
ALTERNATIVE EVALUATION SUMMARY DOCUMENTATION

King County Puget Sound Beach CSO Control Projects

Alternative Narrowing (9 to 3) Workshop for South Magnolia

Dec. 17, 2009, 1:00 PM – 4:00 PM

King Street Center 6th Floor (Rm 603/604)

Summary

Attendance

<i>King County</i>		<i>Consultant</i>	<i>SPU</i>
Betsy Cooper	John Phillips	Ellen Blair	Sahba Mohandessi
Hien Dung	Kevin Schock	Jennifer Corrigan	
Pam Erstad	Linda Sullivan	Kevin Dour	
Ron Kohler	Jim Weber	Karl Hadler	
Sue Meyer	Mary Wohleb	Jeff Lykken	
Shahrzad Namini	Monica Van Der	Allen de Steiguer	
Chris Okuda	Vieren	Lloyd Skinner	
		Bob Wheeler	

Project Overview

During heavy rains when flows in the combined sewer system exceed the system's capacity at the South Magnolia CSO Control Structure, the system can overflow into Puget Sound at the South Magnolia outfall near the 32nd Ave W boat ramp. When this happens, about 90 percent of the combined volume of the overflow is storm water and the rest is diluted sewage. These events are called combined sewer overflows, or CSOs.

Each year, the South Magnolia CSO discharges into Puget Sound approximately 19 times, for a total of 31 million gallons of mixed storm water and raw sewage.

CSOs help to avoid sewer backups into homes and businesses and onto streets, but CSOs can be a public health and environmental concern. State regulations require King County to reduce the number of CSOs each year, with a long-term goal of less than one untreated discharge per location per year.

Meeting Purposes

1. Primarily to narrow the 9 alternatives for the South Magnolia Basin to 3 recommended alternatives that will be further evaluated and considered.
2. Provide the reasons and rationale why alternatives were and were not recommended for public, agency, and workshop participants' understanding.

Information Available for Workshop

1. Final revised South Magnolia Basin Alternatives summary sheets (1 for each alternative)
2. Final revised table of criteria ratings and descriptions of Low, Moderate, and High impact
3. Final revised Alternative Rating Sheets for South Magnolia Basin (summary & expanded to include description of ratings)
4. Comment logs relating to Barton, Murray, and South Magnolia Basin Alternatives

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5. Summary of major changes to Barton, Murray, and South Magnolia Basin Alternatives and overall evaluation criteria
6. Preliminary planning level cost information for comparison purposes for South Magnolia Basin
7. Community input from public meetings
8. Initial Straw Poll Results

Agenda

* The recommendations for the Murray basin were finalized before the beginning of the Magnolia basin discussion, which is outlined in the agenda below. The discussion of the Murray basin is reflected in the summary of the December 16, 2009 workshop.

Review of Initial Straw Poll Results for South Magnolia (Allen de Steiguer, Carollo Engineers)

Initial South Magnolia Alternatives Narrowing - Discussion (facilitated by Bob Wheeler, Triangle Associates)

- Alternatives clearly not meriting further consideration
- Alternatives clearly meriting further consideration
- Iterative Process for remaining alternatives to decide what will be and not be considered further
- Identify reasons and rationale for being recommended or not recommended

Presentation of Preliminary Planning Level Cost Information for Comparison Purposes (Allen de Steiguer, Carollo Engineers)

- Methodology for determining costs
- Review of methodology for creating comparative cost ratings
- Discussion – Does cost information change any of the three alternatives currently identified for further evaluation?

Team Agreement on 3 Alternatives to Consider Further (facilitated by Bob Wheeler, Triangle Associates)

- Truth Test – Do we have the right 3 alternatives to consider further?
- Additional reasons and rationale for recommendation or non-recommendation

Summary of Workshop Outcome

King County staff agreed that the CSO control alternatives to evaluate further include:

- Single Rectangular Storage Tank (Alternative 1A)
- Rectangular Storage Tank out of Basin w/ Gravity Sewer (Alternative 1F1)
- Conveyance out of Basin to downstream treatment (Alternative 2A)
- Peak flow Reduction w/ Storage (Alternative 5A)

The project team decided to recommend four alternatives for further evaluation. The capacity available in the King County sewer system downstream of the South Magnolia basin had been reconsidered, which could make Alternative 2A (Conveyance out of Basin to downstream treatment) more feasible than originally thought. The project team decided that more information

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about downstream capacity is needed before deciding whether to develop Alternative 2A in more detail. If downstream capacity is confirmed to be adequate, Alternative 2A will be developed in more detail along with the three other recommended alternatives. If downstream capacity is found to be inadequate, only the three other recommended alternatives will be developed in more detail.

The Basin Lead for the South Magnolia Basin supported these choices.

Action Items	Responsibility
The capacity of the King County sanitary sewer system downstream of the South Magnolia Basin will be verified by mid-January 2010.	Betsy Cooper, Ron Koehler, John Phillips; King County
John Phillips will confirm with Christie True whether to start communicating with the City of Seattle RainWise Program about the CSO control alternatives.	John Phillips, King County

Key Points of Discussion

- Geotechnical reports may affect permitting issues for the CSO control alternatives. Initial review of geotechnical conditions is promising for all alternatives.
- The project team is uncertain how much capacity exists in the King County sanitary sewer system downstream of the South Magnolia basin. Previous estimates have been reconsidered.
- Peak flow reduction is paired with a storage tank in Alternative 5A, but it could also be paired with a convey-and-treat element. Peak flow reduction could reduce the amount of flow to convey and treat from 7.7 MGD as described in Alternative 2A to roughly 5 MGD.
- The degree of uncertainty about the likelihood of meeting the CSO control requirement is similar for all of the CSO control alternatives.

Reasons and Rationale for Recommendation & Non-Recommendation of Alternatives for Further Evaluation

RECOMMENDED → *Alternative 1A: Single Rectangular Storage Tank – Bottom of Basin*

Reasons and Rationale for Being Recommended

- Single storage facility requires lowest level of complexity to operate, control, and maintain compared to other CSO control approaches.
- All of the basin flow is captured passively. Most reliable location to capture the highest volume of peak flows.
- Location is out of the shoreline zone.
- Low cost compared to other South Magnolia CSO control alternatives.
- Low risk of cost estimate changing dramatically compared to other South Magnolia CSO control alternatives.

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Challenges

- Project requires construction of a relatively large facility sited at the base of steep slopes; facility may require permanent slope reinforcement uphill of the facility.
- Construction access difficult due to narrow streets; will present access challenges for nearby residents.
- Steep slopes may make permitting the project difficult.

Other Considerations

- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Single storage facility localizes impacts to one area.
- Potential to use property owned by the City of Seattle Dept. of Parks and Recreation.
- City of Seattle Dept. of Parks and Recreation may not want construction to occur on parks property.
- Maintenance access is an issue. Access would be restricted if entry were within the paved road or special provisions would be required so the structures could be accessed from the side of the road a safe distance from the paved area.
- Geotech reports are critical to project costs, permitting, and feasibility.

Not Recommended → *Alternative 1B: Dispersed Rectangular Storage Tanks*

Reasons and Rationale for Not Being Recommended

- Technically complex.
- Multiple facilities will require more maintenance and are not as easy to manage as a single facility.
- Multiple facilities will create construction disruption at multiple locations in the basin.

Benefits

- Reduces volume of storage tank at bottom of basin.

Other Considerations

- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Telemetry and instrumentation will be necessary to predict and capture adequate flows at multiple facilities to meet the CSO control requirement. Telemetry and flow control is more difficult for meeting the CSO control requirement compared to passively capturing basin flow at the bottom of the basin.
- Geotech reports may revise expectations for permitting.

Not Recommended → *Alternative 1C: Dispersed Rectangular Storage Tanks (different configuration)*

Reasons and Rationale for Not Being Recommended

- Technically complex.

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- Multiple facilities will require more maintenance and are not as easy to manage as a single facility.
- Multiple facilities will create construction disruption at multiple locations in the basin.

Benefits

- Reduces volume of storage tank at bottom of basin.

Other Considerations

- Telemetry and instrumentation will be necessary to predict and capture adequate flows at multiple facilities to meet the CSO control requirement. Telemetry and flow control is more difficult for meeting the CSO control requirement compared to passively capturing all of basin flow at the bottom of the basin.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports are critical to project costs, permitting, and feasibility.

Not Recommended → *Alternative 1D: Pipe Storage in Rights of Way and Rectangular Storage at Bottom of Basin*

Reasons and Rationale for Not Being Recommended

- Technically complex.
- Multiple facilities will create construction disruption at multiple locations in the basin.
- Multiple facilities will require more maintenance and are not as easy to manage as a single facility.

Benefits

- Reduces volume of storage tank at bottom of basin.

Other Considerations

- Construction of pipe storage will disrupt use of arterial streets, 34th Ave W and Magnolia Blvd. during construction.
- Telemetry and instrumentation will be necessary to predict and capture adequate flows at multiple facilities to meet the CSO control requirement. Telemetry and flow control is more difficult for meeting the CSO control requirement compared to passively capturing all of basin flow at the bottom of the basin.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports are critical to project costs, permitting, and feasibility.

Not Recommended → *Alternative 1E: Tunnel Storage under Galer St.*

Reasons and Rationale for Not Being Recommended

- High cost compared to other South Magnolia CSO control alternatives.
- Tunneling is a somewhat more complex and risky construction method than cut-and-cover methods proposed for other South Magnolia CSO control alternatives.

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Benefits

- All of the basin flow is captured passively. Most reliable location to capture the highest volume of peak flows.
- Single storage facility requires lowest level of effort and complexity to operate, control, and maintain.
- Fewer community impacts from construction and permanent facilities compared to building rectangular or pipe storage.

Other Considerations

- City of Seattle Dept. of Parks and Recreation may not want construction to occur on parks property.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Tunnel alignment is close to planned route of new Magnolia Bridge.
- Geotech reports are critical to project costs, permitting, and feasibility.

RECOMMENDED → *Alternative IF1: Rectangular Storage Tank out of Basin (Gravity Sewer)*

Reasons and Rationale for Being Recommended

- Project components are limited in size in steep slope area.
- Storage tank is located outside basin in area with industrial zoning.
- Facility has lower level of complexity and fewer limiting operations and control and maintenance efforts compared to most of the other S. Magnolia CSO control alternatives.

Challenges

- Pipeline through hill will require trenchless construction method; adequate area for pipe laydown presents some challenges.
- Storage tank requires special foundation support in poor soils of potential area.
- A manhole or regulator structure would be located in steep slope area.

Other Considerations

- Single storage facility and gravity pipeline require low level of effort and complexity to operate, control, and maintain.
- Storage tank could be located within Seattle Dept. of Parks and Recreation property. City of Seattle Dept. of Parks and Recreation may not want construction to occur on parks property.
- Avoids building storage in constrained, environmentally sensitive area at 32nd Ave W.
- Construction traffic and other construction impacts will be concentrated in area with industrial zoning.
- Geotech reports are critical to project costs, permitting, and feasibility.

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Not Recommended → *Alternative 1F2: Rectangular Storage Tank out of Basin (Pump Station/Force Main)*

Reasons and Rationale for Not Being Recommended

- More complex technically, higher cost, and creates more new, permanent facilities than Alternative 1F1 but provides no additional operational benefits compared to Alternative 1F1.

Benefits

- Storage tank is located outside basin in area with industrial zoning.

Other Considerations

- Storage tank requires special foundation support in poor soils of potential area.
- Geotech reports are critical to project costs, permitting, and feasibility.

Not Recommended → *Alternative 1F3 – Rectangular Storage Tank out of Basin (Convert existing sewer)*

Reasons and Rationale for Being Recommended

- More complex technically, higher cost, and creates more new, permanent facilities than Alternative 1F1 but provides no additional operational benefits compared to Alternative 1F1.

Benefits

- Storage tank is located outside basin in area with industrial zoning.

Other Considerations

- Conversion of existing sewer to force main may present unexpected construction challenges.
- 12 MGD pump station for peak flows needed.
- Storage tank requires special foundation support in poor soils.

RECOMMENDED → *Alternative 2A – Conveyance out of Basin to downstream treatment*

Reasons and Rationale for Being Recommended

- System is simple to operate and utilizes existing infrastructure.
- Potential reduction or elimination of storage volumes.
- Low cost compared to other South Magnolia CSO control alternatives.
- Low risk of cost estimate changing dramatically compared to other South Magnolia CSO control alternatives.

Challenges

- Potential need for new pump station and sewer construction.
- Pump station would be located on steep slope.
- Construction access limited and neighborhood traffic/access impacts would occur.

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Other Considerations

- Members of the project team will verify whether there is downstream capacity in the King County system before deciding whether to develop Alternative 2A in more detail.
- Soils in the Port of Seattle area may be contaminated.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports are critical to project costs, permitting, and feasibility.

Not Recommended → *Alternative 3A – End of Pipe Treatment*

Reasons and Rationale for Not Being Recommended

- Technically complex.
- O&M more complicated and time-consuming for staff than a storage facility.
- Permitting effluent discharge to Puget Sound could cause significant schedule delay.
- Community members may object to treatment facility in residential neighborhood.

Benefits

- Eliminates need for storage.

Other Considerations

- Construction and permanent facility located in constrained, environmentally sensitive area at 32nd Ave W
- Construction access difficult due to narrow streets; will present access challenges for nearby residents.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.

RECOMMENDED → *Alternative 5A – Peak flow Reduction w/ Storage*

Reasons and Rationale for Being Recommended

- Reduces storage volume required and size of facility in steep slope area.
- Many community members have expressed interest in demand management approaches.
- Efficient use of existing stormwater infrastructure.
- Combined approach that results in a single facility requiring operation/maintenance effort.
- Low cost compared to other South Magnolia CSO control alternatives.
- Low risk of cost estimate changing dramatically compared to other South Magnolia CSO control alternatives.
- The King County CSO Program is interested in roof drain disconnects as a way to control CSOs. Other agencies have had success with roof drain disconnects. The City of Seattle has a good roof drain disconnect program and they have offered to partner and cost-share with King County to encourage people to redirect their roof drains to the stormwater system in partially separated basins.

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- Department of Ecology and EPA have indicated interest in “source control” as a way to control CSOs.
- While it may take some time to achieve peak flow reduction, the disconnect efforts can begin as soon as the Facility Plan is complete.

Challenges

- May be challenging to identify sufficient stormwater sources that can be disconnected from the system to reliably reduce the storage volume to meet CSO control requirements.
- Project schedule could be significantly delayed because of need to coordinate with City of Seattle and work required on hundreds of private properties.

Other Considerations

- Some community members are concerned that demand management approaches could exacerbate problems with unstable slopes.
- The capacity of the City of Seattle municipal storm sewer system is unknown.
- Maintenance access to the storage facility is an issue. Access would be restricted if entry were within the paved road or special provisions would be required so the structures could be accessed from the side of the road a safe distance from the paved area.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports may revise expectations for permitting.

