and beach sections vary slightly with local elevations along the existing berm alignment. Elevations reference MLLW datum.

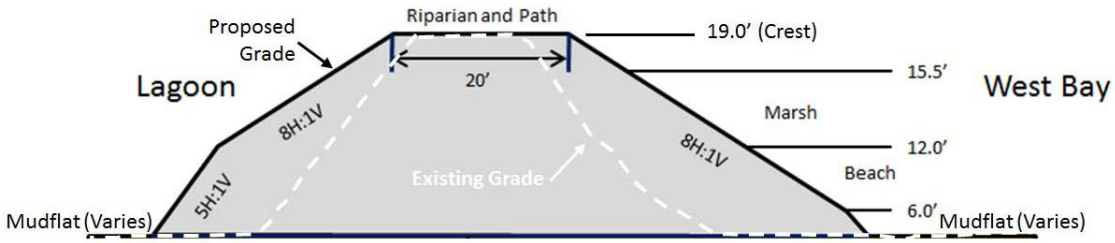


Figure 9. Typical cross-section of proposed berm for model grid (not to scale).

To represent berm removal, the model bathymetry was modified to match existing mudflat elevations, approximately 5 ft MLLW. Figure shows Lagoon Alternative 2 model bathymetry.

Estimated Costs for Alternative 1, Reach 1 Budd Bay Lagoon

Olympia City Public Works Engineering developed a conceptual Estimate of Probable Construction Cost based on Section 14 (see Appendix A) for a trail along West Bay Drive.

The conceptual cost estimate range is $9,000,000 to $10,500,000 and includes right of way purchase, sales tax, engineering contingency, and overall contingency.
The conceptual cost estimate includes a 12-foot multiuse trail on the east side of West Bay Drive, two 5-foot bike lanes, two 11-foot vehicle lanes, an 8-foot sidewalk on the west side of the road, and associated miscellaneous road elements for a total width of 56 feet.

Assumptions:

- Remedial cleanup action costs are not included. Over excavation is limited to the placement thicknesses needed for restoration.
- Berm material excavated from the Lagoon is not considered for reuse outside Lagoon reach.
- All dredged material must be disposed in a confined upland facility.
- Marsh, beach, backshore and beach toe substrate placement is assumed to be a minimum 1.5 feet thick.
- Concrete/rubble locations and areas are based on analysis of 2015 aerial photography.

Cost summaries for conceptual alternatives and reach

Reference Appendix One for a detailed high level cost estimate.

High level cost estimate.

Reach	Alternative	Restoration Cost	*June 1, 2016Recreation Cost	**Storm Water
Budd Bay 1	**Alternative 1**	**$ 6,402,000**	**$ 3,922.000**	**$ 2,943,000 to $ 4,414,000**

* Recreation costs assumes trail along remaining berm with two overwater spans

**Low cost range is based upon average storm water retrofit costs plus 30% contingency per Puget Sound Storm water Retrofit Cost Estimate (Puget Sound Partnership 2010).

APPENDIX ONE

West Bay Environmental Restoration Assessment - Lagoon Alternative No. 1

High level cost estimate detail.

High cost range is based upon 1.5 times the estimated low cost range.

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1	Marine Mobilization/Demobilization	1	LS	10% of Construction Costs	$600,000
2	Construction Surveying	1	LS	$ 25,000	$ 25,000
3	Cleaning and Grubbing	2	AC	$ 8,000	$ 16,000
4	Temporary Erosion and Water pollution Control	1	LS	$ 8,000	$ 8,000
5	Demolish and Dispose Rubble and Concrete Debris	630	Ton	$ 50	$ 31,500
6	Berm Excavation and Off-site Disposal	0	CY	$ 50	$ 0
7	Misc. Excavation and Off-site Disposal	3,820	CY	$ 35	$133,700
8	Misc. Excavation, Grading and on-site Reuse	4,420	CY	$ 15	$ 66,300
9	Pit Run Fill	9,720	Ton	$ 20	$194,400
10	Demolish and Dispose Creosote Railroad Ties	1,140	EA	$ 400	$456,000
11	Demolish and Dispose Creosote Piles	200	EA	$ 700	$140,000
12	Demolish and Dispose Steel Rails	3.400	LF	$ 15	$ 51,000
13	Dredging and Upland Disposal	2,460	CY	$ 175	$430,500
14	Stormwater Treatment and Drainage System	10	SF	$ 4	$ 40
15	Cobble Fill	0	TON	$ 40	$ 0
16	Fish Mix for Beach	13,000	TON	$ 50	$650,000
17	Gravel Beach Material	2,780	TON	$ 40	$111,200
18	Site Restoration – Riparian Planting	58,620	SF	$ 8	$468,960
19	Habitat Log	22	EA	$ 2,100	$ 46,200
20	Site Restoration – Topsoil Cover (for marsh/upland riparian)	1,330	CY	$ 47	$ 62,510
21	Site Restoration – Marsh Planting	49,100	SF	$ 5	$245,500
22	Habitat Snag	0	EA	$ 2,200	$ 0
23	Path – Asphalt (CSBC) along berm	2,322	SY	$ 24	$ 55,728
24	Board Walk – View Deck	2	EA	$ 14,000	$ 14,000