MAGNOLIA BASIN ALTERNATIVES
 PRELIMINARY DRAFT

ATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR STORAGE, BOTTOM OF BASIN		ALTERNATIVE 1F1: OUT OF BASIN RECTANGULAR STORAGE - Gravity Sewer		ALTERNATIVE 2A: IN-LINE STORAGE	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
LAND USE AND PERMITTING						
1. City of Seattle Comprehensive Plan	2	Section 6.5 of the Seattle Comprehensive Plan (Utilities Element of the Planning Policies, U16) states that the City should work cooperatively with King County to identify and expeditiously address combined sewer overflows. <Location of utilities within Seattle Parks are strongly discouraged>. [See Murray Alt. 1A] Affected park property is currently undeveloped, natural area.	3	Section 6.5 of the Seattle Comprehensive Plan (Utilities Element of the Planning Policies, U16) states that the City should work cooperatively with King County to identify and expeditiously address combined sewer overflows. Elsewhere in the Comp Plan (Land Use Element, Section 2.1, LU 61 & 62), uses in Single Family Residential neighborhoods should affirm and encourage residential use by one household as the principal use or should only encourage uses that are permitted outright. Location will require review for consistency with City parks policies.	3	Section 6.5 of the Seattle Comprehensive Plan (Utilities Element of the Planning Policies, U16) states that the City should work cooperatively with King County to identify and expeditiously address combined sewer overflows. Elsewhere in the Comp Plan (Land Use Element, Section 2.1, LU 61 & 62), uses in Single Family Residential neighborhoods should affirm and encourage residential use by one household as the principal use or should only encourage uses that are permitted outright. Location will require review for consistency with City parks policies.
2. Seattle Municipal Code (SMC/Zoning Code)	2	Zoning is Single Family Residential. Locations will require review for consistency with Parks policies. Utility service use may require conditional use permit. (5/19/10)SMC 23.51A.002(B): Public Facilities in SF zones will likely require a CCU. Locations will require review for consistency with Parks policies.	2	Zoning is Single Family Residential for the diversion structure, and Industrial General for the storage tank site. (5/19/10) Entry/exit HDD pit may require CCU.	2	(5/19/10) This alternative has same issues as 1F1 for SMC. N/A: Portions of the pipeline alignment are within the Shoreline District, but in developed road rights of way. Zoning for the east half of the alternative site is Industrial General.
3. Shoreline Master Program Compatibility	3	Location is not in Shoreline Zone.	2	Storage tank is most likely considered a "Utility Service Use". A Utility Service Use is allowed outright within the Shoreline District only if it can be demonstrated that it requires a shoreline location, although water-related uses (CSO tank will likely be considered a water-related use) are preferred next in line to water-dependent uses within the Shoreline District. May require Council Conditional Use Permit. (THIS SITE IN THE SHORELINE DISTRICT)	3	Consistent with Shoreline Districts Urban Industrial designation.
4. Permitting Complexity	1	Potential 10-20-ft high retaining wall in steep slope area will require special conditions for steep slopes and work in landslide areas. Street Use permit will affect nearby residences. Stormwater control will be complex due to likelihood of groundwater from steep slopes. Traffic volumes in residential areas with single access to residences will require careful traffic planning to maintain access to residential land uses. Only local permits required (no federal or state permits required). Traffic impacts for local residents. Provisions for temporary and emergency access required. Conditional use permit required. Will likely require City of Seattle reviews from DPD, SDOT, and Parks. Above ground OCU and electrical would be less than 15-foot high and will meet height requirements and view requirements. (5/19/10)Construction would require a significant number of trees to be removed - some may be considered "exceptional" trees. Although trees are not considered as an ECA, a separate section of the code only allows removal under limited circumstances.	2	(5/19/10)Shoreline zoning is Urban Industrial. Public facilities may be allowed outright within Shoreline District if water-dependent or water-related (SMC 23.60.840). Language vague in other areas of code. Small diversion structure in 32nd Ave W should not be difficult to permit. The large size of the storage tank at the 23rd Ave site, within a City of Seattle park may be difficult to get permitted if Parks does not consider the use consistent with their policy. Shorelines permit required. Will likely require City of Seattle reviews from DPD, SDOT, and Parks. Above ground OCU and electrical would be less than 15-foot high and will meet height requirements and view requirements. Marine access not anticipated to be required.	3	Potential 50-ft high retaining wall in steep slope area near pump station will require special conditions for steep slopes and work in landslide areas. Street Use permit will affect nearby residences. Stormwater control will be complex due to likelihood of groundwater from steep slopes. Low traffic volumes in residential areas with single access to residences (32nd) will require careful traffic planning to maintain access to residential land uses. Provisions for temporary and emergency access required. Only local permits required (no federal or state permits required). Approximately 1,200 linear feet of force main and sewer is proposed, located within the public ROW of Galer St. SDOT street use fee could be high. High traffic volumes on Galer St north of the Magnolia Bridge will require traffic planning and control during construction of a force main along the street. Stormwater control will be complex due to likelihood of groundwater from steep slopes. Possible special conditions for steep slopes and work in landslide areas. Low traffic volumes in commercial area of park and marina may require traffic planning to reduce conflicts with construction traffic. Will likely require City of Seattle reviews from DPD, SDOT, and Parks. Above ground OCU and electrical would be less than 15-foot high and will meet height requirements and view requirements. Marine access not anticipated to be required. Shoreline permit required. Permitting complexity under 2A most likely will be less onerous than 1F1 because this alternative does not have a large storage tank within the Shoreline District.
5. Property Acquisition Complexity	1	Purchase from City of Seattle Parks Dept. may be difficult. Location of storage may be located in under-utilized (open space) portion of the park. <May impact future park uses>. <The tank will be located partially within the right-of-way.>	2 <Changed from 1 to 2>	Purchase from City of Seattle Parks Dept. may be difficult. If storage located on Port of Seattle property, rating would change from 1 to 2. Purchase from Port of Seattle in Urban Industrial zone. <Easements may need to be acquired from Seattle Parks Dept. and Dept. of Defense.>	2	Purchase from City of Seattle Parks Dept. may be difficult. Location of pump station may be in under-utilized (open space) portion of the park. <Purchase from Port of Seattle <approx. 5,000 sft. For odor control and electrical. 30 foot wide permanent easement for storage pipe across Parks and Port Property.>

MAGNOLIA BASIN ALTERNATIVES
PRELIMINARY DRAFT

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR STORAGE, BOTTOM OF BASIN		ALTERNATIVE 1F1: OUT OF BASIN RECTANGULAR STORAGE - Gravity Sewer		ALTERNATIVE 2A: IN-LINE STORAGE	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
ENVIRONMENT						
1. Cultural Resources	3	The project area is located in a historic creek ravine that has been filled and paved. The ravine is identified as an ethnologic site ("Wolf Creek"). Based on site characteristics, this project area has a low probability of containing archaeological resources. No historic resources identified in the project area.	2	32nd Ave. W. Site: This project area is located in a historic creek ravine that has been filled and paved. The ravine is identified as an ethnologic site ("Wolf Creek"). Based on site characteristics, this project area has a low probability of containing archaeological resources. No historic resources identified in this project area. 23rd Ave. W. Site: Based on site characteristics, this project area has a high probability of containing archaeological resources if in native soil at the base of the bluff . No historic resources identified in this project area. Pipeline area: Based on site characteristics, the eastern end of the pipeline area has a high probability of containing archaeological resources (same as 23rd Ave. W. Site). The rest of the pipeline area has a low probability of containing archaeological resources. A historic building is located at 1461 Magnolia Blvd. (the Magnolia Park Comfort Station) but construction is not expected to affect the building .	2	32nd Ave. W. Site: This project area is located in a historic creek ravine that has been filled and paved. The ravine is identified as an ethnologic site ("Wolf Creek"). Based on site characteristics, this project area has a low probability of containing archaeological resources. No historic resources identified in this project area. 23rd Ave. W. Site: Based on site characteristics, this project area has a high probability of containing archaeological resources if in native soil at the base of the bluff . No historic resources identified in this project area. Pipeline area: Based on site characteristics, the eastern end of the pipeline area has a high probability of containing archaeological resources (same as 23rd Ave. W. Site). The rest of the pipeline area has a low probability of containing archaeological resources. A historic building is located at 1461 Magnolia Blvd. (the Magnolia Park Comfort Station) but construction is not expected to affect the building . The pipeline alignment in the Port area is adjacent to an existing pipeline in a previously disturbed industrial area.
2. Fish and Wildlife	2	If marine access is required, construction would likely have adverse effects on fish and wildlife and/or their habitat in Puget Sound. Marine access not required with addition of off site staging and acceptability of large number of haul trips. Construction would require clearing of forested area, which may also affect fish and wildlife. If marine access was not required, rating would change from a 1 to a 2-2 to a 1. Note presence or absence of PHS.	3	32nd Ave. W Site: Construction would not require clearing of forested area. Construction and operation at this site would not affect fish and wildlife, or their habitat. Marine access is not anticipated required. 23rd Ave. W Site: Construction and operation at this site would not affect fish and wildlife, or their habitat. Note presence or absence of PHS. No trees would need to be removed for construction at the base of the bluff.	3	32nd Ave. W Site: If marine access is required, construction would likely have adverse effects on fish and wildlife and/or their habitat in Puget Sound. Marine access is not required. Construction would require limited clearing of forested area, which may also affect fish and wildlife. Construction and operation at this site would not affect fish and wildlife, or their habitat. If marine access was not required, rating would change from a 1 to a 2.
3. Wetlands, Streams, and Shorelines	2	There is no shoreline in the project area. If marine access is required, construction would impact Puget Sound shoreline. Marine access not required with addition of off site staging and acceptability of large number of haul trips. Wolf Creek may be piped through project area. No wetlands in project area are mapped for this area, but field observations indicate possible presence of wetlands. Further study may be needed. If marine access was not required, rating would change from a 4 to a 3-2 to a 1.	2	32nd Ave. W Site: Project site not in shoreline. Wolf Creek may be piped through this project area near diversion structure. No wetlands and no impacts to shoreline area anticipated in this project area. No wetlands in project area are mapped for this area, but field observations indicate possible presence of wetlands. Further study may be needed. 23rd Ave. W. Site: Shorelines around tank site (5/19/10) in the project area. No wetlands or streams and no impacts to shoreline area anticipated in this project area.	2	32nd Ave. W Site: If marine access is required, construction would impact Puget Sound shoreline. Wolf Creek may be piped through this project area. No wetlands in this project area. 23rd Ave. W. site and pipeline alignment: No wetlands or streams, and no impacts to shoreline area anticipated in these project areas. If marine access was not required, rating would change from a 1 to a 3. 32nd Ave. W Site: No shoreline in the project area. Wolf Creek may be piped through this project area. No wetlands are mapped for this area, but field observations indicate possible presence of wetlands. Further study may be needed. Pipeline alignment: no wetlands or streams or impacts to shorelines are anticipated in this area.
4. Soils and Sediments	1	No known contaminated sites in project area. Project area contains steep slopes (>40%) and potential landslide areas. Permanent retaining wall may be required. Project area is not within liquefaction zone.	2	32nd Ave. W Site: No known contaminated sites in this project area. Project area contains steep slopes (>40%) and potential landslide areas. Construction area and location in the right of way avoids steep slopes. Project area is not within liquefaction zone. 23rd Ave. W. site: Leaking underground storage tank in northwest corner of Smith Cove Park. Smith Cove Park is liquefaction zone. There are steep slopes with landslide potential on the west side of Smith Cove Park, but the pipeline alignment is not expected to impact them.	1	32nd Ave. W Site: No known contaminated sites in this project area. Project area contains steep slopes (>40%) and potential landslide areas. Construction area and location in the right of way avoids steep slopes. Project area is not within liquefaction zone. 23rd Ave. W. site: Leaking underground storage tank in northwest corner of Smith Cove Park. Smith Cove Park is liquefaction zone. There are steep slopes with landslide potential on the west side of Smith Cove Park, but the pipeline alignment is not expected to impact them. Pipeline alignment east of 23rd Ave site: Alignment in liquefaction zone. No steep slopes or potential or known landslide areas. Known leaking underground storage tank and suspected contaminated soils at Magnolia Bridge and BNSF railway. Other suspected contamination along the alignment.
5. Water Quality	3	No new untreated discharges to surface waters.	3	No new untreated discharges to surface waters.	3	New new untreated discharges to surface waters.
TECHNICAL						
1. Technical Complexity	3	Single site. Simple approach. Gravity overflow at new control structure to gravity fill tank. Automatic cleaning and emptying after event will require telemetry and local controls. Flows exceeding tank capacity overflow at diversion structure to existing outfall.	3	Simple approach. 32nd Ave. W. Site: Gravity overflow at new control structure to gravity sewer that discharges to a storage tank. Automatic cleaning and emptying of storage tank after event will require telemetry and local controls. Tank empties to existing Magnolia Trunk on 23rd Ave. W.	3	Simple approach. 32nd Ave. W. Site: Gravity overflow at new control structure to pump station that discharges to pressure sewer that terminates at the Elliott Bay Interceptor near the Interbay PS.
2. Compatibility with Existing WW system	3	Stand alone alternative. Diversion structure to tank built in SPU collection system upstream of existing CSO control. Likely to have to comply with SPU standards. Does not affect downstream capacity in county system.	3	Stand alone alternative. Diversion structure to tank built in SPU collection system upstream of existing CSO control. Likely to have to comply with SPU standards. Does not affect downstream capacity in county system.	3	Stand alone alternative. Diversion structure to tank built in SPU collection system upstream of existing CSO control. Likely to have to comply with SPU standards. Does not affect downstream capacity in county system.
3. Flexibility/Adaptive Management	1	Not easily modified for enlargement due to restricted physical space related to steep slopes and slope of ground in direction of flow.	3	Good opportunity for tank expansion on site up to 100%, depending on size of site acquired. No topographical or system limitations.	2	Limited opportunity for pump station and/or sewer pipe storage expansion unless provided during initial construction.
4. Constructability/Implementation Schedule	1	Significant risks associated with shoring and groundwater. Cuts in adjacent hillside of up to 60-ft likely to accommodate dimensions of tank. Very limited staging and access area due to topography and width of adjacent right of way. Alternative can likely meet the construction schedule.	3	Alternative can likely meet the construction schedule. 23rd Ave. W site: shoring and groundwater control required. May Like to require pile supported tank.	2	Some risks Significant risks associated with shoring and groundwater. Cuts in adjacent hillside of up to 25-ft likely to accommodate pump station on 32nd Ave. W. Very limited staging and access area due to topography and width of adjacent right of way. Alternative can likely meet the construction schedule. 23rd Ave. W site: shoring and groundwater control required. May require pile supported tank.

MAGNOLIA BASIN ALTERNATIVES
PRELIMINARY DRAFT

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR STORAGE, BOTTOM OF BASIN		ALTERNATIVE 1F1: OUT OF BASIN RECTANGULAR STORAGE - Gravity Sewer		ALTERNATIVE 2A: IN-LINE STORAGE	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
O&M						
1. Staffing	3	Facility can be automatically started (gravity overflow) and run autonomously under design conditions. Minimal staffing required for operation and shut down. Some staffing/supervision may be needed for cleaning. <At the end of the rain event, telemetry and coordination with downstream facilities required before drainage.>	3	Facility can be automatically started (gravity overflow) and run autonomously under design conditions. Minimal staffing required for operation and shut down. Some staffing/supervision may be needed for cleaning. <At the end of the rain event, telemetry and coordination with downstream facilities required before drainage.>	3	Facility can be automatically started (gravity overflow) and run autonomously under design conditions. Minimal staffing required for operation and shut down. Some staffing/supervision may be needed for cleaning. <At the end of the rain event, telemetry and coordination with downstream facilities required before drainage.>
2. Training	3	Staff familiar with storage facilities and technology such as North Creek. Similar control approaches to other facilities within the system can be specified for consistency.	3	Staff familiar with storage facilities and technology such as North Creek. Similar control approaches to other facilities within the system can be specified for consistency.	3	Staff familiar with storage facilities and technology such as North Creek. Similar control approaches to other facilities within the system can be specified for consistency.
3. Reliability	3	System is not complex. Gravity diversion over a weir. Power is <required to prevent an excursion from design conditions.> Storage is a proven technology for controlling peak flow events.	3	<System is not complex. Gravity diversion over a weir. Power is <required to prevent an excursion from design conditions.> Storage is a proven technology for controlling peak flow events.>	3	<System is not complex. Gravity diversion over a weir. Power is <required to prevent an excursion from design conditions.> Storage is a proven technology for controlling peak flow events.>
4. Maintenance	3	Alternative requires less maintenance than other alternatives. Automatic flushing gates should provide most, if not all, the cleaning needed. Minimal telemetry/controls to maintain (typical level sensing and pump system controls). Assumes no entry.	3	Alternative requires less maintenance than other alternatives. Automatic flushing gates should provide most, if not all, the cleaning needed. Minimal telemetry/controls to maintain (typical level sensing and pump system controls). Assumes no entry.	2	<Specialized cleaning equipment may be needed to clean the storage pipe. The change in direction of the storage pipe renders flushing gates not efficient. Additional ventilation requirements may increase size of ventilatio/odor control structure. Required multiple points of access for maintenance. May require special access considerations because of land use.>
5. Safety	3	No street access required. No traffic control procedures required. No street use/closure permit required.	3	No street access required. No traffic control procedures required. No street use/closure permit required.	2	<Coordination with another agency required for access. Special access considerations may be required (raised hatches, etc.)>
COST EFFECTIVENESS						
1. Relative Project Costs	3	Relative Cost = 1.1	3	Relative Cost = 1.1	3	Relative Cost = 1.0 (Base)
2. Relative Lifecycle Costs	3	Relative Cost = 1.0	3	Relative Cost = 1.0	3	Relative Cost = 1.0 (Base)
3. Relative Variability/Risk	2	Relative Variability = 1.1 Limited availability to increase costs of key construction items within contingency amount	3	Relative Variability = 1.15 Good availability to increase costs of key construction items within contingency amount	2	Relative Variability = 1.0 (Base) Limited availability to increase costs of key construction items within contingency amount
COMMUNITY IMPACT						
1. Location	1	<Large> above ground facilities and vents may cause limited reduction in land use. <Potential for large permanent retaining wall/permanent alteration of the existing slope>. <Design cannot mitigate these permanent changes>. <Several large trees must be removed>.	3	Small, above ground facilities and vents may cause limited reduction in land use. <Potential for restoration benefit. Location is consistent with industrial use>.	3	Aboveground structure for large pump station in parks use on residential street. Design can help facility remain consistent with area. Below grade tank does not impose similar limitations on land use. <Location is consistent with industrial use>.
2. Potential Community Impacts	1	Community has expressed concern about facility changing character and nature of the neighborhood. <Community has expressed concerns about potential impacts to slopes and existing homes>. <Design will have to consider re-vegetation of the slope and lengthy re-establishment period.>	3	Facilities can be design<ed> such that any small aboveground facilities can fit into community vision that is consistent with current surrounding uses. Storage tank and ancillary facilities located near a marina and sports field at base of a bluff. No residential properties immediately adjacent. <Limited O&M activities associated with diversion structure on 32nd Avenue W.>	3	Community has expressed concern about facility changing character and nature of the neighborhood. However, facilities can be design such that any small aboveground facilities can fit into community vision that is consistent with current surrounding uses. Potential impact limited to small pump station on residential street. <Limited O&M activities associated with diversion structure on 32nd Avenue W and on Port Property associated with storage pipeline maintenance.>
3. Construction Impacts	1	Construction will affect traffic and parking for 11 residences. Likely need for offsite temporary parking for residences. <Large number of truck trips through the residential streets and arterials will affect traffic in the local neighborhood and community center. Standard construction practices may not be able to completely mitigate noise effects. Park use will be restricted during construction.>	3	32nd Ave. W. Site: Construction will affect parking for 11 residences. <Athletic Facility: If necessary, potential exists to relocate activities during construction.>	2	32nd Ave. W. Site: Construction will affect parking for 11 residences. <Athletic Facility: If necessary, potential exists to relocate activities during construction.> <Port of Seattle: Pipeline construction will require traffic diversion during construction.

Barton, Murray, Magnolia and North Beach CSO Projects
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Category	Sample Criteria	Scale		
		Low Impact (rating of 3)	Moderate Impact (rating of 2)	High Impact (rating of 1)
LAND USE AND PERMITTING				
[REV 11/23/09]	1. City of Seattle Comprehensive Plan			
	Yes		Partly consistent	Potentially inconsistent with policies
[REV 11/23/09]	2. Seattle Municipal Code			
	Yes		Partly consistent	Inconsistent; requires change to code or major exception to existing regulations
[REV 11/23/09]	3. Shoreline Master Program	Not located in shoreline zone	Located in shoreline zone, generally consistent with SMP	Located in shoreline zone, potentially inconsistent with SMP
	4. Permitting Complexity			
[REV03/08/10]		SEPA and local permits (no conditional use or variances required)	SEPA and local permits (conditional use and/or variance required)	COE Individual Section 10 or 404 permit required with Public Notice or NWP 404 and Section 10 Review required; HPA Permit; Shoreline permit and ECA reviews required
[REV03/08/10]		1 departmental review only	2 departmental reviews required	3 or more departmental reviews required
[REV04/05/10] NEW QUESTION		Yes	Consistent with Conditions (CCU required)	No - prohibited
[REV 11/23/09]		No marine access required. No known fish or wildlife impact likely.	Marine access may be required. Fish and wildlife impacts low to moderate may occur.	Marine access believed required for project. Fish and wildlife impacts higher and more certain.
		Roadways not affected, or affected roadways are low volume and provide access to few residents for a short duration project.	Affected roadways will require careful attention to traffic control and maintaining access to properties during a moderate duration project	Major traffic and access issues raised by the alternative during a long duration project.
[REV 11/16/09]	5. Property Acquisition Complexity			
		King County has ownership, or Existing use of ROW	Voluntary seller has been/will be identified, or Acquisition	Ability to acquire property rights unknown Property ownership requires work with other agencies Acquisition difficulty evaluated case-by-case basis by KC

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		Owner accepts appraised value, or King County offers listed price	Owner requests additional compensation that is supported	Significant costs of acquisition probable
		No conflict w/ current use	Owner(s) /tenant(s) require relocation	Agency, neighbors or other stakeholders may have strong opposition
ENVIRONMENT				
[REV 11/23/09]	1. Cultural Resources			
		The project site area does not contain any known archaeological sites. And, based on site characteristics, there is low potential for archaeological resources to be present in the project site area.	The project site area does not contain any known archaeological sites. However, based on site characteristics, there is potential for archaeological resources to be present in the project site area.	The project site area contains or is adjacent to a known archaeological site(s).
[REV 11/23/09]		Historic properties are located in or near the project site area.	Historic properties are located in or near the project site area, but construction of the alternative is not likely to impact those properties.	Historic properties are located in or near the project site area and construction of the alternative will likely impact those properties.
[REV 11/23/09]	2. Fish and Wildlife			
		Construction and operation of the alternative will not adversely affect, or will beneficially affect, fish and wildlife and/or their habitat.	Construction and/or operation of the alternative may adversely affect fish and wildlife or their habitat. <Including removal of exceptional trees and	Construction and/or operation of the alternative is likely to adversely affect fish and wildlife and/or their habitat.
[REV 11/23/09]	3. Wetlands, Streams, and Shoreline			
[REV 12/3/09]		It is unlikely that the alternative will impact wetlands, streams, their buffers, or shoreline areas.	It is likely that the alternative will directly impact wetland and/or stream buffer, and/or piped streams, but not wetlands, non-pipe streams, or shoreline areas.	It is likely that the alternative will directly impact wetlands, non-piped streams, and/or shoreline areas.
[REV 11/23/09]	4. Soils and Sediments			
[REV 12/3/09]		The project site area is not known to contain contaminated soils. And, based on site characteristics, there is low potential for contaminated soils to be present in the project site area.	The project site area is not known to contain contaminated soils. However, based on site characteristics, there is potential for contaminated soils to be present in the project site area.	The project site area is known to contain contaminated soils. New discharges of untreated stormwater could impact sediment quality.
		It is unlikely that the alternative will disrupt steep slopes or increase the potential for landslides.	It is likely that the alternative will temporarily impact steep slopes and/or temporarily increase the potential for landslides.	It is likely that the alternative will result in long-term disruptions to steep slopes and/or result in long-term increase in the potential for landslides.
[REV 11/23/09]	5. Water Quality			
		Operation of the alternative will not result in the discharge of a new source of untreated stormwater to a surface waterbody.	N/A	Operation of the alternative will result in the discharge of a new source of untreated stormwater to a surface waterbody.

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TECHNICAL				
	1. Technical Complexity			
		Routing of flows is simple, with overflow weirs, automatic gates, or similar controls. Alternative is located adjacent to or part of the infrastructure. Flow measurement is simple and controls require only simple 'on/off' controls.	Implementation requires remote measurement of flows, measurement of flows in downstream infrastructure to coordinate and control routing of flows to the alternative storage or treatment facility. Location of the alternative is remote from the measurement point. Modifications to infrastructure include simple structures and limited pipelines.	There are more than two locations included in flow control. The alternative includes modifications to existing infrastructure and complex controls to route flow including complex measurement of upstream and downstream flows. Pump stations may be required to route flows to the alternative storage or treatment facility. New pipelines of significant length may be needed to implement.
		There is one site included in the alternative. All controls and infrastructure are located within the site or on adjacent existing rights of way or county-owned property.	There are two non adjacent sites included in the alternative. There may be differing construction methodologies, e.g. a pump station combined with a storage tank. Flow routing and diversion structures may be located adjacent to the sites on rights of way or county-owned property.	There are multiple non-adjacent sites included in the alternative. There may be two or more differing construction technologies involved, e.g. pump stations, storage tanks, and pipelines that are not contiguous.
	2. Compatibility with Existing WW system			
[REV 3/01/10]		King county design standards are the only applicable standards. Construction and operation is entirely within county infrastructure.	Structures required for flow routing may be located in City of Seattle right of way, and be subject to City sewer operational standards. No City access permissions are needed for access. (WTD would not accept City operational standards for operations. Some engineering elements for design may need to meet City design standards.)	Major structures may be located within City of Seattle right of way, e.g. pipeline storage adjacent to collector sewers, where City standards control design and operation. Access permissions and coordination are needed for normal O&M activities. (Can't see where any City issues would affect operational designs. Structures would need to meet City design standards.)
[REV 3/01/10]		The alternative is stand alone, and does not affect downstream or upstream county facilities. Peak flows at the WPTP are not affected.	The alternative may require modifications to the county's infrastructure upstream and downstream for implementation, e.g. modification of pump stations, pipelines, or operational methods for existing infrastructure. Peak flows at the WPTP may be affected. (Should delete affecting peak flows at WP as a criteria. This is a no go criteria.)	The alternative requires modification of both City of Seattle and county infrastructure and operational methods for both, e.g. flow patterns may be changed in City sewers, changes in capacity of wet weather treatment plants may occur. (Should delete affecting peak flows at WP as a criteria. This is a no go criteria.)
	3. Flexibility/Adaptive Management			
		Yes, with minimal modification of controls.	Yes, with moderate modification of controls.	Yes, but significant modification of complex controls likely.
[REV 3/01/10]		Infrastructure can readily be modified in the future.	Infrastructure can be modified in the future with significant effort.	Infrastructure can not be modified in the future.

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[REV 3/01/10]	4. Constructability/Implementation Schedule			
		Alternatives are on stable, low-slope sites, with groundwater elevations not affected during construction or operation.	Sites may have low to moderate slopes, require some dewatering, and robust foundations including piles or tiebacks.	Sites have steep slopes with groundwater and soils conditions that increase instability if disturbed. Erosion potential may be high. Special construction and permanent measures are needed to stabilize the site such as caissons, slurry walls, tiebacks, permanent dewatering.
[REV 3/01/10]		Site is not constrained. Adequate area for access and staging and operation of special equipment can be accommodated. There is adequate room on site for contractor staging and operations.	Site may be constrained, but access and staging are not required for adequate construction sequencing. Contractor may have to provide offsite staging and operations.	Site is constrained, requiring careful construction sequencing, with several move-in, move-out stages to accommodate specialty contractors as well as conventional construction. Contractor must provide offsite staging and operations.
O&M	1. Staffing			
[REV 03/01/10]		The facility can be automatically started. The facility can operate autonomously under the design conditions.	The facility can be automatically started. The facility may require operator attention during design conditions (e.g. monitoring, sampling, chemical control, etc.).	The facility will likely require operator attention during startup or operations. The facility will likely require operator attention during design conditions (e.g. monitoring, sampling, chemical control, etc.).
[REV 03/01/10]		The facility can be remotely operated. Peak staff times require no operator be present during operation or startup . The facility can be shut down via automated processes . Cleanup work is automated.	The facility can generally be remotely operated. An operator may need to be present periodically for sampling, chemical make-up, chemical delivery acceptance or other discrete tasks. Peak staff times require 1-2 operators. The facility can be shut down with minimal staff time. Cleanup work is generally just monitored however, 1-2 personnel may very infrequently be required . Some procedures of shutdown may need to be conducted immediately, however, most work can be automated or scheduled to be integrated with other staff duties.	The facility requires operator attention during the event. Peak staff times require 2 or more operators. The facility requires significant effort for shut down (e.g. vac/boom truck, several days for cleanup). Cleanup work is generally manual with 2 or more personnel required for more than one day. Most procedures of shutdown need to be conducted immediately.
[REV 03/01/10]		No impact on downstream secondary processes. No impact on secondary treatment bypass frequency.	Impact on downstream secondary processes minimal but no effect on permit compliance. Increase on secondary treatment bypass frequency but within permit limits.	Impact on downstream secondary processes that may affect permit compliance or require construction of additional facilities. Increase on secondary treatment bypass frequency.
[REV 03/01/10]		The facility by design does not require post event cleanup activities.	the facility by design requires post event cleanup activities. Previous designs of this type have successfully designed automated cleanup systems that reduce staffing requirements to a single individual.	The facility by design will require annual or schedule large effort confined space entries by multiple staff. These type of activities will require large number of mobile resources and require large amounts of area to stage in.

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	2. Training			
[REV 03/01/10]		Minimal routine annual training is required. Staff is familiar with the technology and similar processes are used at other WTD facilities.	Minimal routine annual training is required. Staff does not routinely operate similar processes or the processes are distinctly different than those used at other CSO projects.	Significant routine annual training is required. Staff does not routinely operate similar processes and the processes are distinctly different than those used at other CSO projects.
		Similar control approaches are specified with identical components at each facility. Control procedures are similar to existing West Section facilities. The facilities can be used to simulate an event during testing and training.	Somewhat similar control approaches are specified at each facility, however there may be differences due to different equipment requirements. Control procedures are not similar to existing West Section facilities. The facilities can be used to simulate an event during testing and training.	Differnt control approaches are specified at each facility. Control procedures are not similar to existing West Section facilities. The facilities can not be used to simulate an event during testing and training.
	3. Reliability			
[REV 03/01/10]		<Single storage facility. This alternative relies on passive structures for control (i.e.) weirs, etc. no telemetry or controls required.>	The alternative has several components in that control is not achieved at a single structure with one or two inlet/outlet structures.. Startup procedures are automated locally with redundant control systems and backup power.	The alternative has numerous components (>4 pump stations, storage facilities, treatment processes, etc.). Startup procedures are generally automated locally but may require operator testing/monitoring with redundant control systems and backup power.
		The alternative employs standard processes commonly used in the West Section and within the industry. Control requirements are minimal and routinely used for similar facilities.	The alternative employs standard processes commonly used within the industry. Control requirements may be significant but are routinely used for similar facilities.	The alternative employs processes not commonly used within the industry. Control requirements may be significant and unique.
	4. Maintenance			
[REV 03/01/10]		The facilities only requires annual preventive maintenance. The processes have minimal mechanical/instrumentation components	The facilities require monthly maintenance such as bumping pumps. The processes have an increasing level of mechanical/instrumentation components.	The facilities require monthly maintenance such as bumping pumps. The processes have an increasing level of mechanical/instrumentation components.
[REV 03/01/10]		The facilities are accessible.	The facilities are accessible for routine O&M. Special procedures or traffic control may be required for irregular maintenance.	The facilities have restricted access for routine O&M. Special procedures or traffic control may be required for irregular maintenance.
[REV 03/01/10]		Coordination with other agencies (Seattle Parks, etc.) is not required for operation and maintenance.	Coordination with other agencies (Seattle Parks, etc.) is not required for operation. Coordination is required for routine maintenance.	Coordination with other agencies is required for operation and maintenance. Coordination not required for operations however maintenance coordination is extensive requiring multiple days notice before significant entry.
	5. Safety			
		The facility does not have right of way access requirements or require confined space entry. No traffic control procedures are required during operations and maintenance.	The facility has right of way access requirements or confined space entry during for non-routine operation and/or maintenance procedures. Traffic control procedures are required during non-routine operations and maintenance procedures.	The facility has <roadway> access requirements or confined space entry during for routine operation and/or maintenance procedures. Traffic control procedures are required during routine operations and maintenance procedures.
COST EFFECTIVENESS				
[REV 12/08/09]	1. Relative Project Costs			
		Alternative has the lowest Project Cost, or the Project Cost is tightly grouped near the lowest cost alternative relative to the expected accuracy of the estimate.	Alternative has a Project Cost that is significantly higher than the low cost alternative, and significantly lower than the high cost alternative, relative to the expected accuracy of the estimate.	Alternative has the highest Project Cost and/or is significantly higher than the next lowest cost alternative, relative to the expected accuracy of the estimate.
[REV 12/08/09]	2. Relative Life-Cycle Costs			
		Alternative has the lowest Life-Cycle Cost, or the Life-Cycle Cost is tightly grouped near the lowest cost alternative relative to the expected accuracy of the estimate.	Alternative has a Life-Cycle Cost that is significantly higher than the low cost alternative, and significantly lower than the high cost alternative, relative to the expected accuracy of the estimate.	Alternative has the highest Life-Cycle Cost and/or is significantly higher than the next lowest cost alternative, relative to the expected accuracy of the estimate.