	with Railing and 2 benches - Large				
25	Board Walk – View Deck with Railing and 1 bench - Small	1	EA	$ 7,000	$ 7,000
26	Board Walk – Elevated with Railing (12’ wide)	0	LF	$ 750	$ 0
27	Interpretive Signage	1	EA	$ 3,000	$ 3,000
28	Wayfinding/Interpretive Kiosk	1	EA	$ 14,000	$ 14,000
29	Overwater Trail (Decking on piles) from berm to uplands	7320	SF	$ 300	$2,196,000
CONSTRUCTION COST SUB-TOTAL					$6,026538
Washington state sales tax (8.8%)					$ 530,335
Engineering/Design & Permitting (25%)					$1,506,635
Contingency (30%)					$2,259,952
TOTAL COST					$10,324,000

NOTE: ADA requirements will need to be considered in this cost estimate.

Storm water mitigation costs are included in this cost estimate and will need to be reviewed to meet anticipated requirements for the Capitol Lake reflecting pool.

APPENDIX TWO

CAPITOL LAKE LONG-TERM MANAGEMENT PROJECT

POTENTIAL CONCEPT DISCUSSION

MARCH 30, 2016

City of Olympia Capitol Lake Concept Meeting

Participants:

Olympia Assistant City Manager: Jay Burney

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Capitol Lake Committee Task:

- The Capitol Lake Committee's task is to submit a final report of its findings by January 2017 through Committee research and public input.

- The Capitol Lake Committee is comprised of representatives from:

    - Olympia
    - Port of Olympia
    - Tumwater
    - Thurston County, and
    - Squaxin Island tribal representatives

- The final report will reflect the committee's recommendation as to which long-term management plan best fits the wishes and needs of the local communities and state for the 260 acre state-owned Capitol Lake

- Capitol Lake long-term management options under consideration are:

    - Remain as a lake
    - Revert to an estuary, or
    - Become a hybrid of both a lake and an estuary

Capitol Lake "Hybrid" Solution

Common "Hybrid Solution" concept: The common "Hybrid Solution" discussed in public, references the following scenarios:

- North Basin remains a lake
- Middle Basin and South Basin are allowed to revert back to an estuary like condition through the natural silting process created by the Deschutes River

Alternative "Hybrid Solution" concept:

Given the somewhat contentious public environment when discussing the traditional "Lake vs. Estuary" solutions for long-term management of Capitol Lake, there emerges another "Alternative Hybrid Solution" that may satisfy both sides of the debate.

Description of the Alternative "Hybrid Solution" concept:

> **Construction of a rock reinforced earth berm spanning from around the 5th Avenue dam to Marathon Park, which can serve both as a public walking path and maintenance road**

Advantages of the Alternative "Hybrid Solution":

- Lake vs. Estuary debate. Satisfies both public desires to have a lake and an estuary.
    - The west side of the berm would be allowed to evolve into an estuary
    - The east side of the berm would remain a lake

- Aesthetic public addition to the lake.
    - A public walk way from the area around the 5th Avenue Dam to Marathon Park would greatly enhance the current walk and bike paths around Capital Lake
    - Potential to have an arbor lined path with intermittent sitting areas to accommodate both lake and estuary viewing
    - Artesian fountain. There currently exists an artesian fountain in the North Basin that is near Heritage Park. The artesian fountain flowed out of a pipe four (4) times daily but the pipe was cut off below the lake bed sometime in the 1950's. With little cost or effort, Capital Lake could once again have an artesian fountain that would add to the Lake's aesthetic appeal and benefit the flow of water circulation in the Lake

- Maintenance access.
    - The berm could also be utilized as a maintenance road for both the lake and estuary sides, as needed

- Silt control from the Deschutes River
    - Eastside Lake protection. The berm concept would protect the west side lake portion of the North Basin from filling up with silt that is currently being carried by the Deschutes River during the heavy spring runoff
    - Westside Estuary maintenance. The berm concept would allow for easier maintenance of the Deschutes River channels that have been previously dredged, as reflected in the maps contained in the June 17, 2013 Floyd/Snider Permitting Recommendations Report that was prepared for the Washington State Department of Enterprise Services

      During low tides, access by dredging equipment would be made easier to access the Deschutes river channels in the North basin

- King tide flooding mitigation and control
    - Bi-directional swing gates installed in the north and south end of the berm can help control and/or mitigate flooding during extremely high tides such as the annual King tides
    - The bi-directional swing gates will allow the water from the Deschutes River to flow into the west side lake
    - Allowing the Deschutes River to flow into the west side lake would create an extremely low water level in the west side estuary
    - Opening the 5th Avenue Dam, would then mitigate the current flooding effects from the high tides/King Tides by allowing the tide flows to enter into the east side estuary, which would then be virtually dry, creating a natural salt-water reservoir
    - This would mitigate damage to the Percival Landing dock infrastructure as well as any damage from flooding to local businesses