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[REV 12/08/09]	3. Cost Variability/Risk	There is a minimal spread in the Project Cost range (i.e. the difference between the high end and the low end of the Project Cost range is small relative to the expected accuracy of the estimate). There is low risk of the Project Cost growing significantly as the project develops.	There is a minimal spread in the Project Cost range (i.e. the difference between the high end and the low end of the Project Cost range is moderate relative to the expected accuracy of the estimate). There is moderate risk of the Project Cost growing significantly as the project develops.	There is a large spread in the Project Cost range (i.e. the difference between the high end and the low end of the Project Cost range is high relative to the expected accuracy of the estimate). There is a high risk of the Project Cost growing significantly as the project develops.
COMMUNITY IMPACT				
[REV 11/20/09]	1. Location	Facility does not change or impede surrounding land and marine use.	Facility design must be considered to limit changes or impediments to surrounding land and marine use.	Facility changes or impedes surrounding land and marine use, and changes can't be addressed during design.
[REV 11/20/09]	2. Potential Community Impacts			
[REV 11/30/09]		Facility is consistent with or does not affect community's vision of itself.	Facility and grounds can be designed to remain consistent with community's vision of itself.	Facility type/size <and/or grounds> is distinct from character, use, community's vision of area and distinction can't be addressed through design.
		Minimal staff will be present infrequently (intermittent or only during/after storms) and maintenance is carried out within facilities.	Routine maintenance will be needed by staff, and staff may be onsite round the clock to check facilities during large storms. Some special equipment may be necessary to maintain the facility, but noise/light/work hours, and/or traffic disruptions are minor.	Routine maintenance will be needed by staff, and multiple staff will be present around the clock during large storms, for special parking, traffic disruptions and or/access limitations to homes and businesses during maintenance operations.
[REV 11/20/09]	3. Construction Impacts			
		Short term project in residential area, long term project in business/industrial area, or longer term project on alignment.	Project extends over 1 year on a site near residences of any kind, or over two years on an alignment.	Project extends several years, or follows another substantial construction project in one area.
		Project located on site with no public access, or public access can be maintained during construction, and project is short duration or constructed outside main user season.	Project located in public access area; access may be reduced, but some access can be maintained during construction. Duration may be longer.	Project lasts year or more, located in heavy use roadway, park or beach area, with serious and unavoidable area closures, resulting in significant use impact.
		Neighbors and businesses will experience limited impacts from	Construction will be located near residences and businesses, but impacts	Construction will be located adjacent to residences and businesses, and it
		Limited amount of hauling required for materials/equipment; roadways sufficient to support traffic (arterials).	Project requires moderate level of hauling that may occur on residential streets but can be scheduled and routed to avoid conflicts with neighborhood traffic, transportation, and services.	Project requires high volume, long term truck traffic on constricted roadways that cannot be carried out on a restricted schedule or route.
		Construction can be carried out on facility site, with limited offsite area required.	Construction can be carried out on facility site, but additional offsite areas will be required for equipment/materials storage or other activities.	Additional property or extensive easements must be obtained for the alternative to be constructed. Multiple offsite areas will be required for equipment/materials storage with ongoing transport of materials to primary construction site.
		Project located in area with no public access, few neighbors, little commuter traffic.	Project located in public access area; however, area is closed only during winter (note high flow months).	Project located in heavy use roadway, park or beach area, resulting in area closure or significant use impact, with duration an entire dry weather season or longer.
		Construction will be located distant to residences and businesses. Haul routes.	Construction will be located near residences and businesses, but impacts will be minimal, or can be mitigated.	Construction will be located near residences and businesses, and it will be difficult or impossible to mitigate impacts such as noise, after hours work, light, vibration, and access.

Magnolia Basin - CSO Risk Workshop

Alternative 1A

Risk Identification		Risk Type		Risk Qualification			Risk Quantification					Risk Mitigation / Response		
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
	Example Threat with Cost Impacts		T	C	H	L	HL	60%	16	\$ 250,000	16.0	\$ 150,000	\$ -	
	Example Opportunity with Schedule Impacts		O	S	M	H	MH	25%	3	\$ 900,000	0	\$ -	\$ (225,000)	
1.0 Land Use and Permitting														
1.01	Political opposition to above grade facility on 32nd Ave delays permitting through appeal process.		T	B	H	H	HH	100%	16	\$ 800,000	16.0	\$ 800,000	\$ -	Mitigate through public involvement and information
1.02	Mitigation for steep slopes and tree removal is costly and causes permit (review) delays		T	S	H	M	HM	100%	16		16.0			Mitigate: up-front work to know permit requirements and shedule of obtaining permits; allow enough time to obtain in project
1.05	Permit application rejected for 32nd Ave. site		T	S	M	M	MM	50%	24		12.0			Avoid: Project will be revised as necessary for city acceptance
1.06	City Changes zoning rules disallowing utility structures in Industrial General or Urban Residential zone		T	B	L	H	LH	2%	12	\$ 2,000,000	0.2	\$ 40,000	\$ -	Avoid: work with City throughout process
1.07	Permits - potential for unanticipated delays or rejection of contractor procured permits minor schedule impact (spring)	Shoring, erosion control, building - permit issuance delay	T	S	L	L	LL	10%	1		0.1			Transfer to the contractor contractually. Cushion in contract
1.08	Permits - potential for delays or rejection of County procured permits major schedule impact	This is delay beyond the 10 month period.	T	B	M	M	MM	50%	3	\$ 500,000	1.5	\$ 250,000	\$ -	Mitigate with pre-work with City staff and briefing agency staff
1.11	DPD will not allow significant tree removal in Park		T	B	L	H	LH	10%	24	\$ 4,000,000	2.4	\$ 400,000	\$ -	Avoid: Project will be revised as necessary for city acceptance.
1.13	Water access will be required triggering HPA and possibly COE permit		T	B	M	H	MH	50%	15	\$ 6,000,000	7.5	\$ 3,000,000	\$ -	Avoid: up-front work to determine access / haul routes. Include requirements in contract.
1.25	One or more codes change during design or construction.	Building or energy codes	T	B	L	L	LL	5%	2	\$ 100,000	0.1	\$ 5,000	\$ -	Avoid: stay educated for potential code changes
1.26	If launch into design before permit approval, may not get approval. Redesign required due to permit review.		T	B	H	M	HM	75%	4	\$ 500,000	3.0	\$ 375,000	\$ -	Mitigate: schedule it in; pre work with City
1.29	Inability to clear a cloudy title		T	B	M	H	MH	30%	12	\$ 2,000,000	3.6	\$ 600,000	\$ -	Avoid
1.30	Cloudy title can be cleared but only through the courts		O	S	M	M	MM	30%	3		0.0			Avoid
1.31	Disposal Permit for dewatering delayed		T	S	M	M	MM	30%	3		0.9			Mitigate: prepare adequate plans/permits for dewatering with contingency plans
2.0 Environmental														
2.02	Environmental limitation not present during planning/predesign develops during final design; new regulations, etc.	Requires redesign	T	B	L	M	LM	10%	4	\$ 500,000	0.4	\$ 50,000	\$ -	Avoid: Stay educated about environmental regulations and potential changes
2.03	SEPA appeal successful, EIS required		T	B	L	H	LH	10%	16	\$ 2,000,000	1.6	\$ 200,000	\$ -	Accept
2.04	Barging required, triggering ESA review	May also require other marine reviews such as eelgrass.	T	B	M	H	MH	30%	9	\$ 2,000,000	2.7	\$ 600,000	\$ -	Avoid: Make early determination to minimize impacts
2.05	Unidentified special-interest sites discovered - wetlands	Discovery assumed in design phase	T	B	L	M	LM	5%	4	\$ 100,000	0.2	\$ 5,000	\$ -	Mitigate: expand predesign exploration as necessary
2.07	Archaeological resources found during construction		T	B	L	L	LL	5%	2	\$ 500,000	0.1	\$ 25,000	\$ -	Mitigate: Additional review during design
2.08	New species listed under ESA - section 7 consultation must be reinitiated		T	B	L	H	LH	2%	12	\$ 100,000	0.2	\$ 2,000	\$ -	Accept: have plan in place for early/quick action if this occurs
2.09	SEPA appeal unsuccessful, no EIS required		T	B	M	M	MM	20%	4	\$ 500,000	0.8	\$ 100,000	\$ -	Accept
3.0 Technical														
3.02	Unknown utilities discovered during construction	Public utilities assumed	T	B	L	L	LL	5%	2	\$ 500,000	0.1	\$ 25,000	\$ -	Mitigate: sufficient design budget to perform utility exploration / relocation
3.05	Soil stability worse than expected		T	B	L	L	LL	5%	2	\$ 250,000	0.1	\$ 12,500	\$ -	Mitigate: Geotechnical characterization to include exploration of this potential.
3.12	Surveys are late or in error		T	B	L	L	LL	15%	2	\$ 200,000	0.3	\$ 30,000	\$ -	Mitigate with QC plan or transfer survey responsibility to contractor
3.15	Weather event alters terrain in project area during construction	Site not identified on landslide maps	T	B	L	M	LL	1%	6	\$ 1,500,000	0.1	\$ 15,000	\$ -	Accept
3.34	Design errors and omissions	Delay completion	T	B	L	M	LM	10%	3	\$ 1,000,000	0.3	\$ 100,000	\$ -	Mitigate: establish and audit QC plan
3.35	Flawed basis of predesign		T	B	L	M	LM	5%	8	\$ 1,000,000	0.4	\$ 50,000	\$ -	Mitigate: establish checkpoints and criteria for acceptance; KC involved in establishing prelim design criteria
3.36	Private property damage results from construction	Shut down of project	T	B	L	M	LL	2%	4	\$ 100,000	0.1	\$ 2,000	\$ -	Transfer to the contractor contractually
3.38	Dewatering volume greater than anticipated		T	B	M	M	MM	30%	3	\$ 200,000	0.9	\$ 60,000	\$ -	Avoid: Collect adequate site-specific soil and groundwater data as early as possible, have geotech reports prepared by experienced engrs, perform rigorous QA/reviews

Magnolia Basin - CSO Risk Workshop

Alternative 1A

Risk Identification		Risk Type		Risk Qualification			Risk Quantification						Risk Mitigation / Response	
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
3.39	Extending utilities to new facilities is more difficult than expected	Water, power, communications	T	B	M	M	MM	50%	3	\$ 100,000	1.5	\$ 50,000	\$ -	- Accept: Start utility extension designs early; schedule adequate time to begin early coordination with the utilities. Consider constructing utility extensions before the construction contract begins.
3.40	Groundwater volume impacts design of foundations	Tremie seal req'd	T	C	M	L	ML	25%		\$ 50,000		\$ 12,500	\$ -	- Mitigate: Collect adequate site-specific groundwater data as early as possible.
4.0 Operations & Maintenance														
4.01	O&M changes desired standards after 30% design is completed		T	C	L	L	LL	10%		\$ 1,000,000		\$ 100,000	\$ -	- Avoid; up-front work to know potential changes to avoid surprises
4.03	Permit review process does not allow fence to protect facility. No fence leads to frequent graffiti.	\$ Impact is per year	T	C	M	L	ML	50%		\$ 10,000		\$ 5,000	\$ -	- Accept
4.04	Lack of a fence leads to severe injury to a citizen		T	C	L	L	LL	10%		\$ 1,000,000		\$ 100,000	\$ -	- Mitigate: Investigate signing and site monitoring potentials during design.
4.05	Groundwater conditions impact infiltration/leakage of facilities		T	C	L	M	LM	15%		\$ 1,500,000		\$ 225,000	\$ -	- Mitigate: involve construction management staff during design to check that the design can be constructed per design, and discuss construction contingency plans.
5.0 Community Impacts														
5.01	Community expectation for mitigation exceeds reasonable determination		T	B	L	M	LM	10%	3	\$ 100,000	0.3	\$ 10,000	\$ -	- Mitigate: Community involvement with design aesthetics (architecture/ landscaping).
5.03	Community opposes water access required for construction		T	B	H	M	HM	75%	4	\$ 150,000	3.0	\$ 112,500	\$ -	- Mitigate: Early involvement with community leaders with respect to mitigation of community impacts
5.05	Community requests GSI to be included in project		T	C	L	M	LM	5%		\$ 2,000,000		\$ 100,000	\$ -	- Avoid: up-front work to know potential for this requirement and have plan in place for early action, if required
5.06	Community demands same treatment as other basins, resulting in schedule delay		T	S	H	M	HM	60%	6		3.6			- Mitigate: Move project forward to avoid overlapping concerns
5.08	Community contests traffic plan and estimation of traffic/parking impact of 32nd Avenue West construction		T	S	H	M	HM	90%	4		3.6			- Mitigate: Early involvement with community leaders; upfront and open communication; keep involved in process
5.09	Public opposition develops resulting in delay of schedule for design		T	S	H	M	HM	100%	8		8.0			- Mitigate: Early involvement with community leaders; upfront and open communication; keep involved in process
5.12	Contractor means and methods, or change to contract specifications, results in unanticipated community impacts that can't be mitigated by standard practices	Includes unanticipated staging, laydown and parking areas; construction equipment impacts.	T	B	M	L	ML	20%	2	\$ 100,000	0.4	\$ 20,000	\$ -	- Mitigate: Discuss likely means and methods during design, and plan mitigative elements into the project before construction begins. Specify/acquire staging area. Route contractor-requested changes through the CM group; do not allow changes which would cause impacts that cannot be mitigated. Include Community Relations lessons learned from other projects.
5.14	Stakeholders request additional meetings to discuss the project		T	B	M	M	MM	30%	3	\$ 50,000	0.9	\$ 15,000	\$ -	- Accept: have plan in place for early/quick action if this occurs
5.15	Comments from other external stakeholders raise new issues	Interbay, Queen Anne, tribal communities.	T	B	M	L	ML	20%	2	\$ 25,000	0.4	\$ 5,000	\$ -	- Avoid: up-front work to know potential for this requirement and have plan in place for early action, if required
5.16	Community requests a partnership project and/or mitigation project.	Examples: habitat restoration, public art/education, public access features.	T	B	M	M	MM	30%	3	\$ 100,000	0.9	\$ 30,000	\$ -	- Accept: Be aware of the characteristics, needs and goals of the City and the community, and ways that the community or other stakeholders could contribute to the the project goal. Propose project elements and/or partnerships that will meet the goals of both the project and the community to achieve public acceptance
6.0 Experience/Capability of the Team														
7.0 Contractor/Vendor Issues														
7.02	Availability of materials - materials for project are not available		T	B	L	H	LM	10%	12	\$ 1,000,000	1.2	\$ 100,000	\$ -	- Mitigate: Explore availability during design or potential pre-purchase by KC; include long-lead language in specs.
7.05	Language interpretation of SCS requirements changes.		T	B	M	M	LM	30%	6	\$ 100,000	1.8	\$ 30,000	\$ -	- Avoid: up-front work to understand interpretations; work with agencies to be fully involved in loop

Magnolia Basin - CSO Risk Workshop

Alternative 1A

Risk Identification		Risk Type		Risk Qualification			Risk Quantification					Risk Mitigation / Response		
Risk #	Description of Risk Event	Addtl Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
7.06	Bid protest		T	B	M	M	MH	25%	6	\$ 100,000	1.5	\$ 25,000	\$ -	Mitigate: accepting this is a potential, ensure contract schedule is set up to avoid long-term impacts due to delay associated with protest
7.11	Final design consultant team uses different design assumptions, causing a change to the Facility Plan design.		T	B	M	M	MM	25%	3	\$ 100,000	0.8	\$ 25,000	\$ -	Mitigate: Min 6 mo overlap transitional period for Carollo team and new consultant to exchange info; hold project review workshop with the two teams; and have new team bring up differing issues as soon as possible.
9.0 Property Acquisition														
9.01	Parks property could be transferred under a federal covenant	Cannot use park	T	B	L	H	LH	5%	12	\$ 100,000	0.6	\$ 5,000	\$ -	Avoid; cannot mitigate; perform as much up-front work as possible to keep risk from occurring
9.02	Initiative 42 (Park for Park)	Could only use parks for parks use or replace	T	C	L	L	LL	10%		\$ 500,000		\$ 50,000	\$ -	Avoid; cannot mitigate; perform as much up-front work as possible to keep risk from occurring
9.04	City Council involvement in acquisitions due to community activism		T	S	H	H	HH	90%	12		10.8			Mitigation Required
10.0 Project Funding														
10.01	Project funding is cut or reduced		T	B	L	M	LM	2%	6	\$ 100,000	0.1	\$ 2,000	\$ -	Avoid: up-front work to keep this project with adequate funding; there is 6 months float in the schedule.
10.02	Low rate loan funding opportunities become available	Free money	O	C	L	L	LL	10%		\$ 500,000		\$ -	\$ (50,000)	Explore funding options during pre-design phase
10.06	Decision to apply for federal funding that triggers SERP		T	S	L	L	LL	10%	2		0.2			Make a decision about federal funding during pre-design
10.07	Current economic climate has favorable bid environment.		O	C	M	L	LL	20%		\$ 1,000,000		\$ -	\$ (200,000)	Accept: HDD is a construction specialty and it not market sensitive.
10.08	Engineer's estimate is low, resulting in re-bid requirement or funding unavailable		T	B	L	M	LM	10%	3	\$ 200,000	0.3	\$ 20,000	\$ -	Mitigate: perform independent review/confirmation of estimate at 60% phase
11.0 CSO program														
11.06	DOE rejects sizing of project during Facility Plan review.	Could trigger SEPA review. Might need more space.	T	B	M	M	MM	20%	6	\$ 3,000,000	1.2	\$ 600,000	\$ -	Mitigate to know by end of predesign
11.12	Flows from Port site sewer connections increase reducing allowable max flow out of storage		T	C	L	H	LH	10%		\$ 5,000,000		\$ 500,000	\$ -	Accept: Would need to be addressed with a future project for expansion
11.13	Project changes occur due to County organization changes, new direction given by management, and/or new County policy	DOE is the regulatory driver; Leadership change potential	T	S	L	L	LL	5%	1		0.1			Accept
11.14	Regulations changes result in stricter storage and water quality control requirements. Storage tank too small and/or treatment needs to be added.	Assumes this occurs during design phase	T	B	L	L	LL	5%	2	\$ 100,000	0.1	\$ 5,000	\$ -	Mitigate: Upcoming regulation changes are typically known in advance; keep up-to-date on potential
12.0 Interfaces														
13.0 Safety														
13.01	Injury/death to citizen(s)		T	B	L	M	LM	2%	2	\$ 3,000,000	0.0	\$ 60,000	\$ -	Mitigate: Safety fencing; security procedures required in Project Manual
13.02	Health and safety hazards cause lost work days		T	S	L	M	LM	10%	4		0.4			Mitigate: Followup with required QC to ensure address by contractor
13.03	Auto accident in construction zone		T	C	M	L	ML	45%		\$ 50,000		\$ 22,500	\$ -	Transfer: contractually require contractor to be responsible; set safety requirements
13.04	Vandalism or theft at jobsite		T	C	H	L	HL	85%		\$ 250,000		\$ 212,500	\$ -	Transfer: contractually require contractor to be responsible for site security
											113	\$ 9,188,500	\$ (250,000)	

Magnolia Basin - CSO Risk Workshop

Alternative 1F1

Risk Identification		Risk Type		Risk Qualification			Risk Quantification						Risk Mitigation / Response	
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
	Example Threat with Cost Impacts		T	C	H	L	HL	60%		\$ 250,000		\$ 150,000	\$ -	
	Example Opportunity with Schedule Impacts		O	S	M	H	MH	25%	3	\$ 900,000	0	\$ -	\$ (225,000)	
1.0 Land Use and Permitting														
1.01	Political opposition to above grade facility on 32nd Ave delays permitting through appeal process.		T	C	L	L	LL	5%		\$ 100,000		\$ 5,000	\$ -	Mitigate through public involvement and information
1.05	Permit application rejected for 32nd Ave. site		T	S	L	M	LM	3%	2		0.1			Avoid: Project will be revised as necessary for city acceptance
1.06	City Changes zoning rules disallowing utility structures in Industrial General or Urban Residential zone		T	B	L	H	LH	2%	12	\$ 2,000,000	0.2	\$ 40,000	\$ -	Avoid: work with City throughout process
1.07	Permits - potential for unanticipated delays or rejection of contractor procured permits minor schedule impact (spring)	Shoring, erosion control, building - permit issuance delay	T	S	L	L	LL	10%	1		0.1			Transfer to the contractor contractually. Cushion in contract
1.08	Permits - potential for delays or rejection of County procured permits major schedule impact	This is delay beyond the 10 month period.	T	B	M	M	MM	50%	3	\$ 500,000	1.5	\$ 250,000	\$ -	Mitigate with pre-work with City staff and briefing agency staff
1.15	Code revisions due to SMP update will impact proposed uses at the site		T	B	L	M	LM	10%	6	\$ 1,500,000	0.6	\$ 150,000	\$ -	Avoid: know by end of 2010 proposed changes; incorporate into project.
1.19	Parks will not approve permanent subterranean easement		T	S	L	M	LM	5%	8		0.4			Avoid: upfront work to know what additional easements would be required.
1.25	One or more codes change during design or construction.	Building or energy codes	T	B	L	L	LL	5%	2	\$ 100,000	0.1	\$ 5,000	\$ -	Avoid: stay educated for potential code changes
1.26	If launch into design before permit approval, may not get approval. Redesign required due to permit review.		T	B	H	M	HM	75%	4	\$ 500,000	3.0	\$ 375,000	\$ -	Mitigate: schedule it in; pre work with City
1.29	Inability to clear a cloudy title		T	B	M	H	MH	30%	12	\$ 2,000,000	3.6	\$ 600,000	\$ -	Avoid
1.30	Cloudy title can be cleared but only through the courts		O	S	M	M	MM	30%	3		0.0			Avoid
1.31	Disposal Permit for dewatering delayed		T	S	M	M	MM	30%	3		0.9			Mitigate: prepare adequate plans/permits for dewatering with contingency plans
1.32	Shoreline permit appealed		T	S	L	M	LM	10%	6		0.6			Avoid: up-front work to avoid potential appeal; include buffer in contract schedule to allow time to deal with event
1.33	Parks/DPD/SDOT will deny easements to allow temporary disturbance within Smith Cove Park	Will also require a subterranean easement from Parks	T	S	L	L	LL	10%	2		0.2			Mitigate: work with agencies during design to ensure easements will be obtained
2.0 Environmental														
2.01	Extent of contaminated soils/groundwater encountered greater than anticipated during construction	Assumed 25% on 1F1 and 50% on 2A of contaminated soils. Stockpiling/testing assumed.	T	B	H	M	HM	75%	4	\$ 4,000,000	3.0	\$ 3,000,000	\$ -	Mitigate by add'l testing during design. Also research/test for rock, abandoned wood pilings and other debris. Special provisions to have stockpiling locations identified.
2.02	Environmental limitation not present during planning/predesign develops during final design; new regulations, etc.	Requires redesign	T	B	L	M	LM	10%	4	\$ 500,000	0.4	\$ 50,000	\$ -	Avoid: Stay educated about environmental regulations and potential changes
2.03	SEPA appeal successful, EIS required		T	B	L	H	LH	2%	16	\$ 2,000,000	0.3	\$ 40,000	\$ -	Accept
2.04	Barging required, triggering ESA review	May also require other marine reviews such as eelgrass.	T	B	M	H	MH	30%	9	\$ 2,000,000	2.7	\$ 600,000	\$ -	Avoid: Make early determination to minimize impacts
2.05	Unidentified special-interest sites discovered - wetlands	Discovery assumed in design phase	T	B	L	M	LM	5%	4	\$ 100,000	0.2	\$ 5,000	\$ -	Mitigate: expand predesign exploration as necessary
2.07	Archaeological resources found during construction		T	B	M	M	MM	20%	4	\$ 1,000,000	0.8	\$ 200,000	\$ -	Mitigate: Additional review during design
2.08	New species listed under ESA - section 7 consultation must be reinitiated		T	B	L	H	LH	2%	12	\$ 100,000	0.2	\$ 2,000	\$ -	Accept: have plan in place for early/quick action if this occurs
2.09	SEPA appeal unsuccessful, no EIS required		T	B	L	M	LM	3%	4	\$ 500,000	0.1	\$ 15,000	\$ -	Accept
3.0 Technical														
3.02	Unknown utilities discovered during construction	Public utilities assumed	T	B	L	L	LL	10%	2	\$ 500,000	0.2	\$ 50,000	\$ -	Mitigate: sufficient design budget to perform utility exploration / relocation
3.03	Sink hole appears during construction	Assume near entry or exit point	T	C	M	L	ML	25%		\$ 100,000		\$ 25,000	\$ -	Mitigate: geotechnical characterization to include exploration of this potential.
3.04	Soils prove more difficult to drill through than planned	HDD	T	B	L	L	LL	5%	1	\$ 100,000	0.1	\$ 5,000	\$ -	Mitigate: soil characterization included in contract; geotechnical exploration sufficient to reduce risk
	Difficult soil stops project	HDD is stopped.	T	B	L	H	LH	5%	9	\$ 3,000,000	0.5	\$ 150,000	\$ -	Mitigate: Sufficient explorations during design phase.
3.05	Soil stability worse than expected		T	B	L	L	LL	10%	2	\$ 250,000	0.2	\$ 25,000	\$ -	Mitigate: Geotechnical characterization to include exploration of this potential.

Magnolia Basin - CSO Risk Workshop

Alternative 1F1

Risk Identification		Risk Type		Risk Qualification			Risk Quantification						Risk Mitigation / Response	
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
3.12	Surveys are late or in error		T	B	L	L	LL	15%	2	\$ 200,000	0.3	\$ 30,000	\$ -	Mitigate with QC plan or transfer survey responsibility to contractor
3.15	Weather event alters terrain in project area during construction	Site not identified on landslide maps	T	B	L	L	LL	1%	1	\$ 250,000	0.0	\$ 2,500	\$ -	Accept
3.22	Geotech exploraton indictes piles needed for pipe storage support.	Unknown soil condition in Port and Smith Cove Park properties.	T	C	M			30%	1	\$ 100,000	0.3	\$ 30,000	\$ -	Mitigate: determine need during predesign to limit impact to project.
3.23	HDD must be done from 32nd Avenue	Add'l permits needed.	T	C	L	M	LM	5%		\$ 2,000,000		\$ 100,000	\$ -	Mitigate: early determination required.
3.34	Design errors and omissions	Delay completion	T	B	L	M	LM	10%	3	\$ 1,000,000	0.3	\$ 100,000	\$ -	Mitigate: establish and audit QC plan
3.35	Flawed basis of predesign		T	B	L	M	LM	5%	8	\$ 1,000,000	0.4	\$ 50,000	\$ -	Mitigate: establish checkpoints and criteria for acceptance; KC involved in establishing prelim design criteria
3.36	Private property damage results from construction	Shut down of project	T	B	L	M	LL	2%	4	\$ 100,000	0.1	\$ 2,000	\$ -	Transfer to the contractor contractually
3.38	Dewatering volume greater than anticipated		T	B	M	M	MM	30%	3	\$ 200,000	0.9	\$ 60,000	\$ -	Avoid: Collect adequate site-specific soil and groundwater data as early as possible, have geotech reports prepared by experienced engrs, perform rigorous QA/reviews
3.39	Extending utilities to new facilities is more difficult than expected	Water, power, communications	T	B	M	M	MM	50%	3	\$ 100,000	1.5	\$ 50,000	\$ -	Accept: Start utility extension designs early; schedule adequate time to begin early coordination with the utilities. Consider constructing utility extensions before the construction contract begins.
3.40	Groundwater volume impacts design of foundations	tie-downs req'd	T	C	M	L	ML	25%		\$ 20,000		\$ 5,000	\$ -	Mitigate: Collect adequate site-specific groundwater data as early as possible.
4.0 Operations & Maintenance														
4.01	O&M changes desired standards after 30% design is completed		T	C	L	L	LL	10%		\$ 1,000,000		\$ 100,000	\$ -	Avoid; up-front work to know potential changes to avoid surprises
4.02	HDD sewer becomes clogged during operation resulting in inability to use line		T	B	L	L	LL	2%	0.25	\$ 100,000	0.0	\$ 2,000	\$ -	Mitigate: O&M involvement in sizing of facility during predesign.
4.05	Groundwater conditions impact infiltration/leakage of facilities		T	C	L	M	LM	15%		\$ 1,500,000		\$ 225,000	\$ -	Mitigate: involve construction management staff during design to check that the design can be constructed per design, and discuss construction contingency plans.
5.0 Community Impacts														
5.01	Community expectation for mitigation exceeds reasonable determination		T	B	H	L	HL	60%	2	\$ 50,000	1.2	\$ 30,000	\$ -	Mitigate: Community involment with design aesthetics (architecture/ landscaping).
5.05	Community requests GSI to be included in project		T	C	L	M	LM	5%		\$ 2,000,000		\$ 100,000	\$ -	Avoid: up-front work to know potential for this requirement and have plan in place for early action, if required
5.06	Community demands same treatment as other basins, resulting in schedule delay		T	S	L	L	LL	5%	2		0.1			Mitigate: Move project forward to avoid overlapping concerns
5.08	Community contests traffic plan and estimation of traffic/parking impact of 32nd Avenue West construction		T	S	L	L	LL	10%	2		0.2			Mitigate: Early involvement with community leaders; upfront and open communication; keep involved in process
5.09	Public opposition develops resulting in delay of schedule for design		T	S	M	M	MM	20%	4		0.8			Mitigate: Early involvement with community leaders; upfront and open communication; keep involved in process
5.12	Contractor means and methods, or change to contract specifications, results in unanticipated community impacts that can't be mitigated by standard practices	Includes unanticipated staging, laydown and parking areas; construction equipment impacts.	T	C	L	L	LL	10%		\$ 50,000		\$ 5,000	\$ -	Mitigate: Discuss likely means and methods during design, and plan mitigative elements into the project before construction begins. Specify/acquire staging area. Route contractor-requested changes through the CM group; do not allow changes which would cause impacts that cannot be mitigated. Include Community Relations lessons learned from other projects.
5.14	Stakeholders request additional meetings to discuss the project		T	B	M	M	MM	30%	3	\$ 50,000	0.9	\$ 15,000	\$ -	Accept: have plan in place for early/quick action if this occurs
5.15	Comments from other external stakeholders raise new issues	Interbay, Queen Anne, tribal communities.	T	B	M	L	ML	20%	2	\$ 25,000	0.4	\$ 5,000	\$ -	Avoid: up-front work to know potential for this requirement and have plan in place for early action, if required

Magnolia Basin - CSO Risk Workshop

Alternative 1F1

Risk Identification		Risk Type		Risk Qualification			Risk Quantification						Risk Mitigation / Response	
Risk #	Description of Risk Event	Addtl Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
5.16	Community requests a partnership project and/or mitigation project.	Examples: habitat restoration, public art/education, public access features.	T	B	M	M	MM	30%	3	\$ 100,000	0.9	\$ 30,000	\$ -	- Accept: Be aware of the characteristics, needs and goals of the City and the community, and ways that the community or other stakeholders could contribute to the the project goal. Propose project elements and/or partnerships that will meet the goals of both the project and the community to achieve public acceptance
6.0 Experience/Capability of the Team														
7.0 Contractor/Vendor Issues														
7.02	Availability of materials - materials for project are not available		T	B	L	H	LM	10%	12	\$ 1,000,000	1.2	\$ 100,000	\$ -	- Mitigate: Explore availability during design or potential pre-purchase by KC; include long-lead language in specs.
7.05	Language interpretation of SCS requirements changes.		T	B	M	M	LM	30%	6	\$ 100,000	1.8	\$ 30,000	\$ -	- Avoid: up-front work to understand interpretations; work with agencies to be fully involved in loop
7.06	Bid protest		T	B	M	M	MH	25%	6	\$ 100,000	1.5	\$ 25,000	\$ -	- Mitigate: accepting this is a potential, ensure contract schedule is set up to avoid long-term impacts due to delay associated with protest
7.09	Specialty contractors required due to HDD drive in project schedule timeline.		T	C	H	M	HH	95%		\$ 2,500,000		\$ 2,375,000	\$ -	- Accept: build into the project cost.
7.11	Final design consultant team uses different design assumptions, causing a change to the Facility Plan design.		T	B	M	M	MM	25%	3	\$ 100,000	0.8	\$ 25,000	\$ -	- Mitigate: Min 6 mo overlap transitional period for Carollo team and new consultant to exchange info; hold project review workshop with the two teams; and have new team bring up differing issues as soon as possible.
9.0 Property Acquisition														
9.01	Parks property could be transferred under a federal covenant	Cannot use park	T	B	L	H	LH	5%	12	\$ 100,000	0.6	\$ 5,000	\$ -	- Avoid; cannot mitigate; perform as much up-front work as possible to keep risk from occurring
9.02	Initiative 42 (Park for Park)	Could only use parks for parks use or replace	T	C	L	L	LL	10%		\$ 500,000		\$ 50,000	\$ -	- Avoid; cannot mitigate; perform as much up-front work as possible to keep risk from occurring
9.04	City Council involvement in acquisitions due to community activism		T	S	L	H	LH	10%	12		1.2			Mitigation required
9.29	Admiral House requires approval from federal gov't & private developer	title report reveals that both signatures are needed	T	S	M	M	MM	50%	6					Avoid: get signatures prior to start of design (if possible).
9.10	Admiral House is owned by federal gov't - require location of portal. Fed gov't denies subterranean easement.		T	B	M	H	MH	50%	12	\$ 400,000	6.0	\$ 200,000	\$ -	- Mitigate: Resolve prior to 60% design.
9.12	Ursula Judkins Viewpoint and Magnolia Park is not highly used	Low resistance to permitting/easements.	O	S	M	M	MM	50%	3		0.0			Capture: Pursue opportunity, if possible. Determination to be made during preliminary design.
9.13	Smith Cove Park is highly used during summer; conflicts with construction activities		T	S	H	M	HM	100%	4		4.0			Mitigate: Evaluate the anticipated need for construction, staging and operation in the park, negotiate a construction and permanent easment with conditions for the anticipated uses, and incorporate into the construction document.
9.15	Seattle Parks easement across sports field requires unanticipated concessions.		T	B	M	M	MM	50%	3	\$ 500,000	1.5	\$ 250,000	\$ -	- Mitigate: Incorporate concessions into project budget as soon as known. Up-front work to identify these concessions.
9.23	Port sells storage site to SDOT first and SDOT requirements increase fees and potential design change.	Magnolia Bridge project	T	B	M	M	MM	50%	6	\$ 1,000,000	3.0	\$ 500,000	\$ -	- Mitigate: Determine prior to final design; negotiate with SDOT first.
9.24	Use of Port property for storage tank not allowed	(moved from Land Use and Permitting)	T	B	L	H	LH	10%	12	\$ 500,000	1.2	\$ 50,000	\$ -	- Avoid: If event occurs, different alternative would be required. Require ink deal before starting final design.
9.26	Stockpiling location unavailable.		T	C	L	L	LL	10%		\$ 1,000,000		\$ 100,000	\$ -	- Mitigate: Identify and/or purchase stockpiling location.
9.28	City accelerates Magnolia Bridge replacement and it takes more of property		T	B	L	L	LL	5%	2	\$ 100,000	0.1	\$ 5,000	\$ -	- Mitigate: close coordination with SDOT during design phases.
10.0 Project Funding														

Magnolia Basin - CSO Risk Workshop

Alternative 1F1

Risk Identification		Risk Type		Risk Qualification			Risk Quantification						Risk Mitigation / Response	
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
10.01	Project funding is cut or reduced		T	B	L	M	LM	2%	6	\$ 100,000	0.1	\$ 2,000	\$ -	Avoid: up-front work to keep this project with adequate funding; there is 6 months float in the schedule.
10.02	Low rate loan funding opportunities become available	Free money	O	C	L	L	LL	10%		\$ 500,000		\$ -	\$ (50,000)	Explore funding options during pre-design phase
10.06	Decision to apply for federal funding that triggers SERP		T	S	L	L	LL	10%	2		0.2			Make a decision about federal funding during pre-design
10.07	Current economic climate has favorable bid environment.		O	C	M	L	LL	20%		\$ 1,000,000		\$ -	\$ (200,000)	Accept: HDD is a construction specialty and it not market sensitive.
10.08	Engineer's estimate is low, resulting in re-bid requirement or funding unavailable		T	B	L	M	LM	10%	3	\$ 200,000	0.3	\$ 20,000	\$ -	Mitigate: perform independent review/confirmation of estimate at 60% phase
11.0 CSO program														
11.06	DOE rejects sizing of project during Facility Plan review.	Could trigger SEPA review. Might need more space.	T	B	M	M	MM	20%	6	\$ 3,000,000	1.2	\$ 600,000	\$ -	Mitigate to know by end of predesign
11.12	Flows from Port site sewer connections increase reducing allowable max flow out of storage		T	C	L	H	LH	10%		\$ 5,000,000		\$ 500,000	\$ -	Accept: Would need to be addressed with a future project for expansion
11.13	Project changes occur due to County organization changes, new direction given by management, and/or new County policy	DOE is the regulatory driver; Leadership change potential	T	S	L	L	LL	5%	1		0.1			Accept
11.14	Regulations changes result in stricter storage and water quality control requirements. Storage tank too small and/or treatment needs to be added.	Assumes this occurs during design phase	T	B	L	M	LM	10%	6	\$ 200,000	1	\$ 20,000	\$ -	Mitigate: Upcoming regulation changes are typically known in advance; keep up-to-date on potential
12.0 Interfaces														
12.01	Magnolia Bridge construction happens at the same time as tank construction causing site access and construction conflicts.		T	S	H	M	HM	60%	4		2			Mitigate: Work with SDOT during design to delineate size and locations of adjacent work zones. Schedule weekly coordination meetings with adjacent contractors to resolve any issues.
12.02	SDOT objects to the project and gets Port to go along with their objections, resulting in Port not selling property or not allowing project.		T	B	M	M	MM	25%	8	\$ 500,000	2	\$ 125,000	\$ -	Avoid: Get binding agreement with Port during pre-design.
12.03	Magnolia Bridge plans/schedule changes and creates conflict with WTD schedule / or plan by taking more land than anticipated.		T	B	M	L	ML	40%	2	\$ 50,000	1	\$ 20,000	\$ -	Mitigate: Assign liaison for both SDOT and KC to be involved in the design reviews for each project; work with SDOT to ensure they are aware of KC project needs during their bridge design.
12.05	Magnolia Bridge project proceeding with coincident tasks eliminating same tasks from CSO project		O	C	L	L	LL	5%		\$ 100,000		\$ -	\$ (5,000)	Mitigate: Assign liaison to work with SDOT to ensure they are aware of KC project needs during their bridge design; look for partnering opportunities
	Development is planned at Elliott Bay Marina, Smith Cove Park, Port or other property which requires coordination		T	C	L	M	LM	10%	3	\$ 50,000	0.3	\$ 5,000	\$ -	Start early and maintain contacts on future development plans nearby to determine whether coordination or interference avoidance is needed.
13.0 Safety														
13.01	Injury/death to citizen(s)		T	B	L	M	LM	2%	2	\$ 3,000,000	0.0	\$ 60,000	\$ -	Mitigate: Safety fencing; security procedures required in Project Manual
13.02	Health and safety hazards cause lost work days		T	S	L	M	LM	10%	4		0.4			Mitigate: Followup with required QC to ensure address by contractor
13.03	Auto accident in construction zone		T	C	M	L	ML	45%		\$ 50,000		\$ 22,500	\$ -	Transfer: contractually require contractor to be responsible; set safety requirements
13.04	Vandalism or theft at jobsite		T	C	H	L	HL	85%		\$ 250,000		\$ 212,500	\$ -	Transfer: contractually require contractor to be responsible for site security
											59.5	\$ 11,835,500	\$ (255,000)	

Magnolia Basin - CSO Risk Workshop

Alternative 2A

Risk Identification		Risk Type		Risk Qualification			Risk Quantification					Risk Mitigation / Response		
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
	Example Threat with Cost Impacts		T	C	H	L	HL	60%		\$ 250,000		\$ 150,000	\$ -	
	Example Opportunity with Schedule Impacts		O	S	M	H	MH	25%	3	\$ 900,000	0	\$ -	\$ (225,000)	
1.0	Land Use and Permitting													
1.01	Political opposition to above grade facility on 32nd Ave delays permitting through appeal process.		T	C	L	L	LL	5%		\$ 100,000		\$ 5,000	\$ -	Mitigate through public involvement and information
1.05	Permit application rejected for 32nd Ave. site		T	S	L	M	LM	3%	2		0.1			Avoid: Project will be revised as necessary for city acceptance
1.06	City Changes zoning rules disallowing utility structures in Industrial General or Urban Residential zone		T	B	L	H	LH	2%	12	\$ 2,000,000	0.2	\$ 40,000	\$ -	Avoid: work with City throughout process
1.07	Permits - potential for unanticipated delays or rejection of contractor procured permits minor schedule impact (spring)	Shoring, erosion control, building - permit issuance delay	T	S	L	L	LL	10%	1		0.1			Transfer to the contractor contractually. Cushion in contract
1.08	Permits - potential for delays or rejection of County procured permits major schedule impact	This is delay beyond the 10 month period.	T	B	M	M	MM	50%	3	\$ 500,000	1.5	\$ 250,000	\$ -	Mitigate with pre-work with City staff and briefing agency staff
1.15	Code revisions due to SMP update will impact proposed uses at the site		T	B	L	M	LM	10%	6	\$ 1,500,000	0.6	\$ 150,000	\$ -	Avoid: know by end of 2010 proposed changes; incorporate into project.
1.19	Parks will not approve permanent subterranean easement		T	S	L	M	LM	5%	8		0.4			Avoid: upfront work to know what additional easements would be required.
1.25	One or more codes change during design or construction.	Building or energy codes	T	B	L	L	LL	5%	2	\$ 100,000	0.1	\$ 5,000	\$ -	Avoid: stay educated for potential code changes
1.26	If launch into design before permit approval, may not get approval. Redesign required due to permit review.		T	B	H	M	HM	75%	4	\$ 500,000	3.0	\$ 375,000	\$ -	Mitigate: schedule it in; pre work with City
1.27	BNSF will not give WTD a crossing permit		T	S	L	M	LM	15%	6		0.9			Avoid: Work with RR early ;decision as to whether this old impact project before final design
1.29	Inability to clear a cloudy title		T	B	M	H	MH	30%	12	\$ 2,000,000	3.6	\$ 600,000	\$ -	Avoid
1.30	Cloudy title can be cleared but only through the courts		O	S	M	M	MM	30%	3		0.0			Avoid
1.31	Disposal Permit for dewatering delayed		T	S	M	M	MM	30%	3		0.9			Mitigate: prepare adequate plans/permits for dewatering with contingency plans
1.32	Shoreline permit appealed		T	S	L	M	LM	10%	6		0.6			Avoid: up-front work to avoid potential appeal; include buffer in contract schedule to allow time to deal with event
2.0	Environmental													
2.01	Extent of contaminated soils/groundwater encountered greater than anticipated during construction	Assumed 25% on 1F1 and 50% on 2A of contaminated soils. Stockpiling/testing assumed.	T	B	H	M	HM	75%	4	\$ 4,000,000	3.0	\$ 3,000,000	\$ -	Mitigate by add'l testing during design. Also research/test for rock, abandoned wood pilings and other debris. Special provisions to have stockpiling locations identified.
2.02	Environmental limitation not present during planning/predesign develops during final design; new regulations, etc.	Requires redesign	T	B	L	M	LM	10%	4	\$ 500,000	0.4	\$ 50,000	\$ -	Avoid: Stay educated about environmental regulations and potential changes
2.03	SEPA appeal successful, EIS required		T	B	L	H	LH	2%	16	\$ 2,000,000	0.3	\$ 40,000	\$ -	Accept
2.05	Unidentified special-interest sites discovered - wetlands	Discovery assumed in design phase	T	B	L	M	LM	5%	4	\$ 100,000	0.2	\$ 5,000	\$ -	Mitigate: expand predesign exploration as necessary
2.07	Archaeological resources found during construction		T	B	L	M	LM	10%	3	\$ 750,000	0.3	\$ 75,000	\$ -	Mitigate: Additional review during design
2.08	New species listed under ESA - section 7 consultation must be reinitiated		T	B	L	H	LH	2%	12	\$ 100,000	0.2	\$ 2,000	\$ -	Accept: have plan in place for early/quick action if this occurs
2.09	SEPA appeal unsuccessful, no EIS required		T	B	L	M	LM	3%	4	\$ 500,000	0.1	\$ 15,000	\$ -	Accept
3.0	Technical													
3.02	Unknown utilities discovered during construction	Public utilities assumed	T	B	M	L	ML	20%	2	\$ 750,000	0.4	\$ 150,000	\$ -	Mitigate: sufficient design budget to perform utility exploration / relocation
3.03	Sink hole appears during construction	Assume near entry or exit point	T	C	M	L	ML	25%		\$ 100,000		\$ 25,000	\$ -	Mitigate: geotechnical characterization to include exploration of this potential.
3.04	Soils prove more difficult to drill through than planned	HDD	T	B	L	L	LL	5%	1	\$ 100,000	0.1	\$ 5,000	\$ -	Mitigate: soil characterization included in contract; geotechnical exploration sufficient to reduce risk
	Difficult soil stops project	HDD is stopped.	T	B	L	H	LH	5%	9	\$ 3,000,000	0.5	\$ 150,000	\$ -	Mitigate: Sufficient explorations during design phase.
3.05	Soil stability worse than expected		T	B	L	L	LL	10%	2	\$ 250,000	0.2	\$ 25,000	\$ -	Mitigate: Geotechnical characterization to include exploration of this potential.
3.12	Surveys are late or in error		T	B	L	L	LL	15%	2	\$ 200,000	0.3	\$ 30,000	\$ -	Mitigate with QC plan or transfer survey responsibility to contractor

Magnolia Basin - CSO Risk Workshop

Alternative 2A

Magnolia Basin - CSO Risk Workshop														
Risk Identification			Risk Type		Risk Qualification			Risk Quantification					Risk Mitigation / Response	
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
3.15	Weather event alters terrain in project area during construction	Site not identified on landslide maps	T	B	L	L	LL	1%	1	\$ 250,000	0.0	\$ 2,500	\$ -	Accept
3.18	Microtunnel crossing of railroad encounters boulders or other changed ground conditions		T	B	M	L	ML	20%	1	\$ 75,000	0.2	\$ 15,000	\$ -	Accept; exploration at RR crossings difficult due to easement issues.
3.22	Geotech exploraton indictes piles needed for pipe storage support.	Will be determined during design.	T	C	M	H	MH	20%		\$ 5,000,000		\$ 1,000,000	\$ -	Mitigate: determine need during predesign to limit impact to project.
3.23	HDD must be done from 32nd Avenue	Add'l permits needed.	T	C	L	M	LM	5%		\$ 2,000,000		\$ 100,000	\$ -	Mitigate: early determination required.
3.34	Design errors and omissions	Delay completion	T	B	L	M	LM	10%	3	\$ 1,000,000	0.3	\$ 100,000	\$ -	Mitigate: establish and audit QC plan
3.35	Flawed basis of predesign		T	B	L	M	LM	5%	8	\$ 1,000,000	0.4	\$ 50,000	\$ -	Mitigate: establish checkpoints and criteria for acceptance; KC involved in establishing prelim design criteria
3.36	Private property damage results from construction	Shut down of project	T	B	L	M	LL	2%	4	\$ 100,000	0.1	\$ 2,000	\$ -	Transfer to the contractor contractually
3.38	Dewatering volume greater than anticipated		T	B	M	M	MM	30%	3	\$ 200,000	0.9	\$ 60,000	\$ -	Avoid: Collect adequate site-specific soil and groundwater data as early as possible, have geotech reports prepared by experienced engrs, perform rigorous QA/reviews
3.39	Extending utilities to new facilities is more difficult than expected	Water, power, communications	T	B	M	M	MM	50%	3	\$ 100,000	1.5	\$ 50,000	\$ -	Accept: Start utility extension designs early; schedule adequate time to begin early coordination with the utilities. Consider constructing utility extensions before the construction contract begins.
3.40	Groundwater volume impacts design of foundations	tie-downs req'd	T	C	M	L	ML	25%		\$ 20,000		\$ 5,000	\$ -	Mitigate: Collect adequate site-specific groundwater data as early as possible.
4.0 Operations & Maintenance														
4.01	O&M changes desired standards after 30% design is completed		T	C	L	L	LL	10%		\$ 1,000,000		\$ 100,000	\$ -	Avoid; up-front work to know potential changes to avoid surprises
4.02	HDD sewer becomes clogged during operation resulting in inability to use line		T	B	L	L	LL	2%	0.25	\$ 100,000	0.0	\$ 2,000	\$ -	Mitigate: O&M involvement in sizing of facility during predesign.
4.05	Groundwater conditions impact infiltration/leakage of facilities		T	C	L	M	LM	15%		\$ 1,500,000		\$ 225,000	\$ -	Mitigate: involve construction management staff during design to check that the design can be constructed per design, and discuss construction contingency plans.
5.0 Community Impacts														
5.01	Community expectation for mitigation exceeds reasonable determination		T	B	H	L	HL	60%	2	\$ 50,000	1.2	\$ 30,000	\$ -	Mitigate: Community involment with design aesthetics (architecture/ landscaping).
5.05	Community requests GSI to be included in project		T	C	L	M	LM	5%		\$ 2,000,000		\$ 100,000	\$ -	Avoid: up-front work to know potential for this requirement and have plan in place for early action, if required
5.06	Community demands same treatment as other basins, resulting in schedule delay		T	S	L	L	LL	5%	2		0.1			Mitigate: Move project forward to avoid overlapping concerns
5.08	Community contests traffic plan and estimation of traffic/parking impact of 32nd Avenue West construction		T	S	L	L	LL	10%	2		0.2			Mitigate: Early involvement with community leaders; upfront and open communication; keep involved in process
5.09	Public opposition develops resulting in delay of schedule for design		T	S	L	L	LL	10%	2		0.2			Mitigate: Early involvement with community leaders; upfront and open communication; keep involved in process
5.12	Contractor means and methods, or change to contract specifications, results in unanticipated community impacts that can't be mitigated by standard practices	Includes unanticipated staging, laydown and parking areas; construction equipment impacts.	T	C	L	L	LL	5%		\$ 20,000		\$ 1,000	\$ -	Mitigate: Discuss likely means and methods during design, and plan mitigative elements into the project before construction begins. Specify/acquire staging area. Route contractor-requested changes through the CM group; do not allow changes which would cause impacts that cannot be mitigated. Include Community Relations lessons learned from other projects.
5.14	Stakeholders request additional meetings to discuss the project		T	B	M	M	MM	30%	3	\$ 50,000	0.9	\$ 15,000	\$ -	Accept: have plan in place for early/quick action if this occurs
5.15	Comments from other external stakeholders raise new issues	Interbay, Queen Anne, tribal communities.	T	B	M	L	ML	20%	2	\$ 25,000	0.4	\$ 5,000	\$ -	Avoid: up-front work to know potential for this requirement and have plan in place for early action, if required
6.0 Experience/Capability of the Team														

Magnolia Basin - CSO Risk Workshop

Alternative 2A

Risk Identification		Risk Type		Risk Qualification			Risk Quantification					Risk Mitigation / Response		
Risk #	Description of Risk Event	Add'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Probability	Impact (schedule)	Impact (dollars)	Risk Time - Threat (mos)	Risk Cost - Threat	Risk Cost - Opportunity	Description (Accept/Avoid/Transfer/Mitigate)
7.0 Contractor/Vendor Issues														
7.02	Availability of materials - materials for project are not available		T	B	L	H	LM	10%	12	\$ 1,000,000	1.2	\$ 100,000	\$ -	Mitigate: Explore availability during design or potential pre-purchase by KC; include long-lead language in specs.
7.05	Language interpretation of SCS requirements changes.		T	B	M	M	LM	30%	6	\$ 100,000	1.8	\$ 30,000	\$ -	Avoid: up-front work to understand interpretations; work with agencies to be fully involved in loop
7.06	Bid protest		T	B	M	M	MH	25%	6	\$ 100,000	1.5	\$ 25,000	\$ -	Mitigate: accepting this is a potential, ensure contract schedule is set up to avoid long-term impacts due to delay associated with protest
7.09	Specialty contractors required due to HDD drive in project schedule timeline.		T	C	H	M	HH	95%		\$ 2,500,000		\$ 2,375,000	\$ -	Accept: build into the project cost.
7.11	Final design consultant team uses different design assumptions, causing a change to the Facility Plan design.		T	B	M	M	MM	25%	3	\$ 100,000	0.8	\$ 25,000	\$ -	Mitigate: Min 6 mo overlap transitional period for Carollo team and new consultant to exchange info; hold project review workshop with the two teams; and have new team bring up differing issues as soon as possible.
9.0 Property Acquisition														
9.01	Parks property could be transferred under a federal covenant	Cannot use park	T	B	L	H	LH	5%	12	\$ 100,000	0.6	\$ 5,000	\$ -	Avoid; cannot mitigate; perform as much up-front work as possible to keep risk from occurring
9.02	Initiative 42 (Park for Park)	Could only use parks for parks use or replace	T	C	L	L	LL	10%		\$ 500,000		\$ 50,000	\$ -	Avoid; cannot mitigate; perform as much up-front work as possible to keep risk from occurring
9.04	City Council involvement in acquisitions due to community activism		T	S	L	H	LH	10%	12		1.2			Mitigation required
9.29	Admiral House requires approval from federal govt & private developer	title report reveals that both signatures are needed	T	S	M	M	MM	50%	6					Avoid: get signatures prior to start of design (if possible).
9.10	Admiral House is owned by federal gov't - require location of portal. Fed gov't denies subterranean easement.		T	B	M	H	MH	50%	12	\$ 400,000	6.0	\$ 200,000	\$ -	Mitigate: Resolve prior to 60% design.
9.12	Ursula Judkins Viewpoint and Magnolia Park is not highly used	Low resistance to permitting/easements.	O	S	M	M	MM	50%	3		0.0			Capture: Pursue opportunity, if possible. Determination to be made during preliminary design.
9.13	Smith Cove Park is highly used during summer; conflicts with construction activities		T	S	H	M	HH	100%	4		4.0			Mitigate: Evaluate the anticipated need for construction, staging and operation in the park, negotiate a construction and permanent easement with conditions for the anticipated uses, and incorporate into the construction document.
9.15	Seattle Parks easement across sports field requires unanticipated concessions.		T	B	M	M	MM	50%	3	\$ 500,000	1.5	\$ 250,000	\$ -	Mitigate: Incorporate concessions into project budget as soon as known. Up-front work to identify these concessions.
9.16	Port does not want pipeline work to be done on Port property		T	B	H	M	HM	100%	6	\$ 500,000	6.0	\$ 500,000	\$ -	Mitigate: Start early - may take longer to negotiate.
9.17	Pipeline work in Port property could impact parking for cruise ship passengers		T	B	H	H	HH	100%	12	\$ 1,000,000	12.0	\$ 1,000,000	\$ -	Mitigate: Work with Port to identify critical areas; incorporate into design and construction work zones.
9.19	BNSF might sell rail property to different owner after we get crossing permit		T	B	L	M	LM	10%	6	\$ 1,000,000	0.6	\$ 100,000	\$ -	Accept.
9.20	Port won't sell easement for storage pipe		T	C	M	L	ML	50%		\$ 500,000		\$ 250,000	\$ -	Avoid: If event occurs, different alternative would be required. Require ink deal before starting final design.
9.21	Easements become a requirement under properties along HDD route		T	C	L	L	LL	5%		\$ 300,000		\$ 15,000	\$ -	Mitigate: Determine temp and permanent easement during pre-design to ensure adequacy. Involve several contractors in early discussions for expertise/input.
9.26	Stockpiling location unavailable.		T	C	L	L	LL	10%		\$ 1,000,000		\$ 100,000	\$ -	Mitigate: Identify and/or purchase stockpiling location.
10.0 Project Funding														
10.01	Project funding is cut or reduced		T	B	L	M	LM	2%	6	\$ 100,000	0.1	\$ 2,000	\$ -	Avoid: up-front work to keep this project with adequate funding; there is 6 months float in the schedule.

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
 CSO BEACHES PROJECT
 ALTERNATIVES COSTS
 MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 1A				
By :	ALS				
Date :	17-May-10				
Rectangular Storage Tank					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 1 - GENERAL REQUIREMENTS					
	Temporary Traffic Control	1	LS	\$253,957	\$253,957
	Temporary Erosion & Sediment Control	1	LS	\$126,979	\$126,979
DIVISION 2 - SITE WORK					
	Equipment Mobilization	1	EA	10000	\$10,000
	ACP Removal				
	Storage Tank	778	SY	\$20	\$15,556
	Odor Control Building	0	SY	\$20	\$0
	Diversion Structure	100	SY	\$20	\$2,000
	Clearing & Grubbing	1	AC	\$25,000	\$28,696
	Excavation				
	Storage Tank	72,942	BCY	\$15	\$1,094,130
	Diversion Structure	405	BCY	\$25	\$10,125
	Haul/Disposal - Tank+Diversion	91,684	LCY	\$11	\$1,008,521
	Shoring				
	Storage Tank	51,819	SF	\$42	\$2,197,126
	Diversion Structure	1,944	SF	\$42	\$82,426
	Dewatering	1	LS	\$1,000,000	\$1,000,000
	Backfill	32,000	BCY	\$15	\$480,000
	Install 24 inch diversion to tank	50	LF	\$750	\$37,500
	Install 10" FM to connection	100	LF	\$200	\$20,000
	Pipe Bedding	67	CY	\$18	\$1,200
	12" Compacted Gravel Fill - Tank	2,122	CY	\$20	\$42,436
	96" MH (14' to 16' deep)	1	EA	\$12,000	\$12,000
	48" MH (14' to 16' deep)	0	EA		\$0
	48" MH (16' to 20' deep)	0	EA		\$0
	Imported Backfill/Compaction	944	CY	\$20	\$18,889
	AC Surface Restoration	1,900	SY	\$45	\$85,500
	Generator fuel tank	1	LS	\$12,000	\$12,000
	Slope restoration	1	LS	\$1,000,000	\$1,000,000

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
 CSO BEACHES PROJECT
 ALTERNATIVES COSTS
 MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 1A				
By :	ALS				
Date :	17-May-10				
<i>Rectangular Storage Tank</i>					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 3 - CONCRETE					
	Diversion Structure				
	Base Slab	8	CY	\$300	\$2,400
	Walls	27	CY	\$500	\$13,500
	Top Slab	8	CY	\$800	\$6,400
	Core Drill - 30" Dia, 2' wall	1	EA	\$2,000	\$2,000
	Storage Tank				
	Base Slab	3,040	CY	\$300	\$912,000
	External Walls	2,423	CY	\$500	\$1,211,500
	Internal Walls	779	CY	\$500	\$389,500
	Top Elevated Slab	1,520	CY	\$800	\$1,216,000
	Miscellaneous fill/appurtenances	20	CY	\$500	\$10,000
	Crane Mobilization	1	EA	\$22,000	\$22,000
	Crane Rental	350	HR	\$1,500	\$525,000
	Crane Crew	350	HR	\$240	\$84,000
	Odor Control and Electrical Bldg				
	Strip Footings	22	CY	\$300	\$6,667
	Foundation Walls	11	CY	\$400	\$4,444
	Slab on Grade	89	CY	\$326	\$28,978
	Retaining Wall, 350x15	894	CY	\$400	\$357,778
DIVISION 4 - MASONRY					
	Odor Control Bldg				
	12" CMU Walls; Full grouted, 12-ft high, slab on grade	2,400	SF	\$38	\$91,200
DIVISION 5 - METALS					
	Odor Control Bldg				
	Metal Decking	2,400	SF	\$6	\$14,400
	Roof Joists, 8-ft OC Fabricated Steel	12,000	LB	\$3	\$32,400
	Miscellaneous Plates/Shapes	11,000	LB	\$3	\$33,000
	Metal Roof	2,400	SF	\$6	\$15,000
	Fencing - Diversion Structure	200	LF	\$8	\$1,600
	Hatches	10	EA	\$10,000	\$100,000
DIVISIONS 7 & 8 - ARCHITECTURAL					
	Roofing, doors, windows, finishes, etc	1	LS	\$6,000	\$6,000

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
 CSO BEACHES PROJECT
 ALTERNATIVES COSTS
 MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 1A				
By :	ALS				
Date :	17-May-10				
Rectangular Storage Tank					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 15 - MECHANICAL					
	Storage Tank				
	Tipping Bucket	4	LS	\$25,000	\$100,000
	Drain Gates	4	LS	\$10,000	\$40,000
	Pumps	3	LS	\$5,000	\$15,000
	Miscellaneous Mechanical	1	LS	\$12,000	\$12,000
	Diversion Structure				
	Slide Gate	1	EA	\$10,000	\$10,000
	Level Sensor	1	EA	\$5,000	\$5,000
	Odor Control/Electrical/Generator Bldg				
	Heating, Ventilating, Plumbing	1	EA	\$65,000	\$65,000
	Odor Control Equipment				
	Scrubber, Fan, Sound Enclosure	1	LS	\$25,000	\$25,000
DIVISION 16 - ELECTRICAL					
	Electrical				
	Electrical	1	LS	\$97,000	\$97,000
	Standby Generator	1	LS	\$60,000	\$60,000
	Telemetry	1	LS	\$25,000	\$25,000
	<i>Subtotal</i>				<i>\$13,078,806</i>
	Escalation to time of construction	14.60%			\$1,909,506
	Total estimated construction cost				\$14,988,312
	Contingency	45%			\$6,744,740
	Engineering Design	15%			\$2,248,247
	Construction Management	15%			\$2,248,247
	Sales Tax	9.5%			\$2,064,640
	Total Estimated Capital Cost				\$28,294,000

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
 CSO BEACHES PROJECT
 ALTERNATIVES COSTS
 MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 1F1				
By :	ALS				
Date :	17-May-10				
<i>Rectangular Storage Tank and Gravity Sewer</i>					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 1 - GENERAL REQUIREMENTS					
	Temporary Traffic Control	1	LS	\$276,993	\$276,993
	Temporary Erosion & Sediment Control	1	LS	\$138,497	\$138,497
DIVISION 2 - SITE WORK					
	Equipment Mobilization	1	EA	10000	\$10,000
	ACP Removal				
	Storage Tank	0	SY	\$20	\$0
	Odor Control Building	0	SY	\$20	\$0
	Diversion Structure	100	SY	\$20	\$2,000
	Clearing & Grubbing	1	AC	12,000	\$15,120
	Excavation				
	Storage Tank	38,000	BCY	\$15	\$570,000
	Diversion Structure	405	BCY	\$25	\$10,125
	Haul/Disposal - Tank	47,500	LCY	\$32	\$1,520,000
	Shoring				
	Storage Tank	36,180	SF	\$42	\$1,534,032
	Diversion Structure	1,944	SF	\$42	\$82,426
	Dewatering	1	LS	\$1,000,000	\$1,000,000
	Carbon Treatment, contaminated water	1	LS	\$250,000	\$250,000
	Backfill	5,037	BCY	\$15	\$75,556
	24" HDD Gravity Sewer	2,700	LF	\$585	\$1,579,500
	24" Fusible PVC	2,700	LF	\$100	\$270,000
	Fusion Machine	1	WK	\$6,000	\$6,000
	Jack and Bore Launch Pit	1	LS	\$100,000	\$100,000
	Jack and Bore Receiving Pit	1	LS	\$75,000	\$75,000
	Boring and Jacking	250	LF	\$500	\$125,000
	Install 10" FM to connection	500	LF	\$200	\$100,000
	Pipe Bedding	67	CY	\$18	\$1,200
	12" Compacted Gravel Fill - Tank	1,972	CY	\$20	\$39,443
	48" MH (14' to 16' deep)	1	EA	\$6,500	\$6,500
	48" MH (14' to 16' deep)	0	EA		\$0
	48" MH (16' to 20' deep)	0	EA		\$0
	Imported Backfill/Compaction	889	CY	\$20	\$17,778
	AC Surface Restoration	2,833	SY	\$45	\$127,500
	Generator fuel tank	1	LS	\$12,000	\$12,000
	Staging Area Restoration, 6" gravel	1,574	CY	\$12	\$18,889

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
CSO BEACHES PROJECT
ALTERNATIVES COSTS
MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 1F1				
By :	ALS				
Date :	17-May-10				
<i>Rectangular Storage Tank and Gravity Sewer</i>					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 3 - CONCRETE					
	Diversion Structure				
	Base Slab	8	CY	\$300	\$2,400
	Walls	27	CY	\$500	\$13,500
	Top Slab	8	CY	\$800	\$6,400
	Core Drill - 30" Dia, 2' wall	1	EA	\$2,000	\$2,000
	Storage Tank				
	Auger Piles - 18" Diameter, 20 ft. long	12,000	LF	\$60	\$720,000
	Base Slab	2,900	CY	\$500	\$1,450,000
	External Walls	2,000	CY	\$500	\$1,000,000
	Internal Walls	850	CY	\$500	\$425,000
	Top Elevated Slab	1,422	CY	\$800	\$1,137,600
	Miscellaneous fill/appurtenances	20	CY	\$500	\$10,000
	Crane Mobilization	1	EA	\$22,000	\$22,000
	Crane Rental	350	HR	\$1,500	\$525,000
	Crane Crew	350	HR	\$240	\$84,000
	Odor Control and Electrical Bldg				
	Strip Footings	22	CY	\$300	\$6,667
	Foundation Walls	11	CY	\$400	\$4,444
	Slab on Grade	89	CY	\$326	\$28,978
DIVISION 4 - MASONRY					
	Odor Control Bldg				
	12" CMU Walls; Full grouted, 12-ft high, slab on grade	2,400	SF	\$38	\$91,200
DIVISION 5 - METALS					
	Odor Control Bldg				
	Metal Decking	2,400	SF	\$6	\$14,400
	Roof Joists, 8-ft OC Fabricated Steel	12,000	LB	\$3	\$32,400
	Miscellaneous Plates/Shapes	11,000	LB	\$3	\$33,000
	Metal Roof	2,400	SF	\$6	\$15,000
	Fencing - Diversion Structure	200	LF	\$8	\$1,600
	Hatches	14	EA	\$10,000	\$140,000
DIVISIONS 7 & 8 - ARCHITECTURAL					
	Roofing, doors, windows, finishes, etc	1	LS	\$12,000	\$12,000

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
 CSO BEACHES PROJECT
 ALTERNATIVES COSTS
 MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 1F1				
By :	ALS				
Date :	17-May-10				
<i>Rectangular Storage Tank and Gravity Sewer</i>					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 15 - MECHANICAL					
	Storage Tank				
	Tipping Bucket	6	LS	\$25,000	\$150,000
	Drain Gates	6	LS	\$10,000	\$60,000
	Pumps	3	LS	\$5,000	\$15,000
	Miscellaneous Mechanical	1	LS	\$12,000	\$12,000
	Diversion Structure				
	Slide Gate	1	EA	\$10,000	\$10,000
	Level Sensor	1	EA	\$5,000	\$5,000
	Odor Control/Electrical/Generator Bldg				
	Heating, Ventilating, Plumbing	1	EA	\$65,000	\$65,000
	Odor Control Equipment				
	Scrubber, Fan, Sound Enclosure	1	LS	\$25,000	\$25,000
DIVISION 16 - ELECTRICAL					
	Electrical				
	Electrical	1	LS	\$97,000	\$97,000
	Standby Generator	1	LS	\$60,000	\$60,000
	Telemetry	1	LS	\$25,000	\$25,000
	<i>Subtotal</i>				<i>\$14,265,146</i>
	Escalation to time of construction	14.60%			\$2,082,711
	Total estimated construction cost				\$16,347,858
	Contingency	45%			\$7,356,536
	Engineering Design	15%			\$2,452,179
	Construction Management	15%			\$2,452,179
	Sales Tax	9.5%			\$2,251,917
	Total Estimated Capital Cost				\$30,861,000

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
CSO BEACHES PROJECT
ALTERNATIVES COSTS
MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 2A				
By :	ALS				
Date :	17-May-10				
<i>12' Inline Storage</i>					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 1 - GENERAL REQUIREMENTS					
	Temporary Traffic Control, detours, Business Access	1	LS	\$466,199	\$466,199
	Temporary Erosion & Sediment Control	1	LS	\$116,550	\$116,550
DIVISION 2 - SITE WORK					
	Equipment Mobilization	1	EA	10000	\$10,000
	ACP Removal				
	Storage Pipe	14,667	SY	\$20	\$293,333
	Odor Control Building	1,111	SY	\$20	\$22,222
	23rd Ave. W and W. Garfield	622	SY	\$20	\$12,444
	Clearing & Grubbing	0.06	AC	\$25,000	\$1,435
	Demolition and relocation of surface improvements	1	LS	\$50,000	\$50,000
	Excavation				
	Diversion Structure	405	BCY	\$25	\$10,125
	Pipe Storage	25,122	BCY	\$25	\$628,056
	Haul/Disposal - Tank+Diversion	31,909	LCY	\$58	\$1,834,769
	Shoring				
	Storage Pipe	5,700	SF	\$42	\$241,680
	Diversion Structure	1,944	SF	\$42	\$82,426
	Dewatering	1	LS	\$760,000	\$760,000
	Carbon Treatment, contaminated water	1	LS	\$375,000	\$375,000
	27" HDD Gravity Sewer	2,700	LF	\$700	\$1,890,000
	27" Fusible PVC HDD	2,700	LF	\$110	\$297,000
	27" PVC Gravity Sewer HDD to Storage	800	LF	\$200	\$160,000
	27" RCP Gravity Sewer Storage to IBPS	500	LF	\$200	\$100,000
	PVC fusion machine	1	WK	\$6,000	\$6,000
	Jacking and Boring Street and RR				
	Jack and Bore Launch Pit	3	LS	\$100,000	\$300,000
	Jack and Bore Receiving Pit	3	LS	\$75,000	\$225,000
	Boring and Jacking	800	LF	\$300	\$240,000
	Install 12 Ft Dia RCP Storage Pipe	2,100	LF	\$1,000	\$2,100,000
	Imported Backfill/Compaction	2,644	CY	\$18	\$47,600
	Pipe bedding and compaction	13,611	CY	\$44	\$598,889
	48" MH (16' to 20' deep)	7	EA	\$7,500	\$52,500
	AC Surface Restoration	16,400	SY	\$45	\$738,000

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
 CSO BEACHES PROJECT
 ALTERNATIVES COSTS
 MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 2A				
By :	ALS				
Date :	17-May-10				
<i>12' Inline Storage</i>					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 3 - CONCRETE					
	Diversion Structure				
	Base Slab	8	CY	\$300	\$2,400
	Walls	27	CY	\$500	\$13,500
	Top Slab	8	CY	\$800	\$6,400
	Core Drill - 30" Dia, 2' wall				
	Odor Control and Electrical Bldg				
	Strip Footings	22	CY	\$300	\$6,667
	Foundation Walls	11	CY	\$400	\$4,444
	Slab on Grade	89	CY	\$326	\$28,978
DIVISION 4 - MASONRY					
	Odor Control Bldg				
	12" CMU Walls; Full grouted, 12-ft high, slab on grade	2,400	SF	\$38	\$91,200
DIVISION 5 - METALS					
	Odor Control Bldg				
	Metal Decking	2,400	SF	\$6	\$14,400
	Roof Joists, 8-ft OC Fabricated Steel	12,000	LB	\$3	\$32,400
	Miscellaneous Plates/Shapes	11,000	LB	\$3	\$33,000
	Metal Roof	2,400	SF	\$6	\$15,000
	Fencing - Diversion Structure	200	LF	\$8	\$1,600
DIVISIONS 7 & 8 - ARCHITECTURAL					
	Roofing, doors, windows, finishes, etc	1	LS	\$12,000	\$12,000

BARTON, MURRAY, MAGNOLIA, AND NORTH BEACH
 CSO BEACHES PROJECT
 ALTERNATIVES COSTS
 MAY 2010

Project:	King County CSO				
Subject:	Magnolia Alternative 2A				
By :	ALS				
Date :	17-May-10				
<i>12' Inline Storage</i>					
Capital Cost Estimate					
Item	Description	Quantity	Unit	Unit cost, \$	Cost, \$
DIVISION 15 - MECHANICAL					
	Drain Gates	1	LS	\$10,000	\$10,000
	Pumps	3	LS	\$5,000	\$15,000
	Miscellaneous Mechanical	1	LS	\$4,500	\$4,500
	Diversion Structure				
	Slide Gate	1	EA	\$10,000	\$10,000
	Level Sensor	1	EA	\$5,000	\$5,000
	Odor Control/Electrical/Generator Bldg				
	Heating, Ventilating, Plumbing	1	EA	\$65,000	\$65,000
	Odor Control Equipment				
	Scrubber, Fan, Sound Enclosure	1	LS	\$25,000	\$25,000
DIVISION 16 - ELECTRICAL					
	Electrical				
	Electrical	1	LS	\$97,000	\$97,000
	Standby Generator	1	LS	\$60,000	\$60,000
	Telemetry	1	LS	\$25,000	\$25,000
	<i>Subtotal</i>				\$12,237,716
	Escalation to time of construction	14.60%			\$1,786,707
	Total estimated construction cost				\$14,024,423
	Contingency	45%			\$6,310,990
	Engineering Design	15%			\$2,103,663
	Construction Management	15%			\$2,103,663
	Sales Tax	9.5%			\$1,931,864
	Total Estimated Capital Cost				\$26,475,000

WTD Business Case Evaluation Results

Magnolia CSO Life Cycle Cost

WTD Borrowing Cost as Discount Rate (1)

Scenario Status Quo	Lifetime	Initial Capital		Total Project		Total Project		Net Project		Average Project		Annual Costs over(under) Status quo
		Outlay	\$0	Life Costs (2)	\$0	Life Benefits	Life Costs	Life Costs	Annual Cost	Annual Cost		
"Status Quo"	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,933,555
Alternatives												
"Alt 1A"	20	\$30,859,000	\$31,060,732	\$0	\$31,060,732	\$0	\$31,060,732	\$1,933,555	\$1,933,555	\$1,933,555	\$1,933,555	\$1,933,555
"Alt 1F.1"	20	\$33,839,000	\$34,354,262	\$0	\$34,354,262	\$0	\$34,354,262	\$2,138,580	\$2,138,580	\$2,138,580	\$2,138,580	\$2,138,580
"Alt 2A"	20	\$29,029,000	\$28,886,717	\$0	\$28,886,717	\$0	\$28,886,717	\$1,798,221	\$1,798,221	\$1,798,221	\$1,798,221	\$1,798,221

Budget Office Discount Rate (3)

Scenario Status Quo	Lifetime	Initial Capital		Total Project		Total Project		Net Project		Average Project		Annual Costs over(under) Status quo
		Outlay	\$0	Life Costs (2)	\$0	Life Benefits	Life Costs	Life Costs	Annual Cost	Annual Cost		
"Status Quo"	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,838,324
Alternatives												
"Alt 1A"	20	\$30,859,000	\$29,530,931	\$0	\$29,530,931	\$0	\$29,530,931	\$1,838,324	\$1,838,324	\$1,838,324	\$1,838,324	\$1,838,324
"Alt 1F.1"	20	\$33,839,000	\$32,599,108	\$0	\$32,599,108	\$0	\$32,599,108	\$2,029,320	\$2,029,320	\$2,029,320	\$2,029,320	\$2,029,320
"Alt 2A"	20	\$29,029,000	\$27,531,223	\$0	\$27,531,223	\$0	\$27,531,223	\$1,713,840	\$1,713,840	\$1,713,840	\$1,713,840	\$1,713,840

First Year of Construction: 2014 Additional inflation rate > 3%: 1.00%

Notes:

- (1) WTD Discount rate based on recent WTD borrowing costs net of 3% annual inflation. 2.18%
- (2) Costs include risk and uncertainty, if estimated. 7.00%
- (3) Discount rate net of inflation, per the King County Budget Office.
The option with the largest net equivalent annualized cost is the financially preferred option.

Describe Alternate 1A:--->	Bottom of Basin Storage Tank											
Brief Title, 20 characters or less:												
"Alt 1A"	" "											
	" "											

Lifetime (in years)--->	20	Please provide											
First year of O&M costs --->	2016	the appropriate											
Electricity Supplier (SCL or PSE) --->	SCL	information in the											
Indicate "Plant" or "Off-Site" --->	Off-site	shaded areas											

All project costs through

Current year (from Results summary sheet)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
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Total Benefits (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Capital and O&M	\$13,110,000	\$11,320,000	\$5,734,858	\$75,607	\$98,363	\$77,127	\$100,340	\$78,677	\$102,357	\$80,258	\$104,414	\$81,871	\$106,513
Debt-related and O&M	\$1,078,308	\$1,747,187	\$2,061,185	\$1,948,733	\$1,971,489	\$1,950,253	\$1,973,466	\$1,951,803	\$1,975,483	\$1,953,385	\$1,977,541	\$1,954,998	\$1,979,639
Risk (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Uncertainty (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Capital outlays	\$13,110,000	\$11,320,000	\$5,660,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Debt issuance	\$262,200	\$226,400	\$113,200	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Debt service	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108
		\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679
			\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339
			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Energy use	\$0	\$0	\$556	\$562	\$568	\$573	\$579	\$585	\$591	\$597	\$603	\$609	\$615
Natural Gas	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
therms	0	0	0	0	0	0	0	0	0	0	0	0	0

Electricity	\$0	\$0	\$556	\$562	\$568	\$573	\$579	\$585	\$591	\$597	\$603	\$609	\$615
Electricity Use kwh	0	0	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0

Chemical spending	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sodium hypochlorite required in gal.	0	0	0	0	0	0	0	0	0	0	0	0	0
Bisulfide required in gal.	0	0	0	0	0	0	0	0	0	0	0	0	0
Other chemical costs - enter \$	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Materials and Supplies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
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Other Costs	\$0	\$0	\$0	\$0	\$22,000	\$0	\$22,442	\$0	\$22,893	\$0	\$23,353	\$0	\$23,823
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Labor	\$0	\$0	\$74,302	\$75,045	\$75,795	\$76,553	\$77,319	\$78,092	\$78,873	\$79,662	\$80,458	\$81,263	\$82,075
Labor Hours	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474

Describe Alternate 1A:--->

Brief Title, 20 characters or less:

"Alt 1A"

Lifetime (in years)--->

First year of O&M costs --->

Electricity Supplier (SCL or PSE) --->

Indicate "Plant" or "Off-Site" --->

Current year (from Results summary sheet)	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Total Benefits (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Capital and O&M	\$83,517	\$108,654	\$85,196	\$110,838	\$86,908	\$113,066	\$88,655	\$115,338	\$90,437	\$117,657	\$92,255	\$120,021	\$94,109
Debt-related and O&M	\$1,956,643	\$1,981,780	\$1,958,322	\$1,983,964	\$1,960,034	\$1,986,192	\$1,961,781	\$1,172,357	\$442,776	\$117,657	\$92,255	\$120,021	\$94,109
Risk (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Uncertainty (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Capital outlays	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Debt issuance	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Debt service	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$816,108	\$0	\$0	\$0	\$0	\$0	\$0
	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$704,679	\$0	\$0	\$0	\$0	\$0
	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$352,339	\$0	\$0	\$0	\$0
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Energy use	\$621	\$627	\$633	\$640	\$646	\$653	\$659	\$666	\$672	\$679	\$686	\$693	\$700
Natural Gas	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
therms	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	\$621	\$627	\$633	\$640	\$646	\$653	\$659	\$666	\$672	\$679	\$686	\$693	\$700
Electricity Use kwh	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical spending	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sodium hypochlorite required in gal.	0	0	0	0	0	0	0	0	0	0	0	0	0
Bisulfide required in gal.	0	0	0	0	0	0	0	0	0	0	0	0	0
Other chemical costs - enter \$	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Materials and Supplies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Other Costs	\$0	\$24,302	\$0	\$24,790	\$0	\$25,288	\$0	\$25,797	\$0	\$26,315	\$0	\$26,844	\$0
Labor	\$82,896	\$83,725	\$84,562	\$85,408	\$86,262	\$87,125	\$87,996	\$88,876	\$89,765	\$90,662	\$91,569	\$92,485	\$93,409
Labor Hours	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474

Describe Alternate 1A:--->

Brief Title, 20 characters or less:

"Alt 1A"

Lifetime (in years)--->

First year of O&M costs --->

Electricity Supplier (SCL or PSE) --->

Indicate "Plant" or "Off-Site" --->

Current year (from Results summary sheet)	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Total Benefits (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Capital and O&M	\$891,434	\$96,001	\$124,895	\$97,930	\$127,405	\$99,899	\$129,966	\$101,907	\$132,578	\$103,955
Debt-related and O&M	\$137,814	\$96,001	\$124,895	\$97,930	\$127,405	\$99,899	\$129,966	\$101,907	\$132,578	\$103,955
Risk (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Uncertainty (from below)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Capital outlays	\$769,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Debt issuance	\$15,380	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Debt service	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Energy use	\$707	\$714	\$721	\$728	\$735	\$743	\$750	\$758	\$765	\$773
Natural Gas	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
therms	0	0	0	0	0	0	0	0	0	0
Electricity	\$707	\$714	\$721	\$728	\$735	\$743	\$750	\$758	\$765	\$773
Electricity Use kwh	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0
Chemical spending	\$0	\$0	\$0							
Sodium hypochlorite required in gal.	0	0	0	0	0	0	0	0	0	0
Bisulfide required in gal.	0	0	0	0	0	0	0	0	0	0
Other chemical costs - enter \$	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Materials and Supplies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Other Costs	\$27,384	\$0	\$27,934	\$0	\$28,496	\$0	\$29,068	\$0	\$29,653	\$0
Labor	\$94,343	\$95,287	\$96,240	\$97,202	\$98,174	\$99,156	\$100,148	\$101,149	\$102,160	\$103,182
Labor Hours	1474	1474	1474	1474	1474	1474	1474	1474	1474	1474